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Dispersed Renewable Generation Transmission Study Phase II

Volume III

Docket Number E999/DI-08-649

Prepared for:

Minnesota Department of Commerce
Office of the Reliability Administrator

Prepared by:
The Minnesota Transmission Owners

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FCITC MULTIPLE TRANSFER REPORT

PSS(tm)MUST 9.1a -- Managing and Utilizing System Transmission -- SAT, APR 18 2009 20:12 <FCM003>X
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Subsys.File C:\Projects\Xcel-DRG\MUST\MN_allbus_SUMP.sub
Monit.File C:\Projects\Xcel-DRG\MUST\MN.mon
Contin.File C:\Projects\Xcel-DRG\MUST\MN_SUMP.con
Exclud.File C:\Projects\Xcel-DRG\MUST\MN.exc

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61752_I_FALLS7	MISO_SINKS_SUMP	100.0	188.1		-0.1219	-	67540 TRANSCO7 110 67706 WHITESH7 110 1	C: 67538 7SISTER7 110 67707 VIVIAN 7 110 1	10626	-92.7	-115.6	-0.10206	-76.3	-95.5
61792_BOISEC_9	MISO_SINKS_SUMP	100.0	92.7		-1.0000	-	61754 BOISE 7 118 61792 BOISEC 9 13.8 1	C: 61792 BOISEC 9 13.8 61793 PAPMILL9 13.8 1	5181	26.7	-66.0	-1.00000	38.0	-54.7
63053_HUBBARD4	MISO_SINKS_SUMP	100.0	77.8		0.0379	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03785	0.0	2.9
62527_ELMO___7	MISO_SINKS_SUMP	100.0	76.6		0.0385	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03846	0.0	2.9
63219_GRANTCO7	MISO_SINKS_SUMP	100.0	75.9		0.0388	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03882	0.0	2.9
63220_ELBOWLK7	MISO_SINKS_SUMP	100.0	75.7		0.0389	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03890	0.0	2.9
61639_MNP_STP7	MISO_SINKS_SUMP	100.0	75.2		0.0391	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03914	0.0	2.9
61642_VERNDLE7	MISO_SINKS_SUMP	100.0	75.2		0.0392	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03916	0.0	2.9
62752_MLTN_TP7	MISO_SINKS_SUMP	100.0	75.2		0.0392	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03917	0.0	2.9
62893_WINGRIV7	MISO_SINKS_SUMP	100.0	75.2		0.0392	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03917	0.0	2.9
62896_ALDRICH7	MISO_SINKS_SUMP	100.0	75.2		0.0392	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03915	0.0	2.9
63221_BRANDN_7	MISO_SINKS_SUMP	100.0	75.0		0.0393	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03926	0.0	2.9
62751_LK_MINA7	MISO_SINKS_SUMP	100.0	74.7		0.0394	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03943	0.0	2.9
67453_ALEXSWM	MISO_SINKS_SUMP	100.0	74.5		0.0396	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03955	0.0	2.9
67454_ALEXPLDM	MISO_SINKS_SUMP	100.0	74.5		0.0395	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03952	0.0	2.9
67461_ALEXSOUM	MISO_SINKS_SUMP	100.0	74.5		0.0396	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03955	0.0	2.9
67471_ALEXTAP7	MISO_SINKS_SUMP	100.0	74.5		0.0395	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03952	0.0	2.9
67452_ALEXSS	MISO_SINKS_SUMP	100.0	74.4		0.0396	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03955	0.0	2.9
63222_ALEXAND7	MISO_SINKS_SUMP	100.0	74.3		0.0396	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03962	0.0	2.9
61643_EAGLVLY7	MISO_SINKS_SUMP	100.0	73.8		0.0399	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.03989	0.0	2.9
60144_DGLASCO7	MISO_SINKS_SUMP	100.0	73.1		0.0403	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04026	0.0	2.9
62817_LSAUKTP7	MISO_SINKS_SUMP	100.0	72.9		0.0404	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04041	0.0	2.9
62818_LTLSAUK7	MISO_SINKS_SUMP	100.0	72.9		0.0404	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04041	0.0	2.9
61617_MUDLAKE4	MISO_SINKS_SUMP	100.0	72.7		0.0405	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04053	0.0	2.9
61647_LONG_PR7	MISO_SINKS_SUMP	100.0	72.6		0.0405	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04054	0.0	2.9
61753_I_FALLS9	MISO_SINKS_SUMP	100.0	72.6		-1.0000	-	61752 I.FALLS7 118 61753 I.FALLS9 12.5 1	C: 62399 WASCOTT8 69.0 62406 CRYSTLK8 69.0 1	5578	12.6	-60.0	-1.00000	12.6	-60.0
61636_SWANVIL7	MISO_SINKS_SUMP	100.0	71.3		0.0413	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04130	0.0	2.9
61649_BLNCHRD7	MISO_SINKS_SUMP	100.0	70.0		0.0421	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04207	0.0	2.9
61650_LITTLEF7	MISO_SINKS_SUMP	100.0	69.2		0.0426	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04258	0.0	2.9
61754_BOISE__7	MISO_SINKS_SUMP	100.0	67.6		-1.0000	-	61752 I.FALLS7 118 61754 BOISE 7 118 1	C: 61754 BOISE 7 118 61792 BOISEC 9 13.8 1	5162	-12.4	-80.0	-1.00000	25.5	-42.0
60760_PAYNES_8	MISO_SINKS_SUMP	100.0	66.8		0.0441	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04407	0.0	2.9
60756_ALBANY_8	MISO_SINKS_SUMP	100.0	65.6		0.0449	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04487	0.0	2.9
69549_WABACO_5	MISO_SINKS_SUMP	100.0	63.9		0.0461	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04610	0.0	2.9
61850_LITTLEF9	MISO_SINKS_SUMP	100.0	63.7		-1.0000	-	61650 LITTLEF7 115 61850 LITTLEF9 34.5 2	C: 61650 LITTLEF7 115 61850 LITTLEF9 34.5 1	4995	33.7	-30.0	-0.50394	17.0	-15.1
60146_GRANCTY7	MISO_SINKS_SUMP	100.0	63.5		0.0464	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04637	0.0	2.9
60161_STREGIS7	MISO_SINKS_SUMP	100.0	63.5		0.0464	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04637	0.0	2.9
60347_MAYHWLK7	MISO_SINKS_SUMP	100.0	63.5		0.0464	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04637	0.0	2.9
60348_BENCTP7	MISO_SINKS_SUMP	100.0	63.5		0.0464	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.04639	0.0	2.9
60752_BLCKOAK8	MISO_SINKS_SUMP	100.0	58.8		-0.4984	-	60751 SAUKCMU8 69.0 62822 KANDTTP8 69.0 1	C: 60752 BLCKOAK8 69.0 60754 MELRSMU8 69.0 1	4259	-6.7	-36.0	-0.34071	-4.7	-24.8
60749_DGLAS_C8	MISO_SINKS_SUMP	100.0	58.6		0.1529	-	60749 DGLAS C8 69.0 60750 OSAKIS 8 69.0 1	C: 60760 PAYNES 8 69.0 62824 ZION TP8 69.0 1	4272	28.0	37.0	0.19541	15.9	27.4
69547_ROCHSTR5	MISO_SINKS_SUMP	100.0	56.8		0.0518	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05184	0.0	2.9
63445_CHESTER	MISO_SINKS_SUMP	100.0	56.7		0.0519	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05193	0.0	2.9
62831_BRCKWTP8	MISO_SINKS_SUMP	100.0	56.2		-1.0000	-	60758 JOHNS U8 69.0 62831 BRCKWTP8 69.0 1	C: 60757 AVON 8 69.0 62831 BRCKWTP8 69.0 1	4267	8.2	-48.0	-0.52859	21.8	-7.9
63410_WILLOW_C	MISO_SINKS_SUMP	100.0	55.9		0.0527	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05270	0.0	2.9
63425_ZUMBRO_R	MISO_SINKS_SUMP	100.0	55.6		0.0530	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05299	0.0	2.9
60757_AVON___8	MISO_SINKS_SUMP	100.0	55.3		1.0000	-	60757 AVON 8 69.0 62831 BRCKWTP8 69.0 1	C: 60756 ALBANY 8 69.0 60757 AVON 8 69.0 1	4264	-7.3	48.0	0.47330	-13.6	12.6
63415_N_HILLS	MISO_SINKS_SUMP	100.0	55.1		0.0534	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05343	0.0	2.9
61836_SWANVIL9	MISO_SINKS_SUMP	100.0	54.9		-1.0000	-	61636 SWANVIL7 115 61836 SWANVIL9 34.5 1	C: 38881 SWANVLLE 34.5 61836 SWANVIL9 34.5 1	3361	15.7	-39.2	-1.00000	25.7	-29.2
63435_BAMBER_V	MISO_SINKS_SUMP	100.0	54.7		0.0539	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05387	0.0	2.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
69182_CHESTER	MISO_SINKS_SUMP	100.0	54.5		-0.2450	-	69180 T RING 69.0 69182 CHESTER 69.0 1	C:GENOA_869.0-ORONO TP69.0-1+SW175	837	-11.7	-25.0	0.00000	-11.7	-11.7
63420_IBM	MISO_SINKS_SUMP	100.0	53.8		0.0548	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05476	0.0	2.9
63440_SILVER_L	MISO_SINKS_SUMP	100.0	53.4		0.0551	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05514	0.0	2.9
63405_CROSSTWN	MISO_SINKS_SUMP	100.0	53.3		0.0553	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05530	0.0	2.9
63430_CASCADE	MISO_SINKS_SUMP	100.0	52.8		0.0558	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.05577	0.0	2.9
62824_ZION_TP8	MISO_SINKS_SUMP	100.0	50.7		-1.0000	-	60760 PAYNES 8 69.0 62824 ZION TP8 69.0 1	C: 60768 ELRSATP8 69.0 62824 ZION TP8 69.0 1	4282	2.7	-48.0	-0.81696	25.6	-15.8
60751_SAUKCMU8	MISO_SINKS_SUMP	100.0	50.6		1.0000	-	60751 SAUKCMU8 69.0 62822 KANDTTP8 69.0 1	C: 60751 SAUKCMU8 69.0 62820 W UNION8 69.0 1	4256	-14.6	36.0	0.52260	-4.7	21.7
60746_GLENWD_8	MISO_SINKS_SUMP	100.0	49.3		-1.0000	-	60375 LOWRYTP8 69.0 60746 GLENWD 8 69.0 1	C: 60746 GLENWD 8 69.0 62756 LEVEN 8 69.0 1	4249	12.3	-37.0	-0.51362	11.0	-14.3
67455_BRANDN_9	MISO_SINKS_SUMP	100.0	48.6		-1.0000	-	63221 BRANDN 7 115 67455 BRANDN 9 41.6 1	C:BRANDJ41.6-BRANDTP941.6-1+SW211	921	15.0	-33.6	-1.00000	24.8	-23.8
61906_MAPLE_LF	MISO_SINKS_SUMP	100.0	48.5		0.0607	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C: 67569 HENDAY 4 230 68056 LIMEST44 230 4	10677	53.1	56.0	0.06072	0.0	2.9
62848_ZION___8	MISO_SINKS_SUMP	100.0	46.7		-1.0000	-	62824 ZION TP8 69.0 62848 ZION 8 69.0 1	C: 60721 ESSIG 8 69.0 62067 SRL JCT8 69.0 1	4203	1.3	-45.4	-1.00000	1.3	-45.4
38810_WADENA	MISO_SINKS_SUMP	100.0	46.5		-1.0000	-	38809 533-TIE 34.5 38810 WADENA 34.5 1	C: 38810 WADENA 34.5 38811 CMPTN TP 34.5 1	3289	12.5	-34.0	-1.00000	14.5	-32.0
63050_WILLMAR4	MISO_SINKS_SUMP	100.0	46.5		0.0630	-	60156 PYNSVIL7 115 60760 PAYNES 8 69.0 1	C: 60156 PYNSVIL7 115 60760 PAYNES 8 69.0 2	3628	44.1	47.0	0.03892	27.2	29.1
62830_ALBANY_8	MISO_SINKS_SUMP	100.0	46.4		-1.0000	-	60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	C: 60756 ALBANY 8 69.0 62851 ALBNYTP8 69.0 1	4266	9.4	-37.0	-0.24681	-9.2	-20.7
62851_ALBNYTP8	MISO_SINKS_SUMP	100.0	46.4		-1.0000	-	60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	C: 60756 ALBANY 8 69.0 62851 ALBNYTP8 69.0 1	4266	9.4	-37.0	-0.24681	-9.2	-20.7
62756_LEVEN__8	MISO_SINKS_SUMP	100.0	45.6		1.0000	-	60748 WESTPRT8 69.0 60749 DGLAS C8 69.0 1	C: 60746 GLENWD 8 69.0 62756 LEVEN 8 69.0 1	4249	-8.6	37.0	0.54089	-9.9	14.8
62847_GROVE__8	MISO_SINKS_SUMP	100.0	44.5		-1.0000	-	60751 SAUKCMU8 69.0 62822 KANDTTP8 69.0 1	C: 60752 BLCKOAK8 69.0 62847 GROVE 8 69.0 1	4260	8.5	-36.0	-0.34491	-4.7	-20.1
61842_VERNDLE9	MISO_SINKS_SUMP	100.0	43.8		-0.3519	-	61642 VERNDLE7 115 61842 VERNDLE9 34.5 1	C: 38809 533-TIE 34.5 61842 VERNDLE9 34.5 1	3288	3.4	-12.0	-0.35192	8.6	-6.8
60686_E_MELRO8	MISO_SINKS_SUMP	100.0	43.7		1.0000	-	60686 E MELRO8 69.0 60754 MELRSMU8 69.0 1	C: 60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	4164	-6.7	37.0	0.53338	2.5	25.8
60754_MELRSMU8	MISO_SINKS_SUMP	100.0	43.7		-1.0000	-	60686 E MELRO8 69.0 60754 MELRSMU8 69.0 1	C: 60752 BLCKOAK8 69.0 60754 MELRSMU8 69.0 1	4259	6.7	-37.0	-0.41946	2.5	-15.8
60755_FREEPRT8	MISO_SINKS_SUMP	100.0	43.5		-1.0000	-	60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	C: 60755 FREEPRT8 69.0 62851 ALBNYTP8 69.0 1	4263	6.5	-37.0	-0.37530	-9.2	-25.5
60747_VILLARD8	MISO_SINKS_SUMP	100.0	42.9		1.0000	-	60748 WESTPRT8 69.0 60749 DGLAS C8 69.0 1	C: 60747 VILLARD8 69.0 62756 LEVEN 8 69.0 1	4251	-5.9	37.0	0.61061	-9.9	16.3
60768_ELRSATP8	MISO_SINKS_SUMP	100.0	41.6		-0.4637	-	60753 MEIRGRV8 69.0 60768 ELRSATP8 69.0 1	C:775	80	-28.7	-48.0	-0.48436	-19.5	-39.6
62755_OMMEN__8	MISO_SINKS_SUMP	100.0	41.4		1.0000	-	60748 WESTPRT8 69.0 60749 DGLAS C8 69.0 1	C: 60747 VILLARD8 69.0 62755 OMMEN 8 69.0 1	4250	-4.4	37.0	0.68665	-9.9	18.6
62821_KANDOTA8	MISO_SINKS_SUMP	100.0	41.3		-1.0000	-	60751 SAUKCMU8 69.0 62822 KANDTTP8 69.0 1	C: 62822 KANDTTP8 69.0 62847 GROVE 8 69.0 1	5803	5.3	-36.0	-0.46199	-4.7	-23.8
62822_KANDTTP8	MISO_SINKS_SUMP	100.0	41.3		-1.0000	-	60751 SAUKCMU8 69.0 62822 KANDTTP8 69.0 1	C: 62822 KANDTTP8 69.0 62847 GROVE 8 69.0 1	5803	5.3	-36.0	-0.46199	-4.7	-23.8
60750_OSAKIS_8	MISO_SINKS_SUMP	100.0	40.3		-1.0000	-	60749 DGLAS C8 69.0 60750 OSAKIS 8 69.0 1	C: 60750 OSAKIS 8 69.0 62820 W UNION8 69.0 1	4255	3.3	-37.0	-0.78673	15.9	-15.8
62828_MILLWD_8	MISO_SINKS_SUMP	100.0	40.1		-1.0000	-	60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	C: 60755 FREEPRT8 69.0 62829 MILWDTP8 69.0 1	4262	3.1	-37.0	-0.39213	-9.2	-25.0
62829_MILWDTP8	MISO_SINKS_SUMP	100.0	40.1		-1.0000	-	60686 E MELRO8 69.0 62829 MILWDTP8 69.0 1	C: 60755 FREEPRT8 69.0 62829 MILWDTP8 69.0 1	4262	3.1	-37.0	-0.39213	-9.2	-25.0
60758_JOHNS_U8	MISO_SINKS_SUMP	100.0	39.1		0.3056	-	60758 JOHNS U8 69.0 62831 BRCKWTP8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	36.1	48.0	0.45422	21.8	39.5
62773_MILTONA9	MISO_SINKS_SUMP	100.0	38.9		-1.0000	-	62548 PRPPRSW9 41.6 62773 MILTONA9 41.6 1	C:MILTONA7115.-MILTONA941.6-1+SW244	1077	11.5	-27.4	0.00000	-8.6	-8.6
62780_LGRNDTP9	MISO_SINKS_SUMP	100.0	38.9		-1.0000	-	62548 PRPPRSW9 41.6 62773 MILTONA9 41.6 1	C:MILTONA7115.-MILTONA941.6-1+SW244	1077	11.5	-27.4	0.00000	-8.6	-8.6
62782_LEAFVLL9	MISO_SINKS_SUMP	100.0	38.9		-1.0000	-	62548 PRPPRSW9 41.6 62773 MILTONA9 41.6 1	C:MILTONA7115.-MILTONA941.6-1+SW244	1077	11.5	-27.4	0.00000	-8.6	-8.6
62820_W_UNION8	MISO_SINKS_SUMP	100.0	38.7		-1.0000	-	60751 SAUKCMU8 69.0 62820 W UNION8 69.0 1	C: 60750 OSAKIS 8 69.0 62820 W UNION8 69.0 1	4255	2.7	-36.0	-0.33933	-9.9	-23.0
62894_WINGRTR9	MISO_SINKS_SUMP	100.0	37.9		1.0000	-	62894 WINGRTR9 13.8 B$0128 230/115 1.00 1	C: 62404 FOND DU9 46.0 62409 FOND DU8 69.0 1	5580	0.0	37.9	1.00000	0.0	37.9
62899_HEWITT_9	MISO_SINKS_SUMP	100.0	37.8		-1.0000	-	38801 HEWITT 34.5 62899 HEWITT 9 34.5 1	C:Unit: 60040 FEN 83G 13.8 Id:3	7625	3.8	-34.0	-1.00000	3.8	-34.0
60753_MEIRGRV8	MISO_SINKS_SUMP	100.0	37.5		-0.5695	-	60752 BLCKOAK8 69.0 60753 MEIRGRV8 69.0 1	C:775	80	-26.6	-48.0	-0.59280	-17.4	-39.7
60748_WESTPRT8	MISO_SINKS_SUMP	100.0	37.4		1.0000	-	60748 WESTPRT8 69.0 60749 DGLAS C8 69.0 1	C: 60748 WESTPRT8 69.0 62755 OMMEN 8 69.0 1	4253	-0.4	37.0	0.70935	-9.9	16.7
60743_BELGRAD8	MISO_SINKS_SUMP	100.0	37.0		-0.2751	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.19181	-20.1	-27.2
60164_XRDS___7	MISO_SINKS_SUMP	100.0	36.9		0.0463	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	45.0	46.7	0.02363	46.9	47.8
61189_WATAB__8	MISO_SINKS_SUMP	100.0	36.0		-0.2437	-	60758 JOHNS U8 69.0 61189 WATAB 8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	-39.2	-48.0	-0.36197	-24.9	-38.0
62827_CROW_LK8	MISO_SINKS_SUMP	100.0	35.8		-0.2836	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.19787	-20.1	-27.2
62832_BROCKWY8	MISO_SINKS_SUMP	100.0	35.1		-1.0000	-	62831 BRCKWTP8 69.0 62832 BROCKWY8 69.0 1	C: 62832 BROCKWY8 69.0 62833 STSTPHN8 69.0 1	5809	3.5	-31.6	-1.00000	7.9	-27.2
62823_ELROSA_8	MISO_SINKS_SUMP	100.0	34.7		-1.0000	-	60768 ELRSATP8 69.0 62823 ELROSA 8 69.0 1	C: 67717 MR11 T 7 110 67718 RAPDCTY7 110 1	10741	3.1	-31.6	-1.00000	3.1	-31.6
38801_HEWITT	MISO_SINKS_SUMP	100.0	34.6		1.0000	-	38801 HEWITT 34.5 38802 501-533H 34.5 1	C: 38801 HEWITT 34.5 62899 HEWITT 9 34.5 1	3278	-0.6	34.0	1.00000	-4.4	30.2
38809_533_TIE	MISO_SINKS_SUMP	100.0	34.3		1.0000	-	38809 533-TIE 34.5 61842 VERNDLE9 34.5 1	C: 38809 533-TIE 34.5 38810 WADENA 34.5 1	3287	-0.3	34.0	1.00000	-14.8	19.5
38868_529_526T	MISO_SINKS_SUMP	100.0	34.1		1.0000	-	38868 529-526T 34.5 61850 LITTLEF9 34.5 1	C:529-526T34.5-SUNBRST34.5-1+SW67	600	-0.1	34.0	1.00000	-10.2	23.9
38802_501_533H	MISO_SINKS_SUMP	100.0	34.0		1.0000	-	38802 501-533H 34.5 38812 501-533W 34.5 1	C: 38801 HEWITT 34.5 38802 501-533H 34.5 1	3277	0.0	34.0	1.00000	-4.5	29.6
38811_CMPTN_TP	MISO_SINKS_SUMP	100.0	34.0		-1.0000	-	38810 WADENA 34.5 38811 CMPTN TP 34.5 1	C: 38811 CMPTN TP 34.5 62914 COMPTON9 34.5 1	3290	0.0	-34.0	-1.00000	2.0	-32.0
38812_501_533W	MISO_SINKS_SUMP	100.0	34.0		-1.0000	-	38802 501-533H 34.5 38812 501-533W 34.5 1	C:501-533W34.5-VERNDLE934.5-1+SW21	420	0.0	-34.0	0.00000	-4.5	-4.5
38869_526_529T	MISO_SINKS_SUMP	100.0	34.0		1.0000	-	38869 526-529T 34.5 61850 LITTLEF9 34.5 1	C: 38869 526-529T 34.5 62204 LTTLFLS9 34.5 1	3345	0.0	34.0	1.00000	-15.4	18.6
60375_LOWRYTP8	MISO_SINKS_SUMP	100.0	33.5		0.5746	-	60375 LOWRYTP8 69.0 60746 GLENWD 8 69.0 1	C:860	93	17.8	37.0	0.48586	11.0	27.3
60376_LOWRY	MISO_SINKS_SUMP	100.0	33.5		0.5746	-	60375 LOWRYTP8 69.0 60746 GLENWD 8 69.0 1	C:860	93	17.8	37.0	0.48586	11.0	27.3
38829_527_535T	MISO_SINKS_SUMP	100.0	32.6		-1.0000	-	61647 LONG PR7 115 61847 LONG PR9 34.5 3	C: 61647 LONG PR7 115 61847 LONG PR9 34.5 1	4984	20.6	-12.0	-0.40180	8.3	-4.8
38830_LPGUTGRV	MISO_SINKS_SUMP	100.0	32.6		-1.0000	-	61647 LONG PR7 115 61847 LONG PR9 34.5 3	C: 61647 LONG PR7 115 61847 LONG PR9 34.5 1	4984	20.6	-12.0	-0.40180	8.3	-4.8
61847_LONG_PR9	MISO_SINKS_SUMP	100.0	32.6		-1.0000	-	61647 LONG PR7 115 61847 LONG PR9 34.5 3	C: 61647 LONG PR7 115 61847 LONG PR9 34.5 1	4984	20.6	-12.0	-0.40180	8.3	-4.8
62776_LAGRAND9	MISO_SINKS_SUMP	100.0	32.0		1.0000	-	62776 LAGRAND9 41.6 62780 LGRNDTP9 41.6 1	C: 68737 T BRN 69.0 68739 BROWNS 1 69.0 1	6958	-4.6	27.4	1.00000	-4.6	27.4
69170_MAPLE_LF	MISO_SINKS_SUMP	100.0	31.7		-1.0000	-	69168 KALMAR 69.0 69170 MAPLE LF 69.0 1	C:MAPLE LF161.-MAPLE LF69.0-1+SW175	834	6.7	-25.0	0.00000	-5.1	-5.1
8048_ST_VINC8	MISO_SINKS_SUMP	100.0	31.1		-1.0000	-	8039 PEMBINA 69.0 8048 ST VINC8 69.0 1	C:Unit: 60040 FEN 83G 13.8 Id:3	7625	0.0	-31.1	-1.00000	0.0	-31.1
69178_RINGE	MISO_SINKS_SUMP	100.0	30.9		1.0000	-	69178 RINGE 69.0 69185 ORONO TP 69.0 1	C:RINGE69.0-T RING69.0-1+SW175	838	-5.9	25.0	0.00000	5.8	5.8
62772_CARLOS_9	MISO_SINKS_SUMP	100.0	30.3		-1.0000	-	7206 CARLSJCT 41.6 62772 CARLOS 9 41.6 1	C: 34616 S OTTUM8 69.0 96467 2OTTUMW 69.0 1	7411	2.9	-27.4	-1.00000	2.9	-27.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62781_LEHMMDU9	MISO_SINKS_SUMP	100.0	30.2		-1.0000	-	62771 HDSN TP9 41.6 1 62781 LEHMMDU9 41.6 1	C:CARLSJCT41.6-LEHMMDU941.6-1+SW246	1084	2.8	-27.4	-1.00000	7.0	-23.3
62753_MILTONA7	MISO_SINKS_SUMP	100.0	30.1		1.0000	-	62753 MILTONA7 115 62773 MILTONA9 41.6 1	C:MLTN TP7115.-MILTONA7115.-1+SW244	1076	-0.1	30.0	0.00000	20.1	20.1
60745_SEDAN__8	MISO_SINKS_SUMP	100.0	30.0		-0.4692	-	60375 LOWRYTP8 69.0 62757 GLENWD 8 69.0 1	C:860	93	-22.9	-37.0	-0.35926	-16.1	-26.9
62777_BELLERV9	MISO_SINKS_SUMP	100.0	29.8		-1.0000	-	62773 MILTONA9 41.6 62777 BELLERV9 41.6 1	C: 38234 OAK 69 69.0 38238 SFL 69 69.0 1	8328	2.4	-27.4	-1.00000	2.4	-27.4
7215_ELBOWLK	MISO_SINKS_SUMP	100.0	29.6		1.0000	-	7215 ELBOWLK 41.6 7446 BARRET 41.6 1	C:ELBOWLK7115.-ELBOWLK41.6-1+SW217	952	-8.0	21.6	0.00000	6.9	6.9
69187_MARVL_TP	MISO_SINKS_SUMP	100.0	29.4		1.0000	-	69187 MARVL TP 69.0 69188 T AIR 69.0 1	C:CHESTER69.0-MARVL TP69.0-1+SW183	856	-4.4	25.0	0.00000	7.5	7.5
69164_ROCKDELL	MISO_SINKS_SUMP	100.0	28.9		1.0000	-	69164 ROCKDELL 69.0 69170 MAPLE LF 69.0 1	C: 69164 ROCKDELL 69.0 69166 CANISTEO 69.0 1	7277	-3.9	25.0	1.00000	-6.7	22.2
7206_CARLSJCT	MISO_SINKS_SUMP	100.0	28.6		1.0000	-	7206 CARLSJCT 41.6 62781 LEHMMDU9 41.6 1	C: 7206 CARLSJCT 41.6 62772 CARLOS 9 41.6 1	1419	-1.2	27.4	1.00000	-4.1	24.5
60142_BENTON_3	MISO_SINKS_SUMP	100.0	28.5		0.0939	-	60160 SHERCO 3 345 60601 SHERCO 115 1	C:009 1	126	445.3	448.0	0.02752	225.9	226.7
60759_STJOSPH8	MISO_SINKS_SUMP	100.0	28.4		0.2327	-	60759 STJOSPH8 69.0 61189 WATAB 8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	41.4	48.0	0.34569	27.1	36.9
62539_PRKR_PR9	MISO_SINKS_SUMP	100.0	28.1		1.0000	-	62539 PRKR PR9 41.6 62547 PRKPRTP9 41.6 1	C: 66283 HURON42T 230 66514 HURON 4 230 1	6302	-4.3	23.8	1.00000	-4.3	23.8
38854_BERTRAM	MISO_SINKS_SUMP	100.0	28.0		-0.5453	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	C:BERTRAM34.5-SWANVIL934.5-1+SW37	496	-5.7	-21.0	0.00000	-6.9	-6.9
62443_WILLMR2T	MISO_SINKS_SUMP	100.0	28.0		1.0000	-	62443 WILLMR2T 12.5 B$0131 230/69 1.00 1	C: 62400 BARDNSW8 69.0 62401 AMNCNTP8 69.0 1	5579	0.0	28.0	1.00000	0.0	28.0
62859_PINELK9	MISO_SINKS_SUMP	100.0	28.0		-0.5453	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	C:BERTRAM34.5-SWANVIL934.5-1+SW37	496	-5.7	-21.0	0.00000	-6.9	-6.9
7197_PARKERS	MISO_SINKS_SUMP	100.0	28.0		1.0000	-	7197 PARKERS 41.6 62548 PRPPRSW9 41.6 1	C: 7197 PARKERS 41.6 62547 PRKPRTP9 41.6 1	1407	-4.0	24.0	1.00000	-8.3	19.7
62771_HDSN_TP9	MISO_SINKS_SUMP	100.0	27.9		-1.0000	-	7135 ALEXAND 41.6 62770 LK M TP9 41.6 1	C:HDSN TP941.6-LEHMMDU941.6-1+SW246	1086	6.3	-21.6	-1.00000	13.3	-14.6
62774_HUDSON_9	MISO_SINKS_SUMP	100.0	27.9		-1.0000	-	7135 ALEXAND 41.6 62770 LK M TP9 41.6 1	C:HDSN TP941.6-LEHMMDU941.6-1+SW246	1086	6.3	-21.6	-1.00000	13.3	-14.6
62548_PRPPRSW9	MISO_SINKS_SUMP	100.0	27.7		1.0000	-	62548 PRPPRSW9 41.6 62773 MILTONA9 41.6 1	C: 7197 PARKERS 41.6 62548 PRPPRSW9 41.6 1	1408	-0.3	27.4	1.00000	-8.6	19.1
69172_GENOA_8	MISO_SINKS_SUMP	100.0	27.7		-1.0000	-	69168 KALMAR 69.0 69172 GENOA_8 69.0 1	C: 62398 DAIRYLD8 69.0 62406 CRYSTLK8 69.0 1	5576	2.7	-25.0	-1.00000	2.7	-25.0
69188_T_AIR	MISO_SINKS_SUMP	100.0	27.5		-1.0000	-	69187 MARVL TP 69.0 69188 T AIR 69.0 1	C: 69188 T AIR 69.0 69194 MARION 69.0 1	7295	2.5	-25.0	-1.00000	7.5	-20.1
69190_AIRPORT	MISO_SINKS_SUMP	100.0	27.5		-1.0000	-	69188 T AIR 69.0 69190 AIRPORT 69.0 1	C: 39619 EAST KRK 138 39620 KEWAUNEE 138 1	9691	2.5	-25.0	-1.00000	2.5	-25.0
60744_BROOTEN8	MISO_SINKS_SUMP	100.0	27.4		-0.3707	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.26007	-20.1	-27.2
69168_KALMAR	MISO_SINKS_SUMP	100.0	27.4		1.0000	-	69168 KALMAR 69.0 69172 GENOA_8 69.0 1	C:KALMAR69.0-MAPLE LF69.0-1+SW175	835	-2.4	25.0	0.00000	2.7	2.7
38881_SWANVLLE	MISO_SINKS_SUMP	100.0	27.0		1.0000	-	38885 508-27T7 34.5 62853 PLLBURY9 34.5 1	C:SWANVLLE34.5-SWANVIL934.5-1+SW23	429	-10.0	17.0	0.00000	0.0	0.0
9539_ELB_MUN	MISO_SINKS_SUMP	100.0	26.7		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:ELBOWLK41.6-ELB MUN41.6-1+SW204	892	-9.4	17.3	0.00000	-1.5	-1.5
60356_PAYNES_4	MISO_SINKS_SUMP	100.0	26.3		0.1113	-	60156 PYNSVIL7 115 60760 PAYNES 8 69.0 1	C: 60156 PYNSVIL7 115 60760 PAYNES 8 69.0 2	3628	44.1	47.0	0.06883	27.2	29.1
62838_FARMING8	MISO_SINKS_SUMP	100.0	26.2		-0.2190	-	60756 ALBANY 8 69.0 62838 FARMING8 69.0 1	C:775	80	-56.2	-61.9	-0.35387	-21.3	-30.6
62757_GLENWD_8	MISO_SINKS_SUMP	100.0	25.9		-0.5443	-	60375 LOWRYTP8 69.0 62757 GLENWD 8 69.0 1	C:860	93	-22.9	-37.0	-0.44937	-16.1	-27.8
62778_BRANDTP9	MISO_SINKS_SUMP	100.0	25.9		1.0000	-	7191 BRANDJ 41.6 67455 BRANDN 9 41.6 1	C: 7192 EVNSVILL 41.6 62778 BRANDTP9 41.6 1	1402	-2.9	23.0	1.00000	-9.8	16.2
62825_BANGOR_8	MISO_SINKS_SUMP	100.0	25.9		-0.3923	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.27548	-20.1	-27.2
62826_BANGRTP8	MISO_SINKS_SUMP	100.0	25.9		-0.3923	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.27548	-20.1	-27.2
38803_BERTHA	MISO_SINKS_SUMP	100.0	25.8		1.0000	-	38822 CLARISSA 34.5 62912 IONA TP9 34.5 1	C:EAGLVLY7115.-EAGLVLY934.5-1+SW47	538	-7.8	18.0	0.00000	8.6	8.6
38821_EAGLEBND	MISO_SINKS_SUMP	100.0	25.8		1.0000	-	38822 CLARISSA 34.5 62912 IONA TP9 34.5 1	C:EAGLVLY7115.-EAGLVLY934.5-1+SW47	538	-7.8	18.0	0.00000	8.6	8.6
38874_525_08T8	MISO_SINKS_SUMP	100.0	25.8		-1.0000	-	38887 LF SOUTH 34.5 38903 529-525T 34.5 1	C:525-298834.5-LITTLEF934.5-1+SW67	602	7.8	-18.0	0.00000	0.0	0.0
38875_525_2988	MISO_SINKS_SUMP	100.0	25.8		1.0000	-	38875 525-2988 34.5 38903 529-525T 34.5 1	C:525-298834.5-LITTLEF934.5-1+SW67	602	-7.8	18.0	0.00000	0.0	0.0
61843_EAGLVLY9	MISO_SINKS_SUMP	100.0	25.8		1.0000	-	38822 CLARISSA 34.5 62912 IONA TP9 34.5 1	C:EAGLVLY7115.-EAGLVLY934.5-1+SW47	538	-7.8	18.0	0.00000	8.6	8.6
62900_EAGLE_B9	MISO_SINKS_SUMP	100.0	25.8		1.0000	-	38822 CLARISSA 34.5 62912 IONA TP9 34.5 1	C:EAGLVLY7115.-EAGLVLY934.5-1+SW47	538	-7.8	18.0	0.00000	8.6	8.6
62768_RSVLLTP9	MISO_SINKS_SUMP	100.0	25.7		-1.0000	-	7215 ELBOWLK 41.6 7446 BARRET 41.6 1	C: 62768 RSVLLTP9 41.6 62769 ROSEVLL9 41.6 1	5779	4.1	-21.6	-1.00000	6.9	-18.8
7444_HOFFJT	MISO_SINKS_SUMP	100.0	25.7		-1.0000	-	7215 ELBOWLK 41.6 7446 BARRET 41.6 1	C: 7444 HOFFJT 41.6 62768 RSVLLTP9 41.6 1	1445	4.1	-21.6	-1.00000	6.9	-18.8
7445_HOFFMN	MISO_SINKS_SUMP	100.0	25.7		-1.0000	-	7215 ELBOWLK 41.6 7446 BARRET 41.6 1	C:HOFFJT41.6-RSVLLTP941.6-1+SW216	943	4.1	-21.6	-1.00000	6.9	-18.8
7203_ERDAHL_J	MISO_SINKS_SUMP	100.0	25.6		1.0000	-	7203 ERDAHL J 41.6 62761 AMOCOTP9 41.6 1	C:POMMEDE41.6-ERDAHL J41.6-1+SW211	924	-1.6	24.0	1.00000	-5.0	20.6
7192_EVNSVILL	MISO_SINKS_SUMP	100.0	25.1		1.0000	-	7192 EVNSVILL 41.6 62761 AMOCOTP9 41.6 1	C:EVNSVILL41.6-BRANDTP941.6-1+SW211	923	-1.1	24.0	0.00000	5.7	5.7
69162_PLNVW_TP	MISO_SINKS_SUMP	100.0	25.0		1.0000	-	69162 PLNVW TP 69.0 69164 ROCKDELL 69.0 1	C: 69161 PLESNT V 69.0 69162 PLNVW TP 69.0 1	7275	0.0	25.0	1.00000	-2.0	23.0
69180_T_RING	MISO_SINKS_SUMP	100.0	25.0		1.0000	-	69180 T RING 69.0 69182 CHESTER 69.0 1	C:RINGE69.0-T RING69.0-1+SW175	838	0.0	25.0	1.00000	-11.7	13.4
69185_ORONO_TP	MISO_SINKS_SUMP	100.0	25.0		-1.0000	-	69178 RINGE 69.0 69185 ORONO TP 69.0 1	C: 69176 ORONOCO 69.0 69185 ORONO TP 69.0 1	7285	0.0	-25.0	-1.00000	5.8	-19.2
60767_WLMSTAP8	MISO_SINKS_SUMP	100.0	24.8		-0.4100	-	60745 SEDAN 8 69.0 60767 WLMSTAP8 69.0 1	C:860	93	-26.8	-37.0	-0.28813	-20.1	-27.2
62761_AMOCOTP9	MISO_SINKS_SUMP	100.0	24.7		-1.0000	-	7203 ERDAHL J 41.6 62761 AMOCOTP9 41.6 1	C:EVNSVILL41.6-AMOCOTP941.6-1+SW211	922	0.7	-24.0	0.00000	-5.0	-5.0
62914_COMPTON9	MISO_SINKS_SUMP	100.0	24.7		-1.0000	-	38811 CMPTN TP 34.5 62914 COMPTON9 34.5 1	C: 64056 MADISON3 345 64060 BOONVIL3 345 1	10211	2.0	-22.7	-1.00000	2.0	-22.7
62770_LK_M_TP9	MISO_SINKS_SUMP	100.0	24.4		-1.0000	-	7135 ALEXAND 41.6 62770 LK M TP9 41.6 1	C:LK M TP941.6-HDSN TP941.6-1+SW246	1085	2.8	-21.6	-1.00000	13.3	-11.1
62775_LK_MARY9	MISO_SINKS_SUMP	100.0	24.4		-1.0000	-	7135 ALEXAND 41.6 62770 LK M TP9 41.6 1	C:LK M TP941.6-HDSN TP941.6-1+SW246	1085	2.8	-21.6	-1.00000	13.3	-11.1
7202_POMMEDE	MISO_SINKS_SUMP	100.0	24.2		1.0000	-	7202 POMMEDE 41.6 7203 ERDAHL J 41.6 1	C:POMMEDE41.6-SNFRDTP941.6-1+SW211	925	-0.2	24.0	1.00000	-3.4	20.8
62547_PRKPRTP9	MISO_SINKS_SUMP	100.0	24.0		-1.0000	-	7197 PARKERS 41.6 62547 PRKPRTP9 41.6 1	C: 62539 PRKR PR9 41.6 62547 PRKPRTP9 41.6 1	5679	0.0	-24.0	-1.00000	4.3	-19.7
62762_SNFRDTP9	MISO_SINKS_SUMP	100.0	24.0		-1.0000	-	7202 POMMEDE 41.6 62762 SNFRDTP9 41.6 1	C: 62762 SNFRDTP9 41.6 62763 SANFORD9 41.6 1	5776	0.0	-24.0	-1.00000	3.2	-20.8
7446_BARRET	MISO_SINKS_SUMP	100.0	23.6		-1.0000	-	7215 ELBOWLK 41.6 7446 BARRET 41.6 1	C: 7444 HOFFJT 41.6 7446 BARRET 41.6 1	1444	2.0	-21.6	-1.00000	6.9	-16.7
7200_ASHBYJT	MISO_SINKS_SUMP	100.0	23.5		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:ASHBYJT41.6-ELBOWJ41.6-1+SW204	890	-6.2	17.3	0.00000	-1.5	-1.5
7201_ELBOWJ	MISO_SINKS_SUMP	100.0	23.5		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:ELBOWJ41.6-ELB MUN41.6-1+SW204	891	-6.2	17.3	0.00000	-1.5	-1.5
7135_ALEXAND	MISO_SINKS_SUMP	100.0	23.4		1.0000	-	7135 ALEXAND 41.6 62770 LK M TP9 41.6 1	C:ALEXAND41.6-ALEXAND7115.-1+SW246	1082	-1.8	21.6	0.00000	13.3	13.3
7198_CATSEYE	MISO_SINKS_SUMP	100.0	23.1		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:CATSEYE41.6-ASHBYJT41.6-1+SW204	888	-5.8	17.3	0.00000	-1.5	-1.5
7448_DONALLY	MISO_SINKS_SUMP	100.0	23.1		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:CATSEYE41.6-ASHBYJT41.6-1+SW204	888	-5.8	17.3	0.00000	-1.5	-1.5
7449_HERMAN	MISO_SINKS_SUMP	100.0	23.1		1.0000	-	7163 CASCJT 41.6 63123 HOOT LK9 41.6 1	C:CATSEYE41.6-ASHBYJT41.6-1+SW204	888	-5.8	17.3	0.00000	-1.5	-1.5
7191_BRANDJ	MISO_SINKS_SUMP	100.0	23.0		1.0000	-	7191 BRANDJ 41.6 67455 BRANDN 9 41.6 1	C: 7191 BRANDJ 41.6 62778 BRANDTP9 41.6 1	1399	0.0	23.0	1.00000	-9.8	13.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
69176_ORONOCO	MISO_SINKS_SUMP	100.0	22.8		1.0000	-	69176 ORONOCO 69.0 69185 ORONO TP 69.0 1	C: 38232 MAY 69 69.0 38234 OAK 69 69.0 1	8325	-5.8	17.0	1.00000	-5.8	17.0
62763_SANFORD9	MISO_SINKS_SUMP	100.0	22.2		-1.0000	-	62762 SNFRDTP9 41.6 62763 SANFORD9 41.6 1	C: 34545 ORIENTM8 69.0 34588 SLAKEN 8 69.0 1	2842	3.2	-19.0	-1.00000	3.2	-19.0
38823_BROWERVL	MISO_SINKS_SUMP	100.0	22.1		1.0000	-	38823 BROWERVL 34.5 62911 HRTFDTP9 34.5 1	C:BROWERVL34.5-IONA TP934.5-1+SW47	535	-5.1	17.0	0.00000	2.3	2.3
38885_508_27T7	MISO_SINKS_SUMP	100.0	21.9		1.0000	-	38885 508-27T7 34.5 62853 PLLBURY9 34.5 1	C:SWANVLLE34.5-508-27T734.5-1+SW23	428	-4.9	17.0	0.00000	0.0	0.0
62759_AMOCO__9	MISO_SINKS_SUMP	100.0	21.9		1.0000	-	62759 AMOCO 9 41.6 62761 AMOCOTP9 41.6 1	C: 38120 AVT 69 69.0 38121 AVO 69 69.0 1	8203	-0.7	21.2	1.00000	-0.7	21.2
7199_WENDEL	MISO_SINKS_SUMP	100.0	21.9		-1.0000	-	7198 CATSEYE 41.6 7199 WENDEL 41.6 1	C:WENDEL41.6-NASUAJCT41.6-1+SW218	954	0.9	-21.0	-1.00000	4.4	-17.6
38886_SUNBRST	MISO_SINKS_SUMP	100.0	21.8		-1.0000	-	38868 529-526T 34.5 38886 SUNBRST 34.5 1	C: 38888 529 REG2 34.5 38893 HIGH SCH 34.5 1	3367	3.8	-18.0	-1.00000	10.1	-11.7
62769_ROSEVLL9	MISO_SINKS_SUMP	100.0	21.8		-1.0000	-	62768 RSVLLTP9 41.6 62769 ROSEVLL9 41.6 1	C: 38235 NFL 69 69.0 38241 SAT 69 69.0 1	8330	2.8	-19.0	-1.00000	2.8	-19.0
62779_BRANDON9	MISO_SINKS_SUMP	100.0	21.8		-1.0000	-	62778 BRANDTP9 41.6 62779 BRANDON9 41.6 1	C: 34534 HUXLEYR8 69.0 34537 WOI 8 69.0 1	2835	2.8	-19.0	-1.00000	2.8	-19.0
38887_LF_SOUTH	MISO_SINKS_SUMP	100.0	21.7		-1.0000	-	38886 SUNBRST 34.5 38887 LF SOUTH 34.5 1	C: 38229 HUBBARD 69.0 39227 HUBBARD 138 1	8320	3.7	-18.0	-1.00000	3.7	-18.0
7193_BRANDNJC	MISO_SINKS_SUMP	100.0	21.7		1.0000	-	7194 MILRVILL 41.6 7195 URBANK 41.6 1	C:BRANDNJC41.6-BRANDN 941.6-1+SW244	1072	-0.7	21.0	0.00000	0.2	0.2
7194_MILRVILL	MISO_SINKS_SUMP	100.0	21.7		1.0000	-	7194 MILRVILL 41.6 7195 URBANK 41.6 1	C:BRANDNJC41.6-BRANDN 941.6-1+SW244	1072	-0.7	21.0	0.00000	0.2	0.2
7204_NASUAJCT	MISO_SINKS_SUMP	100.0	21.5		-1.0000	-	7199 WENDEL 41.6 7204 NASUAJCT 41.6 1	C: 7204 NASUAJCT 41.6 8786 WENDEL 2 41.6 1	1418	0.5	-21.0	-1.00000	3.4	-18.0
69186_MARVALE	MISO_SINKS_SUMP	100.0	21.4		1.0000	-	69186 MARVALE 69.0 69187 MARVL TP 69.0 1	C: 63889 PLYMOTH5 161 63965 LEEDS 5 161 1	10158	-4.4	17.0	1.00000	-4.4	17.0
7195_URBANK	MISO_SINKS_SUMP	100.0	21.2		-1.0000	-	7194 MILRVILL 41.6 7195 URBANK 41.6 1	C:URBANK41.6-LAKADLEY41.6-1+SW244	1075	0.2	-21.0	-1.00000	0.2	-21.0
9529_ELBOWM	MISO_SINKS_SUMP	100.0	21.1		1.0000	-	9529 ELBOWM 41.6 9539 ELB MUN 41.6 1	C: 34671 KLEMME 8 69.0 36242 SHEFFLD8 69.0 1	7415	-3.1	18.0	1.00000	-3.1	18.0
61856_BLNCHD29	MISO_SINKS_SUMP	100.0	21.0		-1.0000	-	61649 BLNCHRD7 115 61856 BLNCHD29 34.5 2	C:521-08SW34.5-BLNCHD2934.5-1+SW9	382	0.0	-21.0	-1.00000	3.7	-17.3
7196_LAKADLEY	MISO_SINKS_SUMP	100.0	21.0		-1.0000	-	7195 URBANK 41.6 7196 LAKADLEY 41.6 1	C: 66283 HURON42T 230 66515 HURON 7 115 1	6303	0.0	-21.0	-1.00000	0.0	-21.0
38855_521_08SW	MISO_SINKS_SUMP	100.0	20.7		1.0000	-	38855 521-08SW 34.5 38882 508-521T 34.5 1	C:521-08SW34.5-BLNCHD2934.5-1+SW9	382	-3.7	17.0	0.00000	0.0	0.0
38856_MN_PIPE	MISO_SINKS_SUMP	100.0	20.6		-1.0000	-	38855 521-08SW 34.5 38856 MN PIPE 34.5 1	C:3Wnd: OPEN B$0122 161/69 1	5569	3.6	-17.0	-1.00000	3.6	-17.0
69194_MARION	MISO_SINKS_SUMP	100.0	20.4		-1.0000	-	69188 T AIR 69.0 69194 MARION 69.0 1	C: 69194 MARION 69.0 69196 PLESNT G 69.0 1	7296	3.4	-17.0	-1.00000	4.9	-15.5
38822_CLARISSA	MISO_SINKS_SUMP	100.0	20.2		1.0000	-	38822 CLARISSA 34.5 62912 IONA TP9 34.5 1	C:EAGLVLY934.5-CLARISSA34.5-1+SW47	539	-2.2	18.0	0.00000	8.6	8.6
60156_PYNSVIL7	MISO_SINKS_SUMP	100.0	19.9		0.1469	-	60156 PYNSVIL7 115 60760 PAYNES 8 69.0 1	C: 60156 PYNSVIL7 115 60760 PAYNES 8 69.0 2	3628	44.1	47.0	0.09083	27.2	29.1
60702_PAYNES19	MISO_SINKS_SUMP	100.0	19.9		0.1469	-	60156 PYNSVIL7 115 60760 PAYNES 8 69.0 1	C: 60156 PYNSVIL7 115 60760 PAYNES 8 69.0 2	3628	44.1	47.0	0.09083	27.2	29.1
7190_GARFIELD	MISO_SINKS_SUMP	100.0	19.9		1.0000	-	7190 GARFIELD 41.6 67455 BRANDN 9 41.6 1	C: 62399 WASCOTT8 69.0 62402 FROG CR8 69.0 1	5577	-1.9	18.0	1.00000	-1.9	18.0
62855_NPARKER9	MISO_SINKS_SUMP	100.0	19.8		-1.0000	-	38885 508-27T7 34.5 62854 FLNSBRG9 34.5 1	C: 62852 GREFLNSB 34.5 62854 FLNSBRG9 34.5 1	5817	2.8	-17.0	-1.00000	4.9	-14.9
69166_CANISTEO	MISO_SINKS_SUMP	100.0	19.8		-1.0000	-	69164 ROCKDELL 69.0 69166 CANISTEO 69.0 1	C: 34540 GEORGE 8 69.0 64033 SHELDON8 69.0 1	7405	2.8	-17.0	-1.00000	2.8	-17.0
62204_LTTLFLS9	MISO_SINKS_SUMP	100.0	19.5		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 2	C:526-529T34.5-LTTLFLS934.5-1+SW70	614	-9.5	10.0	0.00000	0.0	0.0
62901_HARTFRD9	MISO_SINKS_SUMP	100.0	19.3		-1.0000	-	38823 BROWERVL 34.5 62911 HRTFDTP9 34.5 1	C: 34621 MORAVIT8 69.0 96482 2MORAVA 69.0 1	7412	2.3	-17.0	-1.00000	2.3	-17.0
62852_GREFLNSB	MISO_SINKS_SUMP	100.0	19.1		1.0000	-	62852 GREFLNSB 34.5 62854 FLNSBRG9 34.5 1	C: 62398 DAIRYLD8 69.0 62406 CRYSTLK8 69.0 1	5576	-2.1	17.0	1.00000	-2.1	17.0
62853_PLLBURY9	MISO_SINKS_SUMP	100.0	19.1		-1.0000	-	38836 11K 34.5 62853 PLLBURY9 34.5 1	C: 67405 MITCHEL7 115 67410 MITCLNW7 115 1	6895	2.1	-17.0	-1.00000	2.1	-17.0
62854_FLNSBRG9	MISO_SINKS_SUMP	100.0	19.1		-1.0000	-	38885 508-27T7 34.5 62854 FLNSBRG9 34.5 1	C: 62854 FLNSBRG9 34.5 62857 NPKRJCT9 34.5 1	5818	2.1	-17.0	-1.00000	4.9	-14.3
62910_LFRVRTP9	MISO_SINKS_SUMP	100.0	19.0		-1.0000	-	61842 VERNDLE9 34.5 62910 LFRVRTP9 34.5 1	C: 62909 LEAFRVR9 34.5 62910 LFRVRTP9 34.5 1	5837	2.0	-17.0	-1.00000	5.0	-14.0
69161_PLESNT_V	MISO_SINKS_SUMP	100.0	19.0		1.0000	-	69161 PLESNT V 69.0 69162 PLNVW TP 69.0 1	C: 68727 CLDNIA 8 69.0 69142 SPGR TP 69.0 1	6946	-2.0	17.0	1.00000	-2.0	17.0
62904_SEBEKA_9	MISO_SINKS_SUMP	100.0	18.8		-1.0000	-	38804 BLUGRASS 34.5 62904 SEBEKA 9 34.5 1	C: 9378 CUBA 69.0 9379 CHAFFEE 69.0 1	1917	1.8	-17.0	-1.00000	1.8	-17.0
62909_LEAFRVR9	MISO_SINKS_SUMP	100.0	18.8		1.0000	-	62909 LEAFRVR9 34.5 62910 LFRVRTP9 34.5 1	C: 66274 FTTHMP29 13.8 66275 FTTHMP2T 345 1	6289	-3.0	15.8	1.00000	-3.0	15.8
7205_NASHUA	MISO_SINKS_SUMP	100.0	18.5		-1.0000	-	7204 NASUAJCT 41.6 7205 NASHUA 41.6 1	C: 67155 LOGAN 7 115 67208 LOGAN TY 230 1	6786	0.5	-18.0	-1.00000	0.5	-18.0
62902_IONA___9	MISO_SINKS_SUMP	100.0	18.2		-1.0000	-	38823 BROWERVL 34.5 62912 IONA TP9 34.5 1	C:CLARISSA34.5-IONA TP934.5-1+SW47	533	1.2	-17.0	0.00000	-7.5	-7.5
62912_IONA_TP9	MISO_SINKS_SUMP	100.0	18.2		-1.0000	-	38823 BROWERVL 34.5 62912 IONA TP9 34.5 1	C:CLARISSA34.5-IONA TP934.5-1+SW47	533	1.2	-17.0	0.00000	-7.5	-7.5
38903_529_525T	MISO_SINKS_SUMP	100.0	18.0		-1.0000	-	38875 525-2988 34.5 38903 529-525T 34.5 1	C: 34560 SWMPFXN 115 36237 SWMPFXNH 161 1	2849	0.0	-18.0	-1.00000	0.0	-18.0
9530_ELBOWM_2	MISO_SINKS_SUMP	100.0	18.0		-1.0000	-	9529 ELBOWM 41.6 9530 ELBOWM 2 41.6 1	C: 62399 WASCOTT8 69.0 62402 FROG CR8 69.0 1	5577	0.0	-18.0	-1.00000	0.0	-18.0
38904_525_08T7	MISO_SINKS_SUMP	100.0	17.6		1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 2	C:525-08T834.5-525-08T734.5-1+SW63	583	-7.6	10.0	0.00000	0.0	0.0
62857_NPKRJCT9	MISO_SINKS_SUMP	100.0	17.6		-1.0000	-	62854 FLNSBRG9 34.5 62857 NPKRJCT9 34.5 1	C: 62855 NPARKER9 34.5 62857 NPKRJCT9 34.5 1	5819	0.0	-17.6	-1.00000	2.7	-14.9
38873_MW_HENN	MISO_SINKS_SUMP	100.0	17.5		1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 2	C:525-08T734.5-MW&HENN34.5-1+SW63	584	-7.5	10.0	0.00000	0.0	0.0
38828_LP_RURAL	MISO_SINKS_SUMP	100.0	17.2		-1.0000	-	38820 9K-10K 34.5 38828 LP RURAL 34.5 1	C:501-535S34.5-LP RURAL34.5-1+SW51	554	0.2	-17.0	-1.00000	3.3	-13.9
38804_BLUGRASS	MISO_SINKS_SUMP	100.0	17.1		1.0000	-	38804 BLUGRASS 34.5 62904 SEBEKA 9 34.5 1	C:BLUGRASS34.5-LFRVRTP934.5-1+SW36	486	-0.1	17.0	0.00000	1.8	1.8
38820_9K_10K	MISO_SINKS_SUMP	100.0	17.0		1.0000	-	38820 9K-10K 34.5 38828 LP RURAL 34.5 1	C:9K-10K34.5-LONG PR934.5-1+SW47	531	0.0	17.0	0.00000	3.3	3.3
38835_12K	MISO_SINKS_SUMP	100.0	17.0		1.0000	-	38835 12K 34.5 38836 11K 34.5 1	C:527-535T34.5-12K34.5-1+SW142	798	0.0	17.0	0.00000	2.1	2.1
38836_11K	MISO_SINKS_SUMP	100.0	17.0		1.0000	-	38836 11K 34.5 62853 PLLBURY9 34.5 1	C:12K34.5-11K34.5-1+SW142	799	0.0	17.0	0.00000	2.1	2.1
62911_HRTFDTP9	MISO_SINKS_SUMP	100.0	17.0		-1.0000	-	38823 BROWERVL 34.5 62911 HRTFDTP9 34.5 1	C: 62901 HARTFRD9 34.5 62911 HRTFDTP9 34.5 1	5835	0.0	-17.0	-1.00000	2.3	-14.7
38834_HRT_PRS	MISO_SINKS_SUMP	100.0	16.3		-1.0000	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C: 38826 IND PRK 34.5 38833 LP PACKN 34.5 1	3303	6.3	-10.0	-1.00000	10.1	-6.2
62833_STSTPHN8	MISO_SINKS_SUMP	100.0	16.1		-1.0000	-	62832 BROCKWY8 69.0 62833 STSTPHN8 69.0 1	C: 9219 HOOPLE 8 69.0 9220 MANOT 8 69.0 1	1795	4.4	-11.7	-1.00000	4.4	-11.7
38898_OAKES_SC	MISO_SINKS_SUMP	100.0	15.6		-1.0000	-	38896 MP TAP 34.5 38897 MN POWER 34.5 1	C:529-36SW34.5-RIVER F34.5-1+SW66	599	2.6	-13.0	0.00000	1.0	1.0
38915_RIVER_44	MISO_SINKS_SUMP	100.0	15.2		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C: 38898 OAKES SC 34.5 38915 RIVER 44 34.5 1	3378	5.2	-10.0	-1.00000	6.3	-8.9
62079_LAFAYTT8	MISO_SINKS_SUMP	100.0	14.8		0.1291	-	60730 ARLNGTN8 69.0 60731 GRENISL8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	32.1	34.0	0.12642	6.6	8.5
38860_529_DIST	MISO_SINKS_SUMP	100.0	14.7		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:RIVER F34.5-529-DIST34.5-1+SW66	598	4.7	-10.0	-1.00000	6.3	-8.4
38865_21K	MISO_SINKS_SUMP	100.0	14.7		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 2	C:LTTLFLS934.5-21K34.5-1+SW70	615	-4.7	10.0	0.00000	0.0	0.0
38866_22K	MISO_SINKS_SUMP	100.0	14.7		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 2	C:21K34.5-22K34.5-1+SW70	612	-4.7	10.0	0.00000	0.0	0.0
38914_RIVER_F	MISO_SINKS_SUMP	100.0	14.7		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529-36SW34.5-RIVER F34.5-1+SW66	599	4.7	-10.0	-1.00000	6.3	-8.4
38916_529_36SW	MISO_SINKS_SUMP	100.0	14.7		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C: 38915 RIVER 44 34.5 38916 529-36SW 34.5 1	3387	4.7	-10.0	-1.00000	6.3	-8.4
38917_529_36E	MISO_SINKS_SUMP	100.0	14.7		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:529-36E34.5-OAKES SC34.5-1+SW69	609	-4.7	10.0	0.00000	-4.7	-4.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38876_526_5261	MISO_SINKS_SUMP	100.0	14.5		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 2	C:22K34.5-526-526134.5-1+SW70	613	-4.5	10.0	0.00000	0.0	0.0
38877_PIERZ	MISO_SINKS_SUMP	100.0	14.5		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 2	C:22K34.5-526-526134.5-1+SW70	613	-4.5	10.0	0.00000	0.0	0.0
38859_EAST88	MISO_SINKS_SUMP	100.0	14.4		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529-DIST34.5-EAST8834.5-1+SW66	594	4.4	-10.0	-1.00000	6.3	-8.1
38861_529_36ES	MISO_SINKS_SUMP	100.0	14.4		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529-DIST34.5-EAST8834.5-1+SW66	594	4.4	-10.0	-1.00000	6.3	-8.1
38892_E_SUB_TP	MISO_SINKS_SUMP	100.0	14.4		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C: 38859 EAST88 34.5 38892 E SUB TP 34.5 1	3334	4.4	-10.0	-1.00000	6.3	-8.1
60719_LAFAYET8	MISO_SINKS_SUMP	100.0	14.1		0.1354	-	60730 ARLNGTN8 69.0 60731 GRENISL8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	32.1	34.0	0.13284	6.6	8.5
38826_IND_PRK	MISO_SINKS_SUMP	100.0	13.9		-1.0000	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C: 38826 IND PRK 34.5 38834 HRT PRS 34.5 1	3304	3.9	-10.0	-1.00000	10.1	-3.8
38833_LP_PACKN	MISO_SINKS_SUMP	100.0	13.9		-1.0000	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C: 38826 IND PRK 34.5 38834 HRT PRS 34.5 1	3304	3.9	-10.0	-1.00000	10.1	-3.8
38880_RICH_PR	MISO_SINKS_SUMP	100.0	13.9		-1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 1	C: 38880 RICH PR 34.5 38884 BUCKMAN 34.5 1	3359	3.9	-10.0	-1.00000	5.9	-8.0
38921_CMEC	MISO_SINKS_SUMP	100.0	13.8		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:MP TAP34.5-MN POWER34.5-1+SW66	596	-3.8	10.0	1.00000	-4.7	9.0
38905_LF_WEST	MISO_SINKS_SUMP	100.0	13.4		1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 2	C:MW&HENN34.5-LF WEST34.5-1+SW63	582	-3.4	10.0	0.00000	0.0	0.0
38827_501_535S	MISO_SINKS_SUMP	100.0	13.1		1.0000	-	38827 501-535S 34.5 38828 LP RURAL 34.5 1	C: 38235 NFL 69 69.0 39175 NFL 138 138 2	8334	-3.1	10.0	1.00000	-3.1	10.0
61755_BOISE__9	MISO_SINKS_SUMP	100.0	13.1		-1.0000	-	61754 BOISE 7 118 61755 BOISE 9 6.60 1	C: 61760 GENBUS G 6.60 61761 IMTRA-39 6.60 1	5168	-19.9	-33.0	-1.00000	-12.5	-25.6
61757_IMTRA_2G	MISO_SINKS_SUMP	100.0	13.1		-1.0000	-	61754 BOISE 7 118 61755 BOISE 9 6.60 1	C: 61760 GENBUS G 6.60 61761 IMTRA-39 6.60 1	5168	-19.9	-33.0	-1.00000	-12.5	-25.6
38858_529_T77	MISO_SINKS_SUMP	100.0	12.9		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C: 38858 529-T77 34.5 38892 E SUB TP 34.5 1	3330	2.9	-10.0	-1.00000	6.3	-6.6
38893_HIGH_SCH	MISO_SINKS_SUMP	100.0	12.9		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:HIGH SCH34.5-529-T7734.5-1+SW87	660	2.9	-10.0	-1.00000	6.3	-6.6
38884_BUCKMAN	MISO_SINKS_SUMP	100.0	12.5		1.0000	-	38843 RYLTNRG2 34.5 38844 RYLTNRG1 34.5 1	C:RICH PR34.5-BUCKMAN34.5-1+SW81	651	-2.5	10.0	0.00000	-0.6	-0.6
38920_ETHANOL	MISO_SINKS_SUMP	100.0	11.2		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:ETHANOL34.5-CMEC34.5-1+SW69	608	-1.2	10.0	1.00000	-4.7	6.5
38896_MP_TAP	MISO_SINKS_SUMP	100.0	11.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:MP TAP34.5-36 K134.5-1+SW69	606	-1.0	10.0	1.00000	-4.7	6.2
38897_MN_POWER	MISO_SINKS_SUMP	100.0	11.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C: 38896 MP TAP 34.5 38919 36 K1 34.5 1	3376	-1.0	10.0	1.00000	-4.7	6.2
38899_CRSTLNER	MISO_SINKS_SUMP	100.0	11.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:MP TAP34.5-36 K134.5-1+SW69	606	-1.0	10.0	1.00000	-4.7	6.2
38919_36_K1	MISO_SINKS_SUMP	100.0	11.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:36 K134.5-ETHANOL34.5-1+SW69	607	-1.0	10.0	1.00000	-4.7	6.2
38839_511_5261	MISO_SINKS_SUMP	100.0	10.6		1.0000	-	38843 RYLTNRG2 34.5 38844 RYLTNRG1 34.5 1	C:BUCKMAN34.5-511-526134.5-1+SW81	652	-0.6	10.0	0.00000	-0.6	-0.6
38901_525_529T	MISO_SINKS_SUMP	100.0	10.5		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C:525-529T34.5-529-DIST34.5-1+SW61	575	0.5	-10.0	0.00000	0.2	0.2
38912_NORTH_S	MISO_SINKS_SUMP	100.0	10.2		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 63186 WILTON Y 230 63343 WILTON19 13.8 1	5967	0.2	-10.0	-1.00000	0.2	-10.0
38825_INPK_REG	MISO_SINKS_SUMP	100.0	10.1		-1.0000	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C:INPK-REG34.5-IND PRK34.5-1+SW51	552	0.1	-10.0	-1.00000	10.1	0.0
38831_LNG_P77	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C:LNG P7734.5-LONG PR934.5-1+SW51	556	0.0	10.0	0.00000	10.1	10.1
38867_529_REG	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529 REG34.5-SUNBRST34.5-1+SW65	587	0.0	10.0	0.00000	6.3	6.3
38878_PIERZ_RG	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 1	C:526-526134.5-PIERZ RG34.5-1+SW81	649	0.0	10.0	0.00000	5.9	5.9
38879_PIERZ_RG2	MISO_SINKS_SUMP	100.0	10.0		-1.0000	-	38878 PIERZ RG 34.5 38879 PIERZ RG2 34.5 1	C:PIERZ RG34.5-RICH PR34.5-1+SW81	650	0.0	-10.0	-1.00000	5.9	-4.1
38888_529_REG2	MISO_SINKS_SUMP	100.0	10.0		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529 REG34.5-HIGH SCH34.5-1+SW87	658	0.0	-10.0	-1.00000	6.3	-3.7
38889_FAIRGND	MISO_SINKS_SUMP	100.0	10.0		-1.0000	-	38867 529 REG 34.5 38888 529 REG2 34.5 1	C:529 REG34.5-HIGH SCH34.5-1+SW87	658	0.0	-10.0	-1.00000	6.3	-3.7
38890_HWY10_77	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:HWY10 7734.5-MP TAP34.5-1+SW66	595	0.0	10.0	1.00000	-4.7	5.3
38891_536_REGL	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C: 38890 HWY10 77 34.5 38891 536 REGL 34.5 1	3369	0.0	10.0	1.00000	-4.7	5.3
38895_536_REG	MISO_SINKS_SUMP	100.0	10.0		-1.0000	-	38891 536 REGL 34.5 38895 536 REG 34.5 1	C:536 REG34.5-LITTLEF934.5-1+SW65	593	0.0	-10.0	0.00000	-4.7	-4.7
38906_525_REG2	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 2	C:LF WEST34.5-525 REG34.5-1+SW63	585	0.0	10.0	0.00000	0.0	0.0
60391_PAYNES29	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	60352 WATKINS9 34.5 62620 WATKINS8 69.0 1	C:PAYNES1934.5-PAYNES2934.5-1+SW180	844	-5.0	5.0	0.00000	0.0	0.0
62629_PYNSVLL9	MISO_SINKS_SUMP	100.0	10.0		1.0000	-	60352 WATKINS9 34.5 62620 WATKINS8 69.0 1	C:PAYNES2934.5-PYNSVLL934.5-1+SW180	843	-5.0	5.0	0.00000	0.0	0.0
8038_ST_VINC9	MISO_SINKS_SUMP	100.0	7.5		1.0000	-	8038 ST VINC9 41.6 8048 ST VINC8 69.0 1	C: 33895 SBU_ES 69.0 38577 CANAL 69 69.0 1	7958	0.0	7.5	1.00000	0.0	7.5
38910_IND_PK	MISO_SINKS_SUMP	100.0	7.1		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 38910 IND-PK 34.5 38911 14K 34.5 1	3384	-2.9	-10.0	-1.00000	0.2	-6.9
38911_14K	MISO_SINKS_SUMP	100.0	7.1		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C:14K34.5-NORTH S34.5-1+SW61	580	-2.9	-10.0	-1.00000	0.2	-6.9
62203_LASTRUP9	MISO_SINKS_SUMP	100.0	7.0		-1.0000	-	38877 PIERZ 34.5 62203 LASTRUP9 34.5 1	C: 69397 ELKMDGEN 13.8 69551 ELK MND5 161 1	7307	2.6	-4.4	-1.00000	2.6	-4.4
38894_LARSON	MISO_SINKS_SUMP	100.0	6.5		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C:LARSON34.5-13K34.5-1+SW61	574	-3.5	-10.0	-1.00000	0.2	-6.3
38909_13K	MISO_SINKS_SUMP	100.0	6.5		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 38909 13K 34.5 38910 IND-PK 34.5 1	3383	-3.5	-10.0	-1.00000	0.2	-6.3
62843_LSAUKTP8	MISO_SINKS_SUMP	100.0	6.5		-0.2073	-	60759 STJOSPH8 69.0 62843 LSAUKTP8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	-46.7	-48.0	-0.30785	-32.4	-34.4
38872_LF_HE	MISO_SINKS_SUMP	100.0	5.9		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 38894 LARSON 34.5 38908 LF HE-88 34.5 1	3372	-4.1	-10.0	-1.00000	0.2	-5.7
38907_525_REG1	MISO_SINKS_SUMP	100.0	5.9		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 38894 LARSON 34.5 38908 LF HE-88 34.5 1	3372	-4.1	-10.0	-1.00000	0.2	-5.7
38908_LF_HE_88	MISO_SINKS_SUMP	100.0	5.9		-1.0000	-	38906 525 REG2 34.5 38907 525 REG1 34.5 1	C: 38894 LARSON 34.5 38908 LF HE-88 34.5 1	3372	-4.1	-10.0	-1.00000	0.2	-5.7
38840_61K_DIST	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38841_LTL_ROCK	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38842_RICE_TP	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38843_RYLTNRG2	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38844_RYLTNRG1	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38845_15K_DIST	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38847_511_508T	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38848_508_511T	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38850_508_525T	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38852_BLAN_6KV	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38853_UPSALA	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38871_C_RIPLEY	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38882_508_521T	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38883_MP_FNSBG	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
38902_508_502T	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
61849_BLNCHRD9	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
62856_SOBIESK9	MISO_SINKS_SUMP	100.0	5.3		-1.0000	-	61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 1	C: 61649 BLNCHRD7 115 61849 BLNCHRD9 34.5 2	4993	-12.7	-18.0	-0.45470	-5.8	-8.2
60351_EDENVLY9	MISO_SINKS_SUMP	100.0	5.0		1.0000	-	60352 WATKINS9 34.5 62620 WATKINS8 69.0 1	C:PYNSVLL934.5-EDENVLY934.5-1+SW180	846	0.0	5.0	0.00000	0.0	0.0
60352_WATKINS9	MISO_SINKS_SUMP	100.0	5.0		1.0000	-	60352 WATKINS9 34.5 62620 WATKINS8 69.0 1	C:EDENVLY934.5-WATKINS934.5-1+SW180	842	0.0	5.0	0.00000	0.0	0.0
60732_WST_CLD8	MISO_SINKS_SUMP	100.0	4.7		0.1958	-	60732 WST CLD8 69.0 62843 LSAUKTP8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	47.1	48.0	0.29066	32.8	34.2
62841_WESTWD_8	MISO_SINKS_SUMP	100.0	4.7		0.1958	-	60732 WST CLD8 69.0 62843 LSAUKTP8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	47.1	48.0	0.29066	32.8	34.2
62842_LESAUK_8	MISO_SINKS_SUMP	100.0	4.7		0.1958	-	60732 WST CLD8 69.0 62843 LSAUKTP8 69.0 1	C: 60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	4193	47.1	48.0	0.29066	32.8	34.2
38824_INPK_REG	MISO_SINKS_SUMP	100.0	-1.4		0.0519	-	38824 INPK REG 34.5 38825 INPK-REG 34.5 3	C:INPK REG34.5-INPK-REG34.5-1+SW51	548	10.1	10.0	0.00000	10.1	10.1
62009_LKJOHNA8	MISO_SINKS_SUMP	100.0	-1.6		-1.0000	-	60767 WLMSTAP8 69.0 62009 LKJOHNA8 69.0 1	C:860	93	-40.2	-38.6	-0.64282	-23.0	-21.9
62010_WILLIAM8	MISO_SINKS_SUMP	100.0	-1.6		-1.0000	-	60767 WLMSTAP8 69.0 62009 LKJOHNA8 69.0 1	C:860	93	-40.2	-38.6	-0.58167	-23.0	-22.0
62015_GILCHRST	MISO_SINKS_SUMP	100.0	-1.6		-1.0000	-	60767 WLMSTAP8 69.0 62009 LKJOHNA8 69.0 1	C:860	93	-40.2	-38.6	-0.52997	-23.0	-22.1
61761_IMTRA_39	MISO_SINKS_SUMP	100.0	-4.4		-1.0000	-	61755 BOISE 9 6.60 61756 MAINBUS9 6.60 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-25.4	-21.0	-1.00000	-25.0	-20.6
63239_BAGLEY_7	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
63240_MN_PIPE7	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
63241_CLEARBR7	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
63242_CLBKPIP7	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
63340_MN_PIPE9	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
63342_CLBK_LK9	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7934_BAGLEY_T	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7935_CLEARBK	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7936_CLRBROOK	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7937_CLRBRK_T	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7938_GONVICK	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
7946_BAGLEY	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
9360_CLEA_MPC	MISO_SINKS_SUMP	100.0	-5.3		0.1387	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.16312	70.5	69.6
60866_LESUEUR8	MISO_SINKS_SUMP	100.0	-7.8		-0.4784	-	60730 ARLNGTN8 69.0 62674 JSNLDTP8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	-37.7	-34.0	-0.46933	-5.4	-1.7
60867_LSUEURE8	MISO_SINKS_SUMP	100.0	-7.8		-0.4784	-	60730 ARLNGTN8 69.0 62674 JSNLDTP8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	-37.7	-34.0	-0.46933	-5.4	-1.7
60868_LESR_TP8	MISO_SINKS_SUMP	100.0	-7.8		-0.4784	-	60730 ARLNGTN8 69.0 62674 JSNLDTP8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	-37.7	-34.0	-0.46933	-5.4	-1.7
61756_MAINBUS9	MISO_SINKS_SUMP	100.0	-11.4		-1.0000	-	61755 BOISE 9 6.60 61756 MAINBUS9 6.60 1	C: 61760 GENBUS G 6.60 61761 IMTRA-39 6.60 1	5168	-32.4	-21.0	-1.00000	-25.0	-13.6
61758_HYDRO__G	MISO_SINKS_SUMP	100.0	-11.4		-1.0000	-	61755 BOISE 9 6.60 61756 MAINBUS9 6.60 1	C: 61760 GENBUS G 6.60 61761 IMTRA-39 6.60 1	5168	-32.4	-21.0	-1.00000	-25.0	-13.6
61759_IMTRA_1G	MISO_SINKS_SUMP	100.0	-11.4		-1.0000	-	61755 BOISE 9 6.60 61756 MAINBUS9 6.60 1	C: 61760 GENBUS G 6.60 61761 IMTRA-39 6.60 1	5168	-32.4	-21.0	-1.00000	-25.0	-13.6
63187_WINGER_Y	MISO_SINKS_SUMP	100.0	-11.4		0.0640	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06867	70.5	69.7
63338_WINGER19	MISO_SINKS_SUMP	100.0	-11.4		0.0640	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06867	70.5	69.7
63138_WINGER_9	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
63238_WINGER_7	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
66786_WINGER_T	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
67018_WINGER_8	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7962_WINGTN	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7963_SO_MCIN	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7964_NO_MCIN	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7971_MCINTOSH	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7994_BEJOU	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7995_REMOVED	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
7996_WAUBON	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9314_ERSKIN_T	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9315_ERSKMPC	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9351_MAPLEBAY	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9353_RINDAL	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9354_WAUKON	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9355_FLOM	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9356_SANDHILL	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9357_FOSSTN_M	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9358_BEAULIEU	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
9359_OAKLAND	MISO_SINKS_SUMP	100.0	-11.5		0.0633	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.06538	70.5	69.7
66758_WINGER_4	MISO_SINKS_SUMP	100.0	-12.1		0.0604	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05229	70.5	69.9
63150_FERTILE9	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
63250_FERTILE7	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
7997_JCT	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
8003_BELTJT	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
8008_FERTTN	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
8009_GARY	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
8010_TWINVY	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
9433_BELTMPC	MISO_SINKS_SUMP	100.0	-12.9		0.0565	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05800	70.5	69.7
63251_PLUMTAP7	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
63252_PLUMMER7	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7939_GULLY_T	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7940_TRAIL	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7941_GRAVEL	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7942_OKLEE_TP	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7943_OKLEE	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7944_GULLY	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7959_PLUM_TP	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7961_BROOKS_P	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7965_ERSK_JT	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7966_BROOKS	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7967_PLUM_SW	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7968_PLUMMER	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7969_RED_LKE	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7970_RED_LKW	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7990_GENT_JT	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7991_MENTOR	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7992_GENTILLY	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
7993_ERSKINE	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
9313_OKLEEMPC	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
9361_GULLY_MP	MISO_SINKS_SUMP	100.0	-13.8		0.0527	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05379	70.5	69.7
63253_PLUMPIP7	MISO_SINKS_SUMP	100.0	-14.0		0.0523	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05330	70.5	69.7
63353_PLUMPIP9	MISO_SINKS_SUMP	100.0	-14.0		0.0523	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.05330	70.5	69.7
29311_TERBONE8	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
29312_HOUT___8	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
29467_NORTHLND	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
66713_TRFALLS7	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
66767_TRFALLS9	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
66782_TRFALLST	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
66910_TRFALLS8	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9248_GRYGLA	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9249_HIGH_LD	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9253_HOLT_8	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9254_DAK_JCT	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9311_HAZEL8	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9416_GATZKE	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
9468_MUD_LK	MISO_SINKS_SUMP	100.0	-16.3		0.0449	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04516	70.5	69.8
66723_GREENWD7	MISO_SINKS_SUMP	100.0	-16.6		0.0441	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04426	70.5	69.8
66726_ANDERNW7	MISO_SINKS_SUMP	100.0	-16.7		0.0438	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04396	70.5	69.8
63249_CRKSTON7	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7960_PORTAL_P	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7972_CROOKST	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7974_SIMPLOT	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7975_CRK_PL_2	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7977_CRKS_P_T	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7978_CRKS_BAR	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7979_CRKS_PRK	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7980_CRKSTN_J	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7981_CRK_UPTN	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7982_CRKS_SUG	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7983_ROSS__41	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7984_FISH_TP	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7985_FANNY	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7986_CLIMAX9	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7988_CLIMAXSB	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
7989_FISHER	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
8001_HAROLD	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
8002_DEROSIER	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
8058_WARREN	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
8059_RODAN	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
8060_ANGUS	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
8066_ANGRON7	MISO_SINKS_SUMP	100.0	-16.9		0.0432	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04343	70.5	69.8
63254_VIKING_7	MISO_SINKS_SUMP	100.0	-18.0		0.0405	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04036	70.5	69.8
63354_VIK_PIP9	MISO_SINKS_SUMP	100.0	-18.0		0.0405	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04036	70.5	69.8
63237_MAHNOMN7	MISO_SINKS_SUMP	100.0	-18.4		0.0396	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.04507	70.5	69.7
62023_ALBERTA9	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
62028_DONNLLY9	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
62037_ALBTJCT9	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
66318_MORRIS_9	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
66555_MORRIS_7	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
7435_STEEL	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
7439_NW_JCT	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
7447_5_MILE	MISO_SINKS_SUMP	100.0	-19.5		-0.1996	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.20518	-65.0	-61.0
66725_WARREN_7	MISO_SINKS_SUMP	100.0	-19.6		0.0373	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03690	70.5	69.8
66724_ALVARAD7	MISO_SINKS_SUMP	100.0	-21.1		0.0347	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03400	70.5	69.8
63156_KARLSTD9	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
63218_MOROTP_7	MISO_SINKS_SUMP	100.0	-21.2		-0.1836	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.18881	-65.0	-61.0
66708_KARLSTA7	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
66785_KARLSTAT	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
66838_KARLSTA8	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8041_LANCST_T	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8042_BRONSON	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8043_HALMA	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8044_LANCAST	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8046_KARLSTAD	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8047_STRNDQST	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8053_FOLD_T8	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8054_HOLT_JCT	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8055_GREENBSH	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8056_BADGER_T	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8057_BADGER	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8566_HOLT_TP	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
8570_FOLD_T	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9231_LANC_MPC	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9239_MPCGRNBS	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9240_GRNBSMPC	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9343_STRANQ	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9445_STRATH_T	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
9446_STRATCO	MISO_SINKS_SUMP	100.0	-21.2		0.0344	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03362	70.5	69.8
63284_OSLO_TN7	MISO_SINKS_SUMP	100.0	-21.9		0.0334	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03261	70.5	69.8
66722_OSLO___7	MISO_SINKS_SUMP	100.0	-22.1		0.0330	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03221	70.5	69.8
66718_HALMA__7	MISO_SINKS_SUMP	100.0	-22.3		0.0327	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03167	70.5	69.8
9230_HALLOCK8	MISO_SINKS_SUMP	100.0	-22.7		0.0322	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03124	70.5	69.8
9237_ARGYLE8	MISO_SINKS_SUMP	100.0	-22.7		0.0322	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03124	70.5	69.8
9251_RADIUM	MISO_SINKS_SUMP	100.0	-22.7		0.0322	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.03124	70.5	69.8
62002_WALDEN_7	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62029_WALDEN_9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62760_HOLMESC9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62764_HLMSCTP9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62765_WBRLAKE9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62766_FRMNSTP9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
62767_FRAMNAS9	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
66706_FALCONR7	MISO_SINKS_SUMP	100.0	-23.8		0.0306	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02966	70.5	69.8
7434_NE_MORRI	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
7440_CYRUSJT	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
7441_CYRUS	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
7442_FARWELL	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
7443_KENSING	MISO_SINKS_SUMP	100.0	-23.8		-0.1630	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.16781	-65.0	-61.0
61152_PARK___8	MISO_SINKS_SUMP	100.0	-24.1		0.0303	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02898	70.5	69.8
66202_GRNDFKS8	MISO_SINKS_SUMP	100.0	-24.1		0.0303	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02907	70.5	69.8
29227_ST_VINCT	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
63155_DONALDS9	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
63255_DONALDS7	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
63256_DONDPIP7	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
63356_DON_PIP9	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8032_DONALDSN	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8033_KENNEDY	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8034_EMER_TIE	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8035_HALLOCK	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8036_NORTHCOT	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8037_HUMBOLT	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8049_ARGYLE	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8050_STEPHEN	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8051_DON_JCT	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
8065_HALL_NW	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
9298_HUNTSVIL	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02883	70.5	69.8
9300_TABOR	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02883	70.5	69.8
9302_EUCLID	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02883	70.5	69.8
9464_STEP_MPC	MISO_SINKS_SUMP	100.0	-24.2		0.0302	-	63245 WILTON 7 115 63246 BEMIDJI7 115 1	C: 63247 CASS LK7 115 65910 CASS LK4 230 1	6072	120.7	120.0	0.02896	70.5	69.8
62003_JOHNJCT7	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
62004_GRACEV_7	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
62017_GRACEV_9	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
62018_CLINTON9	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7474_ALBERTA	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7475_CHOKIOTP	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7476_CLINTON	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7477_GRCEVILL	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7481_JOHNSN	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
7482_CHOKIO	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
8781_DUMONT	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
8782_DUMONER	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
8784_GRACET	MISO_SINKS_SUMP	100.0	-25.7		-0.1512	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.14908	-65.0	-61.1
91053_BENSON_T	MISO_SINKS_SUMP	100.0	-35.0		-0.1112	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11464	-65.0	-61.0
60374_FIBROMN7	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62001_BENSON_7	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62013_BENSON_9	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62030_DOME_BN9	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62033_MOYER__9	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62034_CSHL_TP9	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
62035_CASHEL_9	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
7438_SE_JCT	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
7459_DANVERS	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
7460_SEEDCO	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
7461_CLONTARF	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
7462_HANCOCK	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
9547_BENSMUN	MISO_SINKS_SUMP	100.0	-35.3		-0.1103	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.11379	-65.0	-61.0
66554_MORRIS_4	MISO_SINKS_SUMP	100.0	-38.5		-0.1010	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.10056	-65.0	-61.1
62012_BENSON_8	MISO_SINKS_SUMP	100.0	-40.2		-0.0967	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.10094	-65.0	-60.9
62349_RUSHRVR8	MISO_SINKS_SUMP	100.0	-42.5		-0.4276	-	60868 LESR TP8 69.0 62349 RUSHRVR8 69.0 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	-65.2	-47.0	-0.41736	-32.8	-15.1
68737_T_BRN	MISO_SINKS_SUMP	100.0	-43.0		0.1835	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.13079	177.0	171.4
68739_BROWNS_1	MISO_SINKS_SUMP	100.0	-43.0		0.1835	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.13079	177.0	171.4
62965_ELKRWS18	MISO_SINKS_SUMP	100.0	-44.4		0.2290	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.22442	59.6	49.7
62967_ELKRWS28	MISO_SINKS_SUMP	100.0	-44.4		0.2290	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.22449	59.6	49.7
36238_E_BL_TP8	MISO_SINKS_SUMP	100.0	-51.1		0.1990	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.19408	59.6	49.7
62175_DEWING_7	MISO_SINKS_SUMP	100.0	-55.3		0.0302	-	62646 WILSONL8 69.0 62647 SPRTLKS8 69.0 1	C: 62191 PINCTRT8 69.0 62651 VINLDTP8 69.0 1	5425	11.4	9.7	0.02184	8.5	7.3
62543_STLLKTP9	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
62544_HENNNGD9	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
62552_STLKRLK9	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
63051_HENNING4	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
63309_HENNING9	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7149_BATTLE_T	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7166_OTTERJT	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7167_DEERCK	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7169_VINING	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7170_CLITHRAL	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
7171_BAT_LAKE	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
9531_HEN_MUN	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
9585_HENMUN_T	MISO_SINKS_SUMP	100.0	-55.8		0.0472	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00646	153.0	152.6
67460_MPSNE	MISO_SINKS_SUMP	100.0	-55.9		-0.1172	-	9929 FARGMID 1.00 66436 FARGO 7 115 1	C: 60133 SHEYNNE4 230 66435 FARGO 4 230 1	3558	-48.6	-42.0	-0.05064	-24.6	-21.7
62100_BIG_LAK8	MISO_SINKS_SUMP	100.0	-56.2		0.1809	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.17569	59.6	49.8
63052_INMAN__4	MISO_SINKS_SUMP	100.0	-59.2		0.0445	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00539	153.0	152.7
66587_MOORHED7	MISO_SINKS_SUMP	100.0	-61.6		-0.1064	-	9929 FARGMID 1.00 66436 FARGO 7 115 1	C: 60133 SHEYNNE4 230 66435 FARGO 4 230 1	3558	-48.6	-42.0	-0.03617	-24.6	-22.3
38838_RICE	MISO_SINKS_SUMP	100.0	-62.5		0.0374	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 61650 LITTLEF7 115 62268 LANGLTP7 115 1	4998	49.0	46.7	0.01518	46.9	46.0
61637_PLATTRV7	MISO_SINKS_SUMP	100.0	-62.5		0.0374	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 61650 LITTLEF7 115 62268 LANGLTP7 115 1	4998	49.0	46.7	0.01518	46.9	46.0
61837_PLATTRV9	MISO_SINKS_SUMP	100.0	-62.5		0.0374	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 61650 LITTLEF7 115 62268 LANGLTP7 115 1	4998	49.0	46.7	0.01518	46.9	46.0
62268_LANGLTP7	MISO_SINKS_SUMP	100.0	-62.5		0.0374	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 61650 LITTLEF7 115 62268 LANGLTP7 115 1	4998	49.0	46.7	0.01518	46.9	46.0
62269_LANGOLA7	MISO_SINKS_SUMP	100.0	-62.5		0.0374	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 61650 LITTLEF7 115 62268 LANGLTP7 115 1	4998	49.0	46.7	0.01518	46.9	46.0
69141_RICEFRD8	MISO_SINKS_SUMP	100.0	-63.3		0.1247	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.09085	177.0	171.3
69177_RICFD_TP	MISO_SINKS_SUMP	100.0	-63.3		0.1247	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.09085	177.0	171.3
63231_FERGSFL7	MISO_SINKS_SUMP	100.0	-65.1		0.0405	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00724	153.0	153.4
69139_SPRI_GR8	MISO_SINKS_SUMP	100.0	-66.7		0.1183	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.08895	177.0	171.1
69142_SPGR_TP	MISO_SINKS_SUMP	100.0	-66.7		0.1183	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.08895	177.0	171.1
62136_REMMELE8	MISO_SINKS_SUMP	100.0	-67.2		0.1512	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.14550	59.6	49.9
62142_REMMLTP8	MISO_SINKS_SUMP	100.0	-67.2		0.1512	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.14550	59.6	49.9
62014_SWIFT_FL	MISO_SINKS_SUMP	100.0	-68.8		-0.0565	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.06287	-65.0	-60.6
8874_AVERILL	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9263_CHRIST	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9362_HENDRUM	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9363_ADA_JCT	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9401_KRAGNES	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9402_AVERILL8	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9404_BUFF_RR	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9406_HAWLEY_J	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
9407_HAWLEY	MISO_SINKS_SUMP	100.0	-70.5		0.0374	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00543	153.0	152.6
68727_CLDNIA_8	MISO_SINKS_SUMP	100.0	-70.7		0.1116	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.08698	177.0	170.9
66553_MOORHED4	MISO_SINKS_SUMP	100.0	-70.8		-0.0926	-	9929 FARGMID 1.00 66436 FARGO 7 115 1	C: 60133 SHEYNNE4 230 66435 FARGO 4 230 1	3558	-48.6	-42.0	-0.01780	-24.6	-23.3
60726_GIBBON_8	MISO_SINKS_SUMP	100.0	-71.6		0.0462	-	60677 HENRYTR8 69.0 60718 BIRDISL8 69.0 1	C: 60742 PANTHER8 69.0 601058 PANTHER3 345 1	4242	38.3	35.0	0.12942	15.4	6.1
68791_CLDNA_SS	MISO_SINKS_SUMP	100.0	-71.6		0.1103	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.08658	177.0	170.8
68729_HOUSTON	MISO_SINKS_SUMP	100.0	-72.2		0.1147	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06976	79.3	74.2
68725_T_HENRY8	MISO_SINKS_SUMP	100.0	-72.4		0.1145	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.07027	79.3	74.2
68822_HENRY8	MISO_SINKS_SUMP	100.0	-72.4		0.1145	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.07027	79.3	74.2
62538_TEN_MIL9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62540_MAINE__9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62541_KRSTJCT9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62542_BAT_LK_9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62545_ORWELL_9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62549_CRLISTP9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62550_CARLISL9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62554_ROTHSAY9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62555_UNDWDTP9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62556_UNDERWD9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62575_ELZBETH9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62839_BGFSHTP8	MISO_SINKS_SUMP	100.0	-74.1		-0.1793	-	62838 FARMING8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	-58.7	-45.4	-0.29453	-23.8	-2.0
62840_BIGFISH8	MISO_SINKS_SUMP	100.0	-74.1		-0.1793	-	62838 FARMING8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	-58.7	-45.4	-0.29453	-23.8	-2.0
63123_HOOT_LK9	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
63223_HOOT_LK7	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
63323_HOOTLK2G	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
63324_HOOTLK3G	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7139_DIVERS	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
7140_FRIBERG	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7141_ELZBTHJT	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7142_ROTHJCT	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7143_ERHARD	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7144_ROTHSAY	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7145_TAPGORGE	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7147_AURDAL	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7148_UNDERWD	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7154_DAYTON_R	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7155_DAYTON	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7156_FOXHTP	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7157_FOXHOME	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7163_CASCJT	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7164_DALTON	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7209_KRISTE	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
7210_OTTERSUB	MISO_SINKS_SUMP	100.0	-74.1		0.0356	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01123	153.0	153.8
62532_FERGUS_7	MISO_SINKS_SUMP	100.0	-74.2		0.0355	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01097	153.0	153.8
63232_EDGETWN7	MISO_SINKS_SUMP	100.0	-74.2		0.0355	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01097	153.0	153.8
63233_EDGETAP7	MISO_SINKS_SUMP	100.0	-74.2		0.0355	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01097	153.0	153.8
63194_FERGSFLY	MISO_SINKS_SUMP	100.0	-76.0		0.0347	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01199	153.0	153.9
63332_FERGSFL9	MISO_SINKS_SUMP	100.0	-76.0		0.0347	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.01199	153.0	153.9
63058_WINGRIV4	MISO_SINKS_SUMP	100.0	-76.1		0.0347	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00296	153.0	152.7
62134_ELKR14S8	MISO_SINKS_SUMP	100.0	-76.9		-0.0925	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.05121	-25.0	-21.1
69527_HARMONY5	MISO_SINKS_SUMP	100.0	-77.1		0.1075	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.07934	79.3	73.1
62531_INMAN__7	MISO_SINKS_SUMP	100.0	-77.5		0.0340	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00278	153.0	153.2
69137_CANTON_8	MISO_SINKS_SUMP	100.0	-78.2		0.1059	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06739	79.3	74.0
69150_CANTN_TP	MISO_SINKS_SUMP	100.0	-78.2		0.1059	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06739	79.3	74.0
62526_RUSH_LK7	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
62560_OTTO___9	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
62561_NYMILLS9	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
62562_RUSH_LK9	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
7168_NY_MILL	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
7172_OTTERT	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
7173_RUSHJCT	MISO_SINKS_SUMP	100.0	-78.7		0.0335	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00244	153.0	153.2
63020_ELK_RIV8	MISO_SINKS_SUMP	100.0	-79.1		-0.0900	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04984	-25.0	-21.1
62546_ERHARD_9	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
62551_PELCNLK9	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
63234_PEL_RPD7	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7176_PELITURK	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7185_PELICTA	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7186_PELICJC	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7187_PELICN	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7188_PELICW	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
7208_PELICAN	MISO_SINKS_SUMP	100.0	-79.7		0.0934	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.16363	49.9	36.9
63235_PERHAM_7	MISO_SINKS_SUMP	100.0	-79.8		0.0331	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00214	153.0	153.1
62530_FRAZEE_7	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62558_EVERGRN9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62559_BURLNTN9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62563_DENT_TP9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62564_DENT___9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62565_FRAZEED9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62566_FRAZEE_9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62568_VRGSJCT9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62569_BTLR_TP9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62570_BUTLER_9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62571_PERHAM_9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
62572_DORA___9	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
7177_LPINELAK	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
7178_FRAZEE	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
7212_VERGAS_T	MISO_SINKS_SUMP	100.0	-80.9		0.0326	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00182	153.0	153.1
67462_DLINDUST	MISO_SINKS_SUMP	100.0	-81.9		0.0322	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00119	153.0	153.1

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
67463_DLRUDDST	MISO_SINKS_SUMP	100.0	-81.9		0.0322	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00119	153.0	153.1
67464_DLWEST	MISO_SINKS_SUMP	100.0	-82.1		0.0321	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00105	153.0	153.1
63207_DL_OTP_7	MISO_SINKS_SUMP	100.0	-82.3		0.0321	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00095	153.0	153.1
68726_HARMNY	MISO_SINKS_SUMP	100.0	-82.7		0.1001	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06546	79.3	73.8
34316_DOVER__8	MISO_SINKS_SUMP	100.0	-83.4		0.0545	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01326	233.7	232.6
68712_CHATFIEL	MISO_SINKS_SUMP	100.0	-83.4		0.0545	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01326	233.7	232.6
29409_HITTRDL8	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
29410_HITTRD_J	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
29411_AUDUBON	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
29476_WSTBRY_S	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
29477_RICHWOOD	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
62557_LKEUNIC9	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
62567_LKENCTP9	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
63136_AUDUBON9	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
66717_ULRICH_7	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
66773_ULRICH_9	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
66781_ULRICH_T	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
67039_ULRICH_8	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
68730_T_LAC	MISO_SINKS_SUMP	100.0	-83.8		0.0988	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06424	79.3	73.9
69304_HAR_MUNI	MISO_SINKS_SUMP	100.0	-83.8		0.0989	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06460	79.3	73.8
7180_CALLAWAY	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
7181_OGEMA	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
7182_ERIEJCT	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
7184_LK_PARK	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
7211_ULRICH	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
7214_AUDBNTWN	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
7998_HITTRDAL	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
7999_ULEN	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
8000_SYRE	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
9412_ERIEMPC	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00044	153.0	152.9
9413_MPCWHITE	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
9414_MPCWHITE2	MISO_SINKS_SUMP	100.0	-83.8		0.0315	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	-0.00002	153.0	153.0
67467_MPSBROOK	MISO_SINKS_SUMP	100.0	-84.8		0.0311	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00093	153.0	152.9
67466_MPSSE	MISO_SINKS_SUMP	100.0	-85.5		0.0309	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00070	153.0	152.9
63336_AUDUBON4	MISO_SINKS_SUMP	100.0	-85.6		0.0308	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00226	153.0	152.8
62114_RDFTAP_8	MISO_SINKS_SUMP	100.0	-86.1		-0.0826	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04572	-25.0	-21.1
62115_RDF____8	MISO_SINKS_SUMP	100.0	-86.1		-0.0826	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04572	-25.0	-21.1
69140_GRANGER	MISO_SINKS_SUMP	100.0	-86.2		0.0961	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06273	79.3	73.8
67459_MPSCENT	MISO_SINKS_SUMP	100.0	-86.4		0.0305	-	63195 BIGSTONY 230 63214 BIGSTON7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	235.6	233.0	0.00038	153.0	152.9
62957_OTSGOTP8	MISO_SINKS_SUMP	100.0	-86.6		-0.0822	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04560	-25.0	-21.1
62938_OTSEGO_8	MISO_SINKS_SUMP	100.0	-86.9		-0.0819	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04571	-25.0	-21.1
62966_ELKROTS8	MISO_SINKS_SUMP	100.0	-86.9		-0.0819	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.04571	-25.0	-21.1
61992_PRESTON	MISO_SINKS_SUMP	100.0	-88.1		0.0940	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06129	79.3	73.9
68700_PREST_TP	MISO_SINKS_SUMP	100.0	-88.1		0.0940	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06129	79.3	73.9
68722_T_PRES	MISO_SINKS_SUMP	100.0	-88.1		0.0940	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06129	79.3	73.9
61994_N_PRESTN	MISO_SINKS_SUMP	100.0	-88.2		0.0939	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06124	79.3	73.9
69305_N_PRES_T	MISO_SINKS_SUMP	100.0	-88.2		0.0939	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.06124	79.3	73.9
69322_QUINCY	MISO_SINKS_SUMP	100.0	-88.4		0.0514	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01342	233.7	232.5
68728_CAL_CITY	MISO_SINKS_SUMP	100.0	-89.7		0.0880	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.07392	177.0	170.4
68724_FOUNTAIN	MISO_SINKS_SUMP	100.0	-90.4		0.0916	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05966	79.3	73.9
69134_CHERRY_8	MISO_SINKS_SUMP	100.0	-91.6		0.0904	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05885	79.3	73.9
34311_CHESTTP8	MISO_SINKS_SUMP	100.0	-92.6		0.0895	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05819	79.3	73.9
34320_STCRLMUN	MISO_SINKS_SUMP	100.0	-94.2		0.0482	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01358	233.7	232.4
34010_HAYWARD5	MISO_SINKS_SUMP	100.0	-94.7		-0.0634	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.05047	-159.7	-154.9
9337_HALSTDMC	MISO_SINKS_SUMP	100.0	-95.4		-0.0688	-	9929 FARGMID 1.00 66436 FARGO 7 115 1	C: 60133 SHEYNNE4 230 66435 FARGO 4 230 1	3558	-48.6	-42.0	-0.03689	-24.6	-21.0
69138_SPRING_8	MISO_SINKS_SUMP	100.0	-96.1		0.0862	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05596	79.3	73.9
34314_SPRVALL8	MISO_SINKS_SUMP	100.0	-97.8		0.0847	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05495	79.3	73.9
61940_SPRING_V	MISO_SINKS_SUMP	100.0	-97.8		0.0847	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05495	79.3	73.9
68731_MND_PRAR	MISO_SINKS_SUMP	100.0	-98.2		0.0843	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.05920	79.3	73.4
34325_ST_CHRT8	MISO_SINKS_SUMP	100.0	-98.6		0.0461	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01369	233.7	232.4
68713_ST_CHARL	MISO_SINKS_SUMP	100.0	-102.0		0.0445	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01377	233.7	232.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62528_TAMARAC7	MISO_SINKS_SUMP	100.0	-103.4		0.0721	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.13297	49.9	36.2
62553_TANSEM_9	MISO_SINKS_SUMP	100.0	-103.4		0.0721	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.13297	49.9	36.2
63310_TAMARAC9	MISO_SINKS_SUMP	100.0	-103.4		0.0721	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.13297	49.9	36.2
9501_BARNMUN	MISO_SINKS_SUMP	100.0	-103.4		0.0721	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.13297	49.9	36.2
60154_SAUK_RV7	MISO_SINKS_SUMP	100.0	-109.5		0.0331	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:756	76	50.3	46.7	0.02718	46.9	44.0
62858_ROCKVLL7	MISO_SINKS_SUMP	100.0	-109.5		0.0331	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:756	76	50.3	46.7	0.02718	46.9	44.0
60165_MEI_INT7	MISO_SINKS_SUMP	100.0	-110.7		0.0327	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:756	76	50.3	46.7	0.02659	46.9	44.0
62427_WILLMAR8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62428_PENNOCK8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62429_PNNCKTP8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62430_SUNBURG8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62431_HAWICK_8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62432_KANDYOH8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62434_PR_WDS_8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62435_PRWDTAP8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62436_GREENLK8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62441_SPICERT8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62442_SPICER_8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62990_WILMRMN8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62991_WILMRSW8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62992_WILMRSO8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62993_WILSWTP8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62994_WILMRTP8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62995_WILMR_E8	MISO_SINKS_SUMP	100.0	-110.7		-0.0351	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03418	-65.0	-61.2
62819_FSCHRHL7	MISO_SINKS_SUMP	100.0	-111.9		0.0324	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:756	76	50.3	46.7	0.02747	46.9	43.9
34313_STEWVLJ8	MISO_SINKS_SUMP	100.0	-115.6		0.0716	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04602	79.3	73.9
34315_CHATFLD8	MISO_SINKS_SUMP	100.0	-115.6		0.0716	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04602	79.3	73.9
34324_JOR_TAP	MISO_SINKS_SUMP	100.0	-115.6		0.0716	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04602	79.3	73.9
69350_JORDAN	MISO_SINKS_SUMP	100.0	-115.6		0.0716	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04602	79.3	73.9
7478_BARRY	MISO_SINKS_SUMP	100.0	-117.5		-0.0331	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	0.00027	-65.0	-65.0
7479_BRDSLYTP	MISO_SINKS_SUMP	100.0	-117.5		-0.0331	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	0.00027	-65.0	-65.0
7480_BEARDSLY	MISO_SINKS_SUMP	100.0	-117.5		-0.0331	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	0.00027	-65.0	-65.0
8787_BEARDREA	MISO_SINKS_SUMP	100.0	-117.5		-0.0331	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	0.00027	-65.0	-65.0
62157_ELKR142T	MISO_SINKS_SUMP	100.0	-118.2		0.0860	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.07993	59.6	50.2
62433_SVEA___8	MISO_SINKS_SUMP	100.0	-121.3		-0.0320	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03123	-65.0	-61.2
62437_SVEATAP8	MISO_SINKS_SUMP	100.0	-121.3		-0.0320	-	63219 GRANTCO7 115 66555 MORRIS 7 115 1	C:610 1	48	-99.9	-96.0	-0.03123	-65.0	-61.2
62929_ALBERTV8	MISO_SINKS_SUMP	100.0	-126.1		-0.0564	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.03267	-25.0	-20.9
34312_STWRTVL8	MISO_SINKS_SUMP	100.0	-126.4		0.0655	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04184	79.3	74.0
62156_ELKR141T	MISO_SINKS_SUMP	100.0	-126.5		-0.2315	-	62134 ELKR14S8 69.0 B$0142 230/69 1.00 1	C:BUNKER LAKE 30RB1 STUCK	263	-216.3	-187.0	-0.05275	-108.1	-101.4
34321_LWSTNIP8	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
34322_RUSHFRD8	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68718_RUSHFORD	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68732_T_WIT	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68733_WITOKA	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68734_WILSON	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68735_T_RUSH	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
68774_UTICA	MISO_SINKS_SUMP	100.0	-126.9		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01422	233.7	231.9
62138_BRGGLKS8	MISO_SINKS_SUMP	100.0	-129.1		0.0328	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C: 63043 ELK RIV4 230 63046 BUNKER 4 230 1	5909	75.9	71.7	0.02182	59.6	56.8
62277_DUELM__8	MISO_SINKS_SUMP	100.0	-129.1		0.0328	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C: 63043 ELK RIV4 230 63046 BUNKER 4 230 1	5909	75.9	71.7	0.02182	59.6	56.8
62295_DUELMSW8	MISO_SINKS_SUMP	100.0	-129.1		0.0328	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C: 63043 ELK RIV4 230 63046 BUNKER 4 230 1	5909	75.9	71.7	0.02182	59.6	56.8
62122_WESTEND8	MISO_SINKS_SUMP	100.0	-132.4		0.0320	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C: 63043 ELK RIV4 230 63046 BUNKER 4 230 1	5909	75.9	71.7	0.02113	59.6	56.9
68716_T_STOC	MISO_SINKS_SUMP	100.0	-133.5		0.0340	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01508	233.7	231.7
68717_STOCKTON	MISO_SINKS_SUMP	100.0	-133.5		0.0340	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01508	233.7	231.7
34323_WOLFCRK8	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
61984_AUSTIN_5	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
61985_AUSTIN	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
61986_AUSTIN	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
61988_AUSTIN	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
61990_BLOOM_PR	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
69052_BROWNSDA	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
69077_SARGENT	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
69084_CORNING	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
69086_T_BP	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
69100_T_AUST	MISO_SINKS_SUMP	100.0	-138.7		-0.0433	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.03514	-159.7	-154.8
62125_BECKER_8	MISO_SINKS_SUMP	100.0	-138.9		0.0305	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C: 63043 ELK RIV4 230 63046 BUNKER 4 230 1	5909	75.9	71.7	0.01989	59.6	56.9
60710_FARM_TP8	MISO_SINKS_SUMP	100.0	-140.6		0.1228	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.21029	27.8	-1.8
63009_CGS__82G	MISO_SINKS_SUMP	100.0	-141.2		0.0339	-	62144 SDRVLSW8 69.0 62152 HAMLAKE8 69.0 1	C:12WB2 Stuck	257	52.6	47.8	0.06009	26.2	17.7
63022_CAMBRDG8	MISO_SINKS_SUMP	100.0	-141.2		0.0339	-	62144 SDRVLSW8 69.0 62152 HAMLAKE8 69.0 1	C:12WB2 Stuck	257	52.6	47.8	0.06009	26.2	17.7
60711_RICHMND8	MISO_SINKS_SUMP	100.0	-141.9		0.1217	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.20842	27.8	-1.8
68703_PLAINVIE	MISO_SINKS_SUMP	100.0	-143.8		0.0466	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01186	233.7	232.0
68705_WHITEWAT	MISO_SINKS_SUMP	100.0	-143.8		0.0466	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01186	233.7	232.0
69158_T_PLV_8	MISO_SINKS_SUMP	100.0	-143.8		0.0466	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01186	233.7	232.0
60779_ALTURA_8	MISO_SINKS_SUMP	100.0	-143.9		0.0316	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01627	233.7	231.4
68720_LEWISTON	MISO_SINKS_SUMP	100.0	-144.0		0.0315	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01310	233.7	231.8
68773_LEWIS_TP	MISO_SINKS_SUMP	100.0	-144.0		0.0315	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:WABACO 869.0-WABACO 5161.-1+SW123	769	231.5	227.0	0.01310	233.7	231.8
68868_PINE_CK	MISO_SINKS_SUMP	100.0	-146.6		0.0565	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04951	79.3	72.0
63331_FERGSFL4	MISO_SINKS_SUMP	100.0	-146.7		0.0508	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.09831	49.9	35.5
62533_CORMRNT7	MISO_SINKS_SUMP	100.0	-148.3		0.0502	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.10163	49.9	34.8
62270_INDSTRL8	MISO_SINKS_SUMP	100.0	-153.9		-0.1386	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.18283	-35.8	-7.7
62296_INDSTTP8	MISO_SINKS_SUMP	100.0	-153.9		-0.1386	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.18283	-35.8	-7.7
62867_AL_CORN5	MISO_SINKS_SUMP	100.0	-156.9		0.0383	-	34298 MEDFRDJ8 69.0 34299 WASECAJ8 69.0 1	C: 60806 WASECA 8 69.0 61976 LOON LK8 69.0 1	4340	37.0	31.0	0.04585	2.9	-4.3
60646_BYLSBY9G	MISO_SINKS_SUMP	100.0	-158.7		0.3266	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.32305	233.7	182.4
62529_CMRTJCT7	MISO_SINKS_SUMP	100.0	-162.8		0.0458	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.09519	49.9	34.4
62836_MUNSON_8	MISO_SINKS_SUMP	100.0	-167.0		0.1034	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.18515	27.8	-3.1
62837_MUNSNTP8	MISO_SINKS_SUMP	100.0	-167.0		0.1034	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.18515	27.8	-3.1
69198_WABACO_8	MISO_SINKS_SUMP	100.0	-167.8		0.0400	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01186	233.7	231.7
68704_LNSBRMUN	MISO_SINKS_SUMP	100.0	-172.6		0.0480	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02644	79.3	74.7
68721_PETERSON	MISO_SINKS_SUMP	100.0	-172.6		0.0480	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02644	79.3	74.7
34319_PLAINVW8	MISO_SINKS_SUMP	100.0	-173.1		0.0387	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01203	233.7	231.6
60802_CANFLS_8	MISO_SINKS_SUMP	100.0	-179.7		0.0941	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60801 CNFLSTR8 69.0 60802 CANFLS 8 69.0 1	4330	243.9	227.0	0.31257	233.7	177.5
62390_SCANNON8	MISO_SINKS_SUMP	100.0	-179.7		0.0941	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60801 CNFLSTR8 69.0 60802 CANFLS 8 69.0 1	4330	243.9	227.0	0.29261	233.7	181.1
34318_ELGIN__8	MISO_SINKS_SUMP	100.0	-182.3		0.0368	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01230	233.7	231.5
61921_PRINNTH	MISO_SINKS_SUMP	100.0	-186.2		-0.1561	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.13863	-86.2	-60.4
69526_BVR_CRK5	MISO_SINKS_SUMP	100.0	-186.5		-0.0322	-	63730 HAMPTON5 161 63774 SHEFFLD5 161 1	C: 34016 EMERY 5 161 64252 FLOYD 5 161 1	7360	-208.0	-202.0	-0.02714	-159.7	-154.6
60828_LACRSNT8	MISO_SINKS_SUMP	100.0	-187.1		0.0443	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.04526	79.3	70.8
69160_LTL_VLY8	MISO_SINKS_SUMP	100.0	-188.9		0.0355	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01248	233.7	231.3
60707_BLUEHRN8	MISO_SINKS_SUMP	100.0	-198.0		0.0872	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.14985	27.8	-1.9
68711_WEST_ALB	MISO_SINKS_SUMP	100.0	-201.5		0.0478	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBRTA869.0-LENA TP869.0-1+SW123	761	236.6	227.0	0.01186	233.7	231.3
34317_EYOTA__8	MISO_SINKS_SUMP	100.0	-209.2		0.0321	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01296	233.7	231.0
62391_HADER__8	MISO_SINKS_SUMP	100.0	-210.6		0.1631	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.11313	64.5	40.7
69159_EYOTA_8	MISO_SINKS_SUMP	100.0	-214.3		0.0313	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBFLS869.0-WEST ALB69.0-1+SW123	764	233.7	227.0	0.01306	233.7	230.9
63043_ELK_RIV4	MISO_SINKS_SUMP	100.0	-215.9		-0.0330	-	62149 RICELKS8 69.0 62968 ELKRNTH8 69.0 1	C: 62134 ELKR14S8 69.0 62967 ELKRWS28 69.0 1	5384	-52.6	-45.5	-0.01798	-25.0	-21.2
62292_PRINCTN8	MISO_SINKS_SUMP	100.0	-220.7		-0.1317	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.11870	-86.2	-60.0
63166_SILVRLK9	MISO_SINKS_SUMP	100.0	-221.3		0.0337	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.07965	49.9	32.3
63366_SILVRLK4	MISO_SINKS_SUMP	100.0	-221.3		0.0337	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.07965	49.9	32.3
63202_AUDUBONY	MISO_SINKS_SUMP	100.0	-224.7		0.0332	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.07440	49.9	33.2
62283_DALBO__8	MISO_SINKS_SUMP	100.0	-230.5		0.0318	-	62293 RUSH CY8 69.0 62299 ADRIANR8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	43.2	35.9	-0.01982	24.8	29.4
62284_DALBOTP8	MISO_SINKS_SUMP	100.0	-230.5		0.0318	-	62293 RUSH CY8 69.0 62299 ADRIANR8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	43.2	35.9	-0.01982	24.8	29.4
34572_ADAMS_S5	MISO_SINKS_SUMP	100.0	-234.4		0.0337	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.02031	177.0	172.3
34014_ADAMS__5	MISO_SINKS_SUMP	100.0	-235.4		0.0335	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.02022	177.0	172.3
34570_ADAMS_N5	MISO_SINKS_SUMP	100.0	-235.9		0.0335	-	69523 GENOA 5 161 69535 LAC TAP5 161 1	C: 60302 COULEE 5 161 69523 GENOA 5 161 1	3933	286.9	279.0	0.02016	177.0	172.3
34306_ADAMS__8	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
68930_T_RC_8	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
68936_LONDON	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
69078_ROSE_CRE	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
69098_MCNEILS8	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
69122_TAOPI	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
69130_T_TAOPI	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
907_G330	MISO_SINKS_SUMP	100.0	-237.1		0.0349	-	60302 COULEE 5 161 60308 LACROSS5 161 1	C:GENOA-N-STK	360	203.3	195.0	0.02097	79.3	74.3
63236_AUDUBON7	MISO_SINKS_SUMP	100.0	-238.5		0.0312	-	63223 HOOT LK7 115 69413 EFERGUS7 115 1	C: 63219 GRANTCO7 115 66555 MORRIS 7 115 1	6026	87.5	80.0	0.06993	49.9	33.2
62814_WESTWD_7	MISO_SINKS_SUMP	100.0	-245.3		0.0301	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 60707 BLUEHRN8 69.0 60717 WAKEFLD8 69.0 1	4188	54.1	46.7	0.03161	46.9	39.2
60163_WST_CLD7	MISO_SINKS_SUMP	100.0	-246.2		0.0308	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C: 63050 WILLMAR4 230 66550 GRANITF4 230 1	5917	54.2	46.7	0.03288	46.9	38.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62535_EVERDEL9	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
62536_ROBRTSW9	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
62537_ROBERTS9	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7596_TOWNTP	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7598_CARGILJC	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7600_BRECKER	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7602_BRECKR	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7603_CARGLJ	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7604_DORANJ	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7639_DORAN	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
7640_CAMBELL	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
8788_DORANREA	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
9550_BREKPT9	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
9551_BRECKJ	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
9552_SO_BRECK	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
9554_TWITOSB	MISO_SINKS_SUMP	100.0	-248.5		-0.0403	-	62003 JOHNJCT7 115 63216 ORTONVL7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6144	-106.6	-96.6	-0.00545	-63.7	-62.4
62812_SRTLLTP7	MISO_SINKS_SUMP	100.0	-248.7		0.0304	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:3Wnd: OPEN B$0116 115/69 1	3644	54.2	46.7	0.03017	46.9	39.4
62813_SARTELL7	MISO_SINKS_SUMP	100.0	-248.7		0.0304	-	60163 WST CLD7 115 B$0092 115/69 1.00 1	C:3Wnd: OPEN B$0116 115/69 1	3644	54.2	46.7	0.03017	46.9	39.4
61950_BYRON__3	MISO_SINKS_SUMP	100.0	-251.8		0.0425	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02991	323.8	316.3
62109_ISANTI_8	MISO_SINKS_SUMP	100.0	-252.1		-0.0846	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.11602	-35.8	-6.6
62141_ISANTTP8	MISO_SINKS_SUMP	100.0	-252.1		-0.0846	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.11602	-35.8	-6.6
62834_ROSCOE_8	MISO_SINKS_SUMP	100.0	-258.7		0.0668	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.13764	27.8	-7.8
62835_ROSCOTP8	MISO_SINKS_SUMP	100.0	-258.7		0.0668	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.13764	27.8	-7.8
60717_WAKEFLD8	MISO_SINKS_SUMP	100.0	-258.8		0.0667	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.11504	27.8	-2.0
62850_WSTCLD_T	MISO_SINKS_SUMP	100.0	-262.9		-0.0321	-	60732 WST CLD8 69.0 B$0092 115/69 1.00 1	C:500	21	-55.1	-46.7	-0.03564	-46.7	-37.3
60775_E_WINON8	MISO_SINKS_SUMP	100.0	-263.0		-0.0323	-	61248 BUGLELK8 69.0 68867 INDEPNDN 69.0 1	C: 60316 TREMVAL5 161 60979 TREMVAL8 69.0 1	3969	-33.5	-25.0	-0.04723	-9.3	3.1
60776_WINONA_8	MISO_SINKS_SUMP	100.0	-263.0		-0.0323	-	61248 BUGLELK8 69.0 68867 INDEPNDN 69.0 1	C: 60316 TREMVAL5 161 60979 TREMVAL8 69.0 1	3969	-33.5	-25.0	-0.04723	-9.3	3.1
60777_GOODV2_8	MISO_SINKS_SUMP	100.0	-263.0		-0.0323	-	61248 BUGLELK8 69.0 68867 INDEPNDN 69.0 1	C: 60316 TREMVAL5 161 60979 TREMVAL8 69.0 1	3969	-33.5	-25.0	-0.04723	-9.3	3.1
60778_GOODV1_8	MISO_SINKS_SUMP	100.0	-263.0		-0.0323	-	61248 BUGLELK8 69.0 68867 INDEPNDN 69.0 1	C: 60316 TREMVAL5 161 60979 TREMVAL8 69.0 1	3969	-33.5	-25.0	-0.04723	-9.3	3.1
60942_WIN_TAP8	MISO_SINKS_SUMP	100.0	-263.0		-0.0323	-	61248 BUGLELK8 69.0 68867 INDEPNDN 69.0 1	C: 60316 TREMVAL5 161 60979 TREMVAL8 69.0 1	3969	-33.5	-25.0	-0.04723	-9.3	3.1
68707_T_ZUM	MISO_SINKS_SUMP	100.0	-268.7		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBRTA869.0-LENA TP869.0-1+SW123	761	236.6	227.0	0.01186	233.7	230.5
68709_ZUMBRO	MISO_SINKS_SUMP	100.0	-268.7		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBRTA869.0-LENA TP869.0-1+SW123	761	236.6	227.0	0.01186	233.7	230.5
62845_FAIRHVN8	MISO_SINKS_SUMP	100.0	-270.1		0.0639	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.11014	27.8	-1.9
62846_FRHV_TP8	MISO_SINKS_SUMP	100.0	-270.1		0.0639	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.11014	27.8	-1.9
61910_MILACA_4	MISO_SINKS_SUMP	100.0	-274.4		0.0370	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.02866	59.6	51.8
60705_LUXBGTP8	MISO_SINKS_SUMP	100.0	-284.7		0.0607	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.10437	27.8	-1.9
62844_LUXMBRG8	MISO_SINKS_SUMP	100.0	-284.7		0.0607	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.10437	27.8	-1.9
63032_PL_VLLY3	MISO_SINKS_SUMP	100.0	-292.8		0.0365	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02572	323.8	316.3
61920_PRINPLNT	MISO_SINKS_SUMP	100.0	-300.2		-0.0968	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08600	-86.2	-60.4
61922_PRINCTAP	MISO_SINKS_SUMP	100.0	-300.2		-0.0968	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08600	-86.2	-60.4
61924_PRINCETN	MISO_SINKS_SUMP	100.0	-300.2		-0.0968	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08600	-86.2	-60.4
62155_PRINCID8	MISO_SINKS_SUMP	100.0	-300.2		-0.0968	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08600	-86.2	-60.4
68706_T_WHWATR	MISO_SINKS_SUMP	100.0	-305.1		0.0316	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:ZUMBRTA869.0-LENA TP869.0-1+SW123	761	236.6	227.0	0.01186	233.7	230.1
62297_BENTON_8	MISO_SINKS_SUMP	100.0	-305.4		0.0333	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.02503	59.6	52.0
62300_MINDEN_8	MISO_SINKS_SUMP	100.0	-305.4		0.0333	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.02503	59.6	52.0
60804_VASATAP8	MISO_SINKS_SUMP	100.0	-306.7		0.2032	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.19273	233.7	174.6
62388_VASA__8	MISO_SINKS_SUMP	100.0	-306.7		0.2032	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.19273	233.7	174.6
62620_WATKINS8	MISO_SINKS_SUMP	100.0	-314.5		0.0549	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.09428	27.8	-1.8
63006_PVS__51G	MISO_SINKS_SUMP	100.0	-319.1		0.0335	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02360	323.8	316.3
63007_PVS__52G	MISO_SINKS_SUMP	100.0	-319.1		0.0335	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02360	323.8	316.3
63008_PVS__53G	MISO_SINKS_SUMP	100.0	-319.1		0.0335	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02360	323.8	316.3
63070_PL_VLLY5	MISO_SINKS_SUMP	100.0	-319.1		0.0335	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02360	323.8	316.3
62102_CABLE__8	MISO_SINKS_SUMP	100.0	-321.8		0.0316	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.02350	59.6	52.1
62139_CABLETP8	MISO_SINKS_SUMP	100.0	-321.8		0.0316	-	62134 ELKR14S8 69.0 63020 ELK RIV8 69.0 1	C:009 2	127	81.9	71.7	0.02350	59.6	52.1
60703_WATKINS8	MISO_SINKS_SUMP	100.0	-324.9		0.0531	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.09117	27.8	-1.8
63073_PL_VLLYT	MISO_SINKS_SUMP	100.0	-325.7		0.0328	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02312	323.8	316.3
60102_ADAMS__3	MISO_SINKS_SUMP	100.0	-329.1		0.0325	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02289	323.8	316.3
60066_GMW	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
60798_DODGCEN8	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
60799_KASSON_8	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
60800_PINEISL8	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60916_GARWINDG	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
61161_WBYRON_8	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
61948_BYRON__5	MISO_SINKS_SUMP	100.0	-342.2		0.0313	-	60236 REDROCK3 345 60238 REDROCK7 115 9	C: 60236 REDROCK3 345 60238 REDROCK7 115 10	3818	458.7	448.0	0.02201	323.8	316.3
62099_BALDWIN8	MISO_SINKS_SUMP	100.0	-355.3		-0.0642	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C:ELK RIVER 14RB1 STUCK	260	-94.5	-71.7	-0.07208	-86.2	-60.6
60787_NOFIELD8	MISO_SINKS_SUMP	100.0	-379.2		0.1367	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.13523	233.7	182.4
62279_BRAHAM_8	MISO_SINKS_SUMP	100.0	-381.0		-0.0763	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.27077	-86.2	17.0
62291_GRASTON8	MISO_SINKS_SUMP	100.0	-381.0		-0.0763	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.21580	-86.2	-4.0
62143_ATHNSSW8	MISO_SINKS_SUMP	100.0	-388.4		-0.0549	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.07927	-35.8	-5.0
62968_ELKRNTH8	MISO_SINKS_SUMP	100.0	-396.8		-0.0328	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62134 ELKR14S8 69.0 62968 ELKRNTH8 69.0 1	5385	-84.7	-71.7	0.00191	-86.2	-86.9
60704_KIMBALL8	MISO_SINKS_SUMP	100.0	-405.9		0.0425	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.07253	27.8	-1.6
62622_KINGSTN8	MISO_SINKS_SUMP	100.0	-405.9		0.0425	-	60710 FARM TP8 69.0 62839 BGFSHTP8 69.0 1	C:775	80	62.7	45.4	0.07253	27.8	-1.6
62271_LONGSDG8	MISO_SINKS_SUMP	100.0	-417.7		-0.0358	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62271 LONGSDG8 69.0 62292 PRINCTN8 69.0 1	5484	-86.7	-71.7	-0.11143	-86.2	-39.6
61665_THOMSON7	MISO_SINKS_SUMP	100.0	-419.6		0.1161	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.11667	146.6	97.6
60786_DUNDAS_8	MISO_SINKS_SUMP	100.0	-420.4		0.1233	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.12172	233.7	182.5
61666_FONDULAC	MISO_SINKS_SUMP	100.0	-427.7		0.2693	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.26930	-40.5	-155.7
62380_WELLSCK8	MISO_SINKS_SUMP	100.0	-429.4		-0.0817	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.00468	-102.8	-104.8
60818_ZUMBRTA8	MISO_SINKS_SUMP	100.0	-430.6		0.0798	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.04320	64.5	45.9
60820_LENATAP8	MISO_SINKS_SUMP	100.0	-430.6		0.0798	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.04320	64.5	45.9
61664_WRENSHL7	MISO_SINKS_SUMP	100.0	-436.5		0.1116	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.11095	146.6	98.1
60725_WINTHRP8	MISO_SINKS_SUMP	100.0	-440.7		0.0342	-	62986 HUTCHMN8 69.0 62987 HUTCHCP8 69.0 1	C:HUTCHMN869.0-HTCHHTI869.0-1+SW22	424	51.0	35.9	0.03422	7.7	-7.4
62281_MAYHEW_8	MISO_SINKS_SUMP	100.0	-444.8		-0.0311	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C:3Wnd: OPEN B$0132 230/69 1	5516	-85.5	-71.7	-0.02091	-86.2	-76.9
62298_POPPLCR8	MISO_SINKS_SUMP	100.0	-444.8		-0.0311	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C:3Wnd: OPEN B$0132 230/69 1	5516	-85.5	-71.7	-0.02091	-86.2	-76.9
62385_GOODHUE8	MISO_SINKS_SUMP	100.0	-448.0		-0.0783	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.00772	-102.8	-106.3
62318_HENNRIE8	MISO_SINKS_SUMP	100.0	-448.5		-0.0422	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62291 GRASTON8 69.0 62318 HENNRIE8 69.0 1	5509	-90.6	-71.7	-0.19295	-86.2	0.4
60162_WAKEFLD7	MISO_SINKS_SUMP	100.0	-451.6		-0.0799	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	0.00340	-168.3	-169.9
60706_WAKEFLD9	MISO_SINKS_SUMP	100.0	-451.6		-0.0799	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	0.00340	-168.3	-169.9
62078_HRTLND_8	MISO_SINKS_SUMP	100.0	-455.9		0.0331	-	62986 HUTCHMN8 69.0 62987 HUTCHCP8 69.0 1	C:HUTCHMN869.0-HTCHHTI869.0-1+SW22	424	51.0	35.9	0.03308	7.7	-7.4
60803_MIESTAP8	MISO_SINKS_SUMP	100.0	-469.7		0.0590	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	4331	254.7	227.0	0.23488	233.7	123.4
62260_BYLLSBY8	MISO_SINKS_SUMP	100.0	-469.7		0.0590	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	4331	254.7	227.0	0.26286	233.7	110.2
61667_POTLTCH7	MISO_SINKS_SUMP	100.0	-470.4		0.1036	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.08721	146.6	105.6
60819_CHERYTP8	MISO_SINKS_SUMP	100.0	-473.2		0.0726	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.04086	64.5	45.1
62381_CHERRYG8	MISO_SINKS_SUMP	100.0	-473.2		0.0726	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.04086	64.5	45.1
61803_THOM46_9	MISO_SINKS_SUMP	100.0	-477.8		0.1020	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09999	146.6	98.8
61668_CLOQUET7	MISO_SINKS_SUMP	100.0	-482.1		0.1010	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.08129	146.6	107.4
62075_CORNISH8	MISO_SINKS_SUMP	100.0	-491.6		0.0307	-	62986 HUTCHMN8 69.0 62987 HUTCHCP8 69.0 1	C:HUTCHMN869.0-HTCHHTI869.0-1+SW22	424	51.0	35.9	0.03068	7.7	-7.4
62404_FOND_DU9	MISO_SINKS_SUMP	100.0	-492.2		0.0990	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09646	146.6	99.1
62409_FOND_DU8	MISO_SINKS_SUMP	100.0	-492.2		0.0990	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09646	146.6	99.1
60833_SPRCRKT8	MISO_SINKS_SUMP	100.0	-492.3		0.1266	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15757	233.7	156.1
61656_MAHTOWA7	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
61809_MAHV46_9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
61813_BARNUM_9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
61814_MAHTOWV9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
61815_MAHT24_9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
61817_CARLTAP9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
62405_PETERSN9	MISO_SINKS_SUMP	100.0	-499.8		0.0975	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.09298	146.6	100.1
62383_BLVDRML8	MISO_SINKS_SUMP	100.0	-503.1		-0.0697	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.01543	-102.8	-110.6
62384_BLVDMTP8	MISO_SINKS_SUMP	100.0	-503.1		-0.0697	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.01543	-102.8	-110.6
62382_LENA_TP8	MISO_SINKS_SUMP	100.0	-523.4		0.0656	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03158	64.5	47.9
62392_LENA___8	MISO_SINKS_SUMP	100.0	-523.4		0.0656	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03158	64.5	47.9
61914_MORA	MISO_SINKS_SUMP	100.0	-523.7		-0.0318	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62270 INDSTRL8 69.0 62296 INDSTTP8 69.0 1	5482	-40.5	-23.9	-0.03179	-35.8	-19.2
62303_MORA___8	MISO_SINKS_SUMP	100.0	-523.7		-0.0318	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62270 INDSTRL8 69.0 62296 INDSTTP8 69.0 1	5482	-40.5	-23.9	-0.03179	-35.8	-19.2
62394_SPRNGC2T	MISO_SINKS_SUMP	100.0	-545.0		0.1144	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15141	233.7	151.2
61675_RIDGEVW7	MISO_SINKS_SUMP	100.0	-545.7		0.0893	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04596	146.6	121.5
61671_BURNETT7	MISO_SINKS_SUMP	100.0	-548.3		0.0888	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.07152	146.6	107.4
60796_KENYON_8	MISO_SINKS_SUMP	100.0	-552.6		0.0622	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03748	64.5	43.8
62874_CMNTJCT8	MISO_SINKS_SUMP	100.0	-552.6		0.0622	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03748	64.5	43.8
61688_COLBYVL7	MISO_SINKS_SUMP	100.0	-555.6		0.0877	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04534	146.6	121.4
62393_SPRNGC1T	MISO_SINKS_SUMP	100.0	-557.4		0.1118	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15163	233.7	149.2
60788_VALLYTP8	MISO_SINKS_SUMP	100.0	-557.6		0.0930	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.09116	233.7	182.9
62870_VLLYGRV8	MISO_SINKS_SUMP	100.0	-557.6		0.0930	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.09116	233.7	182.9
68719_WEAVER	MISO_SINKS_SUMP	100.0	-560.9		0.0302	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 62224 RAVENNA5 161 63071 SPRNGCK5 161 1	5446	243.9	227.0	0.01829	233.7	223.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60817_BURNSID8	MISO_SINKS_SUMP	100.0	-572.2		0.1089	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15261	233.7	146.4
62216_KNIFELK8	MISO_SINKS_SUMP	100.0	-572.4		-0.0508	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08570	-86.2	-37.1
62217_KNIFETP8	MISO_SINKS_SUMP	100.0	-572.4		-0.0508	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.08570	-86.2	-37.1
62280_OGILVIE8	MISO_SINKS_SUMP	100.0	-573.2		-0.0372	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	0.01936	-35.8	-46.9
61689_FRNCHRV7	MISO_SINKS_SUMP	100.0	-577.2		0.0844	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04405	146.6	121.2
60795_KENYNVL8	MISO_SINKS_SUMP	100.0	-577.8		0.0595	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03659	64.5	43.3
60797_KENYNTP8	MISO_SINKS_SUMP	100.0	-577.8		0.0595	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03659	64.5	43.3
60789_CIRCLTP8	MISO_SINKS_SUMP	100.0	-578.0		0.0897	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.08787	233.7	182.9
62871_CIRCLEL8	MISO_SINKS_SUMP	100.0	-578.0		0.0897	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.08787	233.7	182.9
62872_FARIBLT8	MISO_SINKS_SUMP	100.0	-578.0		0.0897	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.08787	233.7	182.9
62387_SPRNGCK8	MISO_SINKS_SUMP	100.0	-579.6		0.1075	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15202	233.7	145.6
61655_CROMWLL7	MISO_SINKS_SUMP	100.0	-583.0		0.0836	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.07513	146.6	102.8
62514_CROMWLLT	MISO_SINKS_SUMP	100.0	-583.5		0.0835	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.07500	146.6	102.8
62172_CLOVERV7	MISO_SINKS_SUMP	100.0	-585.0		0.0833	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04361	146.6	121.1
60821_MAZEPPA8	MISO_SINKS_SUMP	100.0	-599.0		0.0573	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.02479	64.5	49.6
62463_CEDARVL8	MISO_SINKS_SUMP	100.0	-604.0		0.0806	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.06423	146.6	107.8
61690_TWO_HBR7	MISO_SINKS_SUMP	100.0	-607.6		0.0802	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04239	146.6	120.8
62124_ZIMERMN8	MISO_SINKS_SUMP	100.0	-612.5		-0.0475	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.03970	-86.2	-61.9
61669_FLDWOOD7	MISO_SINKS_SUMP	100.0	-612.6		0.0795	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.06588	146.6	106.2
62170_WALDO__7	MISO_SINKS_SUMP	100.0	-613.2		0.0794	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.04211	146.6	120.8
60824_FRONTNC8	MISO_SINKS_SUMP	100.0	-619.8		0.1006	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.12216	233.7	158.0
62389_KENYON_8	MISO_SINKS_SUMP	100.0	-622.0		0.0552	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03522	64.5	42.6
34302_LECENTR8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
34303_LECNTRT8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
62673_STTHMTP8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
62681_CLVLAND8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
62682_MNTGMRY8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
62691_STTHOMS8	MISO_SINKS_SUMP	100.0	-627.0		0.0682	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.03008	67.9	49.0
60823_REDWING8	MISO_SINKS_SUMP	100.0	-632.8		0.0985	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.13465	233.7	148.5
60794_NRSTRND8	MISO_SINKS_SUMP	100.0	-638.4		0.0538	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.03476	64.5	42.3
62386_BNSD_TP8	MISO_SINKS_SUMP	100.0	-640.5		-0.0548	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.03290	-102.8	-123.9
62470_CROMWLL8	MISO_SINKS_SUMP	100.0	-642.4		0.1793	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17931	-40.5	-155.7
63079_BENTON2T	MISO_SINKS_SUMP	100.0	-649.0		0.0455	-	63043 ELK RIV4 230 B$0142 230/69 1.00 1	C:BUNKER LAKE 30RB1 STUCK	263	216.6	187.0	0.01211	108.4	100.5
60827_LKEMILY8	MISO_SINKS_SUMP	100.0	-664.9		0.0643	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.02696	67.9	49.9
62459_CRMWLLD8	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62460_WRIGHT_8	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62461_ROUNDLK8	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62519_BIGSANDT	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62520_BIGSAND8	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62649_PALISAD8	MISO_SINKS_SUMP	100.0	-669.5		0.1721	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.17205	-40.5	-155.7
62127_STFRNCT8	MISO_SINKS_SUMP	100.0	-672.3		-0.0317	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62273 MILACAD8 69.0 62301 MILACA 8 69.0 1	5487	-45.2	-23.9	-0.05381	-35.8	0.4
62302_ISLE___8	MISO_SINKS_SUMP	100.0	-684.0		-0.0425	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.06494	-86.2	-41.7
61974_ST_PETER	MISO_SINKS_SUMP	100.0	-689.2		0.0620	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.02514	67.9	50.5
63045_BENTON_4	MISO_SINKS_SUMP	100.0	-694.2		0.0426	-	63043 ELK RIV4 230 B$0142 230/69 1.00 1	C:BUNKER LAKE 30RB1 STUCK	263	216.6	187.0	0.01129	108.4	100.5
62645_SPIRITL8	MISO_SINKS_SUMP	100.0	-704.6		-0.0324	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C:ELK RIVER 14RB1 STUCK	260	-94.5	-71.7	-0.03260	-86.2	-63.2
62647_SPRTLKS8	MISO_SINKS_SUMP	100.0	-704.6		-0.0324	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C:ELK RIVER 14RB1 STUCK	260	-94.5	-71.7	-0.03260	-86.2	-63.2
62615_SWANLK_7	MISO_SINKS_SUMP	100.0	-711.0		-0.0507	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00938	-168.3	-161.7
61691_SLVRBYH7	MISO_SINKS_SUMP	100.0	-713.0		0.0683	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03774	146.6	119.7
61692_SLVRBAY7	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61762_NSM_3A_G	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61763_SBAYP_1G	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61764_NSM_B1_G	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61765_NSM_3B_G	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61766_SBAYP_2G	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61767_NSM_2ABG	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
61783_NSMSYNC9	MISO_SINKS_SUMP	100.0	-713.9		0.0682	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03771	146.6	119.7
62468_KETTLER8	MISO_SINKS_SUMP	100.0	-719.8		0.1600	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.16003	-40.5	-155.7
62469_STURGEN8	MISO_SINKS_SUMP	100.0	-719.8		0.1600	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.16003	-40.5	-155.7
62473_MOOSETP8	MISO_SINKS_SUMP	100.0	-719.8		0.1600	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.16003	-40.5	-155.7
62970_MOOSELK8	MISO_SINKS_SUMP	100.0	-719.8		0.1600	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.16003	-40.5	-155.7
62971_MOOSEMN8	MISO_SINKS_SUMP	100.0	-719.8		0.1600	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.16003	-40.5	-155.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62636_MCGREGR7	MISO_SINKS_SUMP	100.0	-723.4		0.1592	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.15924	-40.5	-155.7
62462_GOWAN__8	MISO_SINKS_SUMP	100.0	-724.1		0.1591	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.15908	-40.5	-155.7
61964_OWATNNA5	MISO_SINKS_SUMP	100.0	-728.2		0.0375	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01741	233.7	221.0
62471_GOWANSW8	MISO_SINKS_SUMP	100.0	-733.0		0.1571	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.15714	-40.5	-155.7
62642_ONAMIA_8	MISO_SINKS_SUMP	100.0	-741.3		-0.0407	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.05942	-86.2	-42.1
61694_FINLAND7	MISO_SINKS_SUMP	100.0	-744.8		0.0654	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03660	146.6	119.3
62171_FINLAND7	MISO_SINKS_SUMP	100.0	-744.8		0.0654	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03660	146.6	119.3
62446_BERGNLK7	MISO_SINKS_SUMP	100.0	-752.3		0.0373	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.04025	146.6	116.3
62447_BERGNTP7	MISO_SINKS_SUMP	100.0	-752.3		0.0373	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.04025	146.6	116.3
60826_TRAVRSE8	MISO_SINKS_SUMP	100.0	-757.4		0.0564	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.02065	67.9	52.2
62464_LKHD_GW8	MISO_SINKS_SUMP	100.0	-757.5		0.1521	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.15207	-40.5	-155.7
62287_OAKPARK8	MISO_SINKS_SUMP	100.0	-758.1		-0.0318	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.02079	-26.6	-10.8
62288_OAKPKTP8	MISO_SINKS_SUMP	100.0	-758.1		-0.0318	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.02079	-26.6	-10.8
62290_MAYHWSW8	MISO_SINKS_SUMP	100.0	-758.1		-0.0318	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.02079	-26.6	-10.8
34279_PRAT_T_8	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
34296_STELCTR8	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
61972_OWATANA1	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
62883_BIXBY__8	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
62884_RIVERPT8	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
62885_PRATT__8	MISO_SINKS_SUMP	100.0	-760.9		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01616	233.7	221.4
61968_OWATANA2	MISO_SINKS_SUMP	100.0	-761.2		0.0359	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01615	233.7	221.4
60644_JANESVL9	MISO_SINKS_SUMP	100.0	-764.2		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01537	233.7	222.0
60806_WASECA_8	MISO_SINKS_SUMP	100.0	-764.2		0.0358	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01537	233.7	222.0
60829_WASMUN18	MISO_SINKS_SUMP	100.0	-765.5		0.0357	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01535	233.7	222.0
62652_RUMRVTP8	MISO_SINKS_SUMP	100.0	-766.4		-0.0393	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.05865	-86.2	-41.2
61720_COTTNTP7	MISO_SINKS_SUMP	100.0	-773.3		0.0630	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03562	146.6	119.0
62452_COTTON_7	MISO_SINKS_SUMP	100.0	-773.3		0.0630	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03562	146.6	119.0
62616_BIGSWAN7	MISO_SINKS_SUMP	100.0	-773.5		-0.0466	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01118	-168.3	-159.7
62643_OPSTEAD8	MISO_SINKS_SUMP	100.0	-773.7		-0.0376	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.05715	-86.2	-42.0
62648_OPSTDTP8	MISO_SINKS_SUMP	100.0	-773.7		-0.0376	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.05715	-86.2	-42.0
62628_BIGSWANT	MISO_SINKS_SUMP	100.0	-775.3		-0.0465	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01118	-168.3	-159.7
34298_MEDFRDJ8	MISO_SINKS_SUMP	100.0	-776.4		0.0352	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01571	233.7	221.5
62873_CLARMNT8	MISO_SINKS_SUMP	100.0	-776.4		0.0352	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01571	233.7	221.5
62882_MERTON_8	MISO_SINKS_SUMP	100.0	-776.4		0.0352	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01571	233.7	221.5
62886_OWATNNA8	MISO_SINKS_SUMP	100.0	-776.4		0.0352	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01571	233.7	221.5
62149_RICELKS8	MISO_SINKS_SUMP	100.0	-799.6		-0.0302	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.02712	-26.6	-4.9
62182_PINECTR8	MISO_SINKS_SUMP	100.0	-802.7		-0.0301	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.01719	-26.6	-12.8
62651_VINLDTP8	MISO_SINKS_SUMP	100.0	-802.7		-0.0301	-	62293 RUSH CY8 69.0 62294 RUSH TP8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-60.0	-35.9	-0.01719	-26.6	-12.8
61812_BARNTAP9	MISO_SINKS_SUMP	100.0	-805.0		-0.0375	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.03002	-86.2	-62.0
62286_PIPE2TP8	MISO_SINKS_SUMP	100.0	-810.8		-0.0317	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62294 RUSH TP8 69.0 63022 CAMBRDG8 69.0 1	5513	-97.4	-71.7	-0.02396	-86.2	-66.7
62289_PIPE_2_8	MISO_SINKS_SUMP	100.0	-810.8		-0.0317	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62294 RUSH TP8 69.0 63022 CAMBRDG8 69.0 1	5513	-97.4	-71.7	-0.02396	-86.2	-66.7
34308_WASECAT8	MISO_SINKS_SUMP	100.0	-813.1		0.0336	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01440	233.7	222.0
61572_TACHBJCT	MISO_SINKS_SUMP	100.0	-813.2		0.0599	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03444	146.6	118.6
61573_TACHBTR9	MISO_SINKS_SUMP	100.0	-813.2		0.0599	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03444	146.6	118.6
61697_TAC_HBR7	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
61918_GRAND_MA	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62049_TAC_HART	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62050_TAC_HAR8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62051_SCHRDER8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62052_LUTSEN_8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62053_MAPLE_H8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62054_GNDMRTP9	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62055_COLVILL8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62056_MPLHLTP8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62057_CASCADE8	MISO_SINKS_SUMP	100.0	-820.7		0.0594	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03422	146.6	118.5
62350_TRAVERS8	MISO_SINKS_SUMP	100.0	-824.8		0.0518	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.01736	67.9	53.6
62467_SOLWAY_8	MISO_SINKS_SUMP	100.0	-834.5		0.0392	-	61665 THOMSON7 115 61666 FONDULAC 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	122.7	90.0	0.03920	21.2	-11.5
60143_BENTON_7	MISO_SINKS_SUMP	100.0	-835.8		0.0354	-	63043 ELK RIV4 230 B$0142 230/69 1.00 1	C:BUNKER LAKE 30RB1 STUCK	263	216.6	187.0	0.00857	108.4	101.2
61160_MERIDAN8	MISO_SINKS_SUMP	100.0	-838.3		0.0326	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01395	233.7	222.0
61960_LAKECITY	MISO_SINKS_SUMP	100.0	-846.8		-0.0414	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	0.01501	-102.8	-115.5
61693_TAC_HBRG	MISO_SINKS_SUMP	100.0	-847.4		0.0575	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03349	146.6	118.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61696_TAC_HBR6	MISO_SINKS_SUMP	100.0	-847.4		0.0575	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03349	146.6	118.2
62321_NMILACA8	MISO_SINKS_SUMP	100.0	-854.1		-0.0353	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.06302	-86.2	-32.3
34299_WASECAJ8	MISO_SINKS_SUMP	100.0	-854.6		0.0320	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:812	89	254.3	227.0	0.01367	233.7	222.0
62637_KIMBRLY7	MISO_SINKS_SUMP	100.0	-857.0		0.1344	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.13441	-40.5	-155.7
60790_FAIRPRK8	MISO_SINKS_SUMP	100.0	-865.0		0.0599	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.05790	233.7	183.6
62272_GILMAN_8	MISO_SINKS_SUMP	100.0	-871.4		-0.0334	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.03845	-86.2	-52.7
61909_MILACA_T	MISO_SINKS_SUMP	100.0	-876.1		0.0337	-	63043 ELK RIV4 230 B$0142 230/69 1.00 1	C:BUNKER LAKE 30RB1 STUCK	263	216.6	187.0	0.00625	108.4	102.9
62644_GLEN___8	MISO_SINKS_SUMP	100.0	-881.5		-0.0342	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.04493	-86.2	-46.6
61808_SAND46_9	MISO_SINKS_SUMP	100.0	-886.0		-0.0447	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02887	-35.8	-10.2
60822_ZUMBFLS8	MISO_SINKS_SUMP	100.0	-890.9		0.0386	-	60801 CNFLSTR8 69.0 62260 BYLLSBY8 69.0 1	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	111.1	76.8	0.00936	64.5	56.1
62617_BIGSWAN8	MISO_SINKS_SUMP	100.0	-908.2		-0.0397	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01145	-168.3	-157.9
60739_DASSEL_8	MISO_SINKS_SUMP	100.0	-919.8		-0.0392	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01175	-168.3	-157.5
62621_DASSEL_8	MISO_SINKS_SUMP	100.0	-919.8		-0.0392	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01175	-168.3	-157.5
62472_4CORNRS8	MISO_SINKS_SUMP	100.0	-927.1		0.0353	-	61665 THOMSON7 115 61666 FONDULAC 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	122.7	90.0	0.03528	21.2	-11.5
62895_THMSTWN7	MISO_SINKS_SUMP	100.0	-927.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02159	146.6	126.6
38782_HBBARD34	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38787_MENAHGA	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38788_MENHGATP	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38789_SPRTLKTP	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38790_SPIRITLK	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38791_MNPIPELN	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38805_SEBKARG1	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38806_SEBKARG2	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38807_SEBEKA	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
38808_ORTON_TP	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
62897_HUBBARD7	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
62898_HUBBARD9	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
62907_MENAHGA9	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
62908_ORTON__9	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
62913_TWIN_LK9	MISO_SINKS_SUMP	100.0	-929.0		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02156	146.6	126.5
61610_BADOURA4	MISO_SINKS_SUMP	100.0	-932.2		0.0301	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C:AHD 7T	294	210.0	182.0	0.02148	146.6	126.6
61807_MAH_46_9	MISO_SINKS_SUMP	100.0	-947.2		-0.0318	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.02559	-86.2	-61.9
60737_COKATO_8	MISO_SINKS_SUMP	100.0	-949.5		-0.0380	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01251	-168.3	-156.5
60773_COKATOT8	MISO_SINKS_SUMP	100.0	-949.5		-0.0380	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01251	-168.3	-156.5
62952_HASTY__8	MISO_SINKS_SUMP	100.0	-957.1		-0.0377	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01381	-168.3	-155.1
62301_MILACA_8	MISO_SINKS_SUMP	100.0	-964.4		-0.0313	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.06738	-86.2	-21.2
62273_MILACAD8	MISO_SINKS_SUMP	100.0	-964.7		-0.0313	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	5503	-101.9	-71.7	-0.06741	-86.2	-21.1
62650_VINELND8	MISO_SINKS_SUMP	100.0	-964.8		-0.0301	-	62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62279 BRAHAM 8 69.0 63022 CAMBRDG8 69.0 1	5498	-100.8	-71.7	-0.04202	-86.2	-45.6
60791_FARIBLT8	MISO_SINKS_SUMP	100.0	-964.9		0.0537	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.05165	233.7	183.9
62465_BRANDEN8	MISO_SINKS_SUMP	100.0	-967.4		0.1191	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.11907	-40.5	-155.7
60742_PANTHER8	MISO_SINKS_SUMP	100.0	-971.4		0.0575	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01964	320.5	301.5
60503_FRNKLN_3	MISO_SINKS_SUMP	100.0	-971.8		0.0575	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01874	320.5	302.3
61810_ANDRCRN9	MISO_SINKS_SUMP	100.0	-972.2		-0.0408	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02627	-35.8	-10.3
62589_MLVILLE8	MISO_SINKS_SUMP	100.0	-973.2		0.0574	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01962	320.5	301.5
62590_MLVILTP8	MISO_SINKS_SUMP	100.0	-973.2		0.0574	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01962	320.5	301.5
61699_POLYMET6	MISO_SINKS_SUMP	100.0	-977.4		0.0498	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03049	146.6	116.8
60265_LOONLKTP	MISO_SINKS_SUMP	100.0	-977.7		0.0437	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.02504	67.9	43.4
62989_HUTCHMNT	MISO_SINKS_SUMP	100.0	-984.4		-0.0366	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01429	-168.3	-154.3
60738_WNSTDTP8	MISO_SINKS_SUMP	100.0	-988.8		-0.0365	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01344	-168.3	-155.1
60932_WINSTED8	MISO_SINKS_SUMP	100.0	-988.8		-0.0365	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01344	-168.3	-155.1
60933_MILRBND8	MISO_SINKS_SUMP	100.0	-988.8		-0.0365	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01344	-168.3	-155.1
62595_SHERMAN8	MISO_SINKS_SUMP	100.0	-988.8		-0.0365	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01344	-168.3	-155.1
62596_SHRMNTP8	MISO_SINKS_SUMP	100.0	-988.8		-0.0365	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01344	-168.3	-155.1
60652_CROWRV_8	MISO_SINKS_SUMP	100.0	-991.5		-0.0364	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01809	-168.3	-150.4
60891_DELANOT8	MISO_SINKS_SUMP	100.0	-992.7		-0.0363	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01730	-168.3	-151.2
61806_ASKOV__9	MISO_SINKS_SUMP	100.0	-994.0		-0.0399	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02573	-35.8	-10.2
61698_HOYT_LK6	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
61716_PLANT_4G	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
61717_PLANT_3G	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
61719_PLANT_2G	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
61786_PLNT2CAG	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61787_PLNT3CAG	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
61788_PLNT4CAG	MISO_SINKS_SUMP	100.0	-994.3		0.0490	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03015	146.6	116.6
60734_MONTRSE8	MISO_SINKS_SUMP	100.0	-995.1		-0.0362	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01579	-168.3	-152.6
60735_WAVERLY8	MISO_SINKS_SUMP	100.0	-996.1		-0.0362	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01517	-168.3	-153.2
62982_HUTCHMN7	MISO_SINKS_SUMP	100.0	-996.2		-0.0362	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01398	-168.3	-154.4
60736_HOWRDLK8	MISO_SINKS_SUMP	100.0	-997.7		-0.0362	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01417	-168.3	-154.2
60872_VICTRTP8	MISO_SINKS_SUMP	100.0	-997.7		-0.0362	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01417	-168.3	-154.2
62943_VICTOR_8	MISO_SINKS_SUMP	100.0	-998.5		-0.0361	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01366	-168.3	-154.7
61801_450_TAP9	MISO_SINKS_SUMP	100.0	-1006.8		0.1144	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.11441	-40.5	-155.7
61804_HINK_E_9	MISO_SINKS_SUMP	100.0	-1006.8		0.1144	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.11440	-40.5	-155.7
62934_HOWARDL8	MISO_SINKS_SUMP	100.0	-1008.2		-0.0358	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01309	-168.3	-155.1
62119_THOMPLK8	MISO_SINKS_SUMP	100.0	-1009.4		-0.0357	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01575	-168.3	-152.4
62983_HUTCH3M7	MISO_SINKS_SUMP	100.0	-1012.0		-0.0356	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01421	-168.3	-154.0
62939_SILVERC8	MISO_SINKS_SUMP	100.0	-1016.4		-0.0355	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01139	-168.3	-156.8
62627_LKJNNSW8	MISO_SINKS_SUMP	100.0	-1022.8		-0.0353	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01319	-168.3	-154.9
62630_LK_JNN_8	MISO_SINKS_SUMP	100.0	-1022.8		-0.0353	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01319	-168.3	-154.9
62946_LKJENTP8	MISO_SINKS_SUMP	100.0	-1022.8		-0.0353	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01319	-168.3	-154.9
62865_AIRTECH7	MISO_SINKS_SUMP	100.0	-1023.5		-0.0343	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	-0.02758	-102.8	-74.6
61701_LASKIN_6	MISO_SINKS_SUMP	100.0	-1024.6		0.0475	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02959	146.6	116.3
62623_LTCHFLD8	MISO_SINKS_SUMP	100.0	-1027.8		-0.0351	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01021	-168.3	-157.9
60678_BROWNT_8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
60696_HECTOR_8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
60697_BUFLOLK8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
60698_STEWART8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
60699_BROWNTP8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
60718_BIRDISL8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62591_YELLWST8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62592_HECTOR_8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62593_BROOKFD8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62594_BRKFDTP8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62600_PRSTNLK8	MISO_SINKS_SUMP	100.0	-1033.0		0.0541	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01814	320.5	301.8
62947_DICKIN_8	MISO_SINKS_SUMP	100.0	-1034.4		-0.0349	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01739	-168.3	-150.4
60740_LTCHMUT8	MISO_SINKS_SUMP	100.0	-1035.7		-0.0348	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01014	-168.3	-157.8
61718_16L_TAP7	MISO_SINKS_SUMP	100.0	-1036.4		0.0470	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02932	146.6	116.2
62454_PEARY__7	MISO_SINKS_SUMP	100.0	-1037.5		0.0470	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02930	146.6	116.2
62601_HOOK_LK8	MISO_SINKS_SUMP	100.0	-1039.5		-0.0347	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01288	-168.3	-155.0
62606_HOOKLKT8	MISO_SINKS_SUMP	100.0	-1039.5		-0.0347	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01288	-168.3	-155.0
62936_MARY_LK8	MISO_SINKS_SUMP	100.0	-1042.2		-0.0346	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01611	-168.3	-151.5
60145_FRANKLN7	MISO_SINKS_SUMP	100.0	-1045.7		0.0534	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01744	320.5	302.3
62984_HUTCHPT8	MISO_SINKS_SUMP	100.0	-1045.8		-0.0345	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01276	-168.3	-155.0
62985_HUTCHPK8	MISO_SINKS_SUMP	100.0	-1045.8		-0.0345	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01276	-168.3	-155.0
62986_HUTCHMN8	MISO_SINKS_SUMP	100.0	-1045.8		-0.0345	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01276	-168.3	-155.0
62988_HTCHHTI8	MISO_SINKS_SUMP	100.0	-1045.8		-0.0345	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01276	-168.3	-155.0
62340_NSWEDEN8	MISO_SINKS_SUMP	100.0	-1047.9		0.0408	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00948	67.9	57.9
62341_NWSWDTP8	MISO_SINKS_SUMP	100.0	-1047.9		0.0408	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00948	67.9	57.9
60152_MNTCELO4	MISO_SINKS_SUMP	100.0	-1049.0		-0.0338	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60152 MNTCELO4 230 63045 BENTON 4 230 1	3613	-174.5	-139.0	-0.00618	-168.3	-161.9
62987_HUTCHCP8	MISO_SINKS_SUMP	100.0	-1050.3		-0.0343	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01253	-168.3	-155.2
61912_LITCHFLD	MISO_SINKS_SUMP	100.0	-1050.7		-0.0343	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00982	-168.3	-158.0
62933_HIGHLND8	MISO_SINKS_SUMP	100.0	-1051.4		-0.0343	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01071	-168.3	-157.1
60364_FIELD_N3	MISO_SINKS_SUMP	100.0	-1053.0		0.0316	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 4	69	481.3	448.0	0.01637	320.5	303.3
60283_BUFFALO8	MISO_SINKS_SUMP	100.0	-1053.5		-0.0342	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01428	-168.3	-153.3
60682_KNGMN_R8	MISO_SINKS_SUMP	100.0	-1054.8		0.0529	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01788	320.5	301.7
61721_ETCO___7	MISO_SINKS_SUMP	100.0	-1057.7		0.0461	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02894	146.6	116.0
61723_ETCO___G	MISO_SINKS_SUMP	100.0	-1057.7		0.0461	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02894	146.6	116.0
60869_OLIVIAC8	MISO_SINKS_SUMP	100.0	-1059.1		0.0527	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01783	320.5	301.7
60875_BVR_CRK8	MISO_SINKS_SUMP	100.0	-1061.5		0.0526	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01780	320.5	301.6
62950_ROCKFRD8	MISO_SINKS_SUMP	100.0	-1062.8		-0.0339	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01715	-168.3	-150.1
60870_OLIVIAM8	MISO_SINKS_SUMP	100.0	-1063.8		0.0525	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01778	320.5	301.6
38460_LSKN_9	MISO_SINKS_SUMP	100.0	-1066.1		0.0457	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	115.8
38461_ARORAVIL	MISO_SINKS_SUMP	100.0	-1066.1		0.0457	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	115.8
38463_HOYT_LKS	MISO_SINKS_SUMP	100.0	-1066.1		0.0457	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	115.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38464_ERIE	MISO_SINKS_SUMP	100.0	-1066.1		0.0457	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	115.8
61702_LASKIN_7	MISO_SINKS_SUMP	100.0	-1066.1		0.0457	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	115.8
62587_HELEN__8	MISO_SINKS_SUMP	100.0	-1067.5		-0.0338	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01292	-168.3	-154.6
62603_HSSNJCT8	MISO_SINKS_SUMP	100.0	-1067.5		-0.0338	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01292	-168.3	-154.6
60903_LYON_CO8	MISO_SINKS_SUMP	100.0	-1067.6		0.0523	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01791	320.5	301.4
60677_HENRYTR8	MISO_SINKS_SUMP	100.0	-1068.8		0.0522	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01724	320.5	302.1
60685_GRNVALY8	MISO_SINKS_SUMP	100.0	-1069.8		0.0522	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01790	320.5	301.4
7852_GREENV2	MISO_SINKS_SUMP	100.0	-1069.8		0.0522	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01790	320.5	301.4
62638_AITKIN_7	MISO_SINKS_SUMP	100.0	-1070.7		0.1076	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.10758	-40.5	-155.7
60062_MEC_ST	MISO_SINKS_SUMP	100.0	-1070.9		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 4	69	481.3	448.0	0.01615	320.5	303.3
60108_WILMART3	MISO_SINKS_SUMP	100.0	-1070.9		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 4	69	481.3	448.0	0.01615	320.5	303.3
60603_MEC_345	MISO_SINKS_SUMP	100.0	-1070.9		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 4	69	481.3	448.0	0.01615	320.5	303.3
60733_HENRY_R8	MISO_SINKS_SUMP	100.0	-1070.9		0.0521	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01745	320.5	301.9
62932_GOOSELK8	MISO_SINKS_SUMP	100.0	-1072.5		-0.0336	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00934	-168.3	-158.3
62944_GOOSETP8	MISO_SINKS_SUMP	100.0	-1072.5		-0.0336	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00934	-168.3	-158.3
60681_TROY__R8	MISO_SINKS_SUMP	100.0	-1072.6		0.0521	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01762	320.5	301.6
60676_TROYT_R8	MISO_SINKS_SUMP	100.0	-1073.1		0.0520	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01767	320.5	301.6
60390_GROVECY8	MISO_SINKS_SUMP	100.0	-1073.8		-0.0336	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01057	-168.3	-157.0
62739_MLRY_TP8	MISO_SINKS_SUMP	100.0	-1074.6		0.0520	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01786	320.5	301.4
62738_MILROY_8	MISO_SINKS_SUMP	100.0	-1075.0		0.0519	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01762	320.5	301.6
61574_LASKNJCT	MISO_SINKS_SUMP	100.0	-1076.7		0.0452	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02868	146.6	115.7
61575_LASKNTR9	MISO_SINKS_SUMP	100.0	-1076.7		0.0452	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02868	146.6	115.7
60404_BISCAY7	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60873_BSCYJCTG	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60878_PLATO__8	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60879_LSTRPRA8	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60880_MCLEDCN8	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60888_GLNCOTP8	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
62588_HIGHISL8	MISO_SINKS_SUMP	100.0	-1080.5		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01664	-168.3	-150.4
60898_GLNCOMU7	MISO_SINKS_SUMP	100.0	-1081.2		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01655	-168.3	-150.4
62736_SHERIDN8	MISO_SINKS_SUMP	100.0	-1082.6		0.0516	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01731	320.5	301.8
60792_WFARBLT8	MISO_SINKS_SUMP	100.0	-1083.6		0.0478	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.04573	233.7	184.2
60695_DANUBE_8	MISO_SINKS_SUMP	100.0	-1084.5		0.0515	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01760	320.5	301.5
60171_LYON_CO7	MISO_SINKS_SUMP	100.0	-1086.6		0.0514	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01766	320.5	301.4
62602_BELL___8	MISO_SINKS_SUMP	100.0	-1086.7		-0.0332	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01304	-168.3	-154.2
62737_SHRDNTP8	MISO_SINKS_SUMP	100.0	-1087.2		0.0514	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01713	320.5	301.9
63024_MAPLE_1G	MISO_SINKS_SUMP	100.0	-1087.7		-0.0332	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00883	-168.3	-158.7
63055_BEARCK_4	MISO_SINKS_SUMP	100.0	-1088.6		0.0447	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03074	146.6	113.1
62935_MAPLELK8	MISO_SINKS_SUMP	100.0	-1089.3		-0.0331	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00877	-168.3	-158.8
60765_MAPLELK8	MISO_SINKS_SUMP	100.0	-1089.5		-0.0331	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00869	-168.3	-158.9
62513_BLCKBRYT	MISO_SINKS_SUMP	100.0	-1090.8		0.0447	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03117	146.6	112.6
61739_BLCKBRY7	MISO_SINKS_SUMP	100.0	-1091.9		0.0446	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03114	146.6	112.6
62315_BEAR_CKT	MISO_SINKS_SUMP	100.0	-1092.8		0.0446	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03050	146.6	113.3
62451_LAKELND7	MISO_SINKS_SUMP	100.0	-1093.6		0.0445	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02842	146.6	115.5
62439_HUTCHTP8	MISO_SINKS_SUMP	100.0	-1094.5		-0.0330	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01029	-168.3	-157.1
62735_REDWOOD8	MISO_SINKS_SUMP	100.0	-1096.7		0.0509	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01676	320.5	302.2
62624_ATWATER8	MISO_SINKS_SUMP	100.0	-1097.1		-0.0329	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01083	-168.3	-156.5
60770_BIRCH_R8	MISO_SINKS_SUMP	100.0	-1097.9		0.0509	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01650	320.5	302.4
60771_RDWDFLTG	MISO_SINKS_SUMP	100.0	-1097.9		0.0509	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01671	320.5	302.2
61958_REDWD_FL	MISO_SINKS_SUMP	100.0	-1097.9		0.0509	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01671	320.5	302.2
62675_ASSMPTN8	MISO_SINKS_SUMP	100.0	-1098.1		-0.0328	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01856	-168.3	-148.0
62740_WALNUTG8	MISO_SINKS_SUMP	100.0	-1098.6		0.0508	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01747	320.5	301.4
62741_WLNTGTP8	MISO_SINKS_SUMP	100.0	-1098.6		0.0508	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01747	320.5	301.4
61704_34L_TAP7	MISO_SINKS_SUMP	100.0	-1103.7		0.0441	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02827	146.6	115.4
60855_TRACYSW8	MISO_SINKS_SUMP	100.0	-1106.0		0.0505	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01737	320.5	301.3
62508_TOWER13	MISO_SINKS_SUMP	100.0	-1108.9		0.0439	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02821	146.6	115.3
61883_TOWER7	MISO_SINKS_SUMP	100.0	-1109.8		0.0439	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02821	146.6	115.3
60728_FRANKLN8	MISO_SINKS_SUMP	100.0	-1113.9		0.0501	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01611	320.5	302.6
62488_BLCKBRY8	MISO_SINKS_SUMP	100.0	-1114.0		0.0437	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03056	146.6	112.5
62500_TOWER8	MISO_SINKS_SUMP	100.0	-1117.6		0.0436	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02814	146.6	115.1
61882_TOWER	MISO_SINKS_SUMP	100.0	-1118.2		0.0436	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02807	146.6	115.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61873_SUDNMPRK	MISO_SINKS_SUMP	100.0	-1118.3		0.0436	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02806	146.6	115.2
61874_TWR_SUDN	MISO_SINKS_SUMP	100.0	-1118.4		0.0436	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02806	146.6	115.2
60679_CROOKS_8	MISO_SINKS_SUMP	100.0	-1119.6		0.0499	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01740	320.5	301.1
62502_CLEARLK9	MISO_SINKS_SUMP	100.0	-1120.0		0.0435	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02804	146.6	115.2
60170_MARSHAL7	MISO_SINKS_SUMP	100.0	-1120.1		0.0498	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01727	320.5	301.2
62506_VRMLLN_9	MISO_SINKS_SUMP	100.0	-1120.1		0.0435	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02804	146.6	115.2
62478_GOODLND8	MISO_SINKS_SUMP	100.0	-1120.3		0.0435	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03040	146.6	112.5
62485_WARBASW8	MISO_SINKS_SUMP	100.0	-1120.3		0.0435	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03040	146.6	112.5
61781_20L_TAP7	MISO_SINKS_SUMP	100.0	-1121.4		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03029	146.6	112.6
62711_LKSARAH8	MISO_SINKS_SUMP	100.0	-1121.5		0.0498	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01716	320.5	301.3
62713_LKSRHTP8	MISO_SINKS_SUMP	100.0	-1121.5		0.0498	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01716	320.5	301.3
61879_ESUBA_TP	MISO_SINKS_SUMP	100.0	-1121.7		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02801	146.6	115.2
61872_ELY_B	MISO_SINKS_SUMP	100.0	-1122.0		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02800	146.6	115.2
61861_WINTON_9	MISO_SINKS_SUMP	100.0	-1122.9		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
61862_ELY_A	MISO_SINKS_SUMP	100.0	-1122.9		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
61864_STCROIX9	MISO_SINKS_SUMP	100.0	-1122.9		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
61880_32_31TIE	MISO_SINKS_SUMP	100.0	-1122.9		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
62503_WINTON_9	MISO_SINKS_SUMP	100.0	-1122.9		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
61863_31_32TIE	MISO_SINKS_SUMP	100.0	-1123.0		0.0434	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	115.1
67472_MMU_N7ST	MISO_SINKS_SUMP	100.0	-1124.4		0.0497	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01725	320.5	301.2
61740_GR_RPDS7	MISO_SINKS_SUMP	100.0	-1124.7		0.0433	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03021	146.6	112.6
61779_BLANDIN7	MISO_SINKS_SUMP	100.0	-1124.7		0.0433	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03010	146.6	112.7
62604_BRWN_TP8	MISO_SINKS_SUMP	100.0	-1124.9		-0.0321	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01329	-168.3	-153.4
61979_NEWPRAGN	MISO_SINKS_SUMP	100.0	-1125.2		-0.0321	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01861	-168.3	-147.4
61778_BLNDTAP7	MISO_SINKS_SUMP	100.0	-1125.6		0.0433	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03005	146.6	112.8
61736_T_BIRD_7	MISO_SINKS_SUMP	100.0	-1125.8		0.0433	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02794	146.6	115.1
62501_FRAZERB8	MISO_SINKS_SUMP	100.0	-1125.8		0.0433	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02808	146.6	115.0
38415_INLNDSTL	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
38416_MCKINLEY	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
38417_BIWABEKV	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
38418_GNT_PNVI	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
38421_LTVLAURN	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
61870_VIRGNIA9	MISO_SINKS_SUMP	100.0	-1126.5		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	115.1
62477_LKHD_BB8	MISO_SINKS_SUMP	100.0	-1126.8		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03024	146.6	112.5
62486_LKHD_TP8	MISO_SINKS_SUMP	100.0	-1126.8		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03024	146.6	112.5
60373_SOUTH_E7	MISO_SINKS_SUMP	100.0	-1127.4		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01716	320.5	301.2
60119_LKYNKTN7	MISO_SINKS_SUMP	100.0	-1127.5		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01716	320.5	301.2
60372_SARATOG7	MISO_SINKS_SUMP	100.0	-1127.5		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01721	320.5	301.1
60853_LK_YANK8	MISO_SINKS_SUMP	100.0	-1127.5		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01716	320.5	301.2
67473_MMU_SW_7	MISO_SINKS_SUMP	100.0	-1127.5		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01718	320.5	301.2
60371_ERIE_RD7	MISO_SINKS_SUMP	100.0	-1127.6		0.0495	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01723	320.5	301.1
61748_BOSWELL7	MISO_SINKS_SUMP	100.0	-1127.6		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02994	146.6	112.8
61776_BOSWE71G	MISO_SINKS_SUMP	100.0	-1127.6		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02994	146.6	112.8
61777_BOSWE72G	MISO_SINKS_SUMP	100.0	-1127.6		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02994	146.6	112.8
61865_BABT_VL9	MISO_SINKS_SUMP	100.0	-1127.8		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02791	146.6	115.1
62504_BABBITT9	MISO_SINKS_SUMP	100.0	-1127.8		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02791	146.6	115.1
61860_BABBITT9	MISO_SINKS_SUMP	100.0	-1128.0		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02791	146.6	115.1
62476_BLKBRYD8	MISO_SINKS_SUMP	100.0	-1128.6		0.0432	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03019	146.6	112.5
62510_LWRNCLK7	MISO_SINKS_SUMP	100.0	-1129.7		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02945	146.6	113.3
62511_LWRNCTP7	MISO_SINKS_SUMP	100.0	-1129.7		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02945	146.6	113.3
38500_NASHWK23	MISO_SINKS_SUMP	100.0	-1130.1		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02935	146.6	113.4
61737_NASHWAK7	MISO_SINKS_SUMP	100.0	-1130.1		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02935	146.6	113.4
60680_EMMET_R8	MISO_SINKS_SUMP	100.0	-1130.4		0.0494	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01734	320.5	300.9
61705_BABBITT7	MISO_SINKS_SUMP	100.0	-1131.1		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02786	146.6	115.1
62517_VIRGNIAT	MISO_SINKS_SUMP	100.0	-1131.1		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02785	146.6	115.1
61708_VIRGNIA7	MISO_SINKS_SUMP	100.0	-1131.2		0.0431	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02786	146.6	115.1
62497_VIRGNIA8	MISO_SINKS_SUMP	100.0	-1131.6		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02790	146.6	115.0
62496_PIKE_RV8	MISO_SINKS_SUMP	100.0	-1132.0		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02794	146.6	115.0
62495_SAND_LK8	MISO_SINKS_SUMP	100.0	-1132.2		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02797	146.6	114.9
62499_SNDLKTP8	MISO_SINKS_SUMP	100.0	-1132.2		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02797	146.6	114.9
62494_POTLTCH8	MISO_SINKS_SUMP	100.0	-1132.6		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02800	146.6	114.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62498_PTLCHSW8	MISO_SINKS_SUMP	100.0	-1132.6		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02800	146.6	114.9
62625_ROSENDL8	MISO_SINKS_SUMP	100.0	-1132.6		-0.0318	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01119	-168.3	-155.7
62493_COOK___8	MISO_SINKS_SUMP	100.0	-1132.7		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02802	146.6	114.8
62505_ORR	MISO_SINKS_SUMP	100.0	-1132.7		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02802	146.6	114.8
61707_MNTACT27	MISO_SINKS_SUMP	100.0	-1133.5		0.0430	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02791	146.6	114.9
60712_ANNDALE8	MISO_SINKS_SUMP	100.0	-1134.1		-0.0318	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	0.00032	-168.3	-168.7
60694_RENVILL8	MISO_SINKS_SUMP	100.0	-1134.7		0.0492	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01732	320.5	300.9
61625_BLCKBRY4	MISO_SINKS_SUMP	100.0	-1135.2		0.0429	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02949	146.6	113.1
63082_WILMRTHT	MISO_SINKS_SUMP	100.0	-1136.1		0.0491	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01424	320.5	304.4
62475_GUNN___8	MISO_SINKS_SUMP	100.0	-1136.2		0.0429	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.03000	146.6	112.5
60684_YELWMED8	MISO_SINKS_SUMP	100.0	-1137.4		0.0491	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01743	320.5	300.7
61731_14L_TAP7	MISO_SINKS_SUMP	100.0	-1138.4		0.0428	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02890	146.6	113.7
61732_NATIONLG	MISO_SINKS_SUMP	100.0	-1139.3		0.0428	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	113.7
61733_NATIONL7	MISO_SINKS_SUMP	100.0	-1139.3		0.0428	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02886	146.6	113.7
62438_LITCHTP8	MISO_SINKS_SUMP	100.0	-1140.9		-0.0316	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00813	-168.3	-159.1
60731_GRENISL8	MISO_SINKS_SUMP	100.0	-1141.2		-0.0316	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01690	-168.3	-149.1
62492_MEADWBK8	MISO_SINKS_SUMP	100.0	-1142.5		0.0426	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02800	146.6	114.6
61735_TBIRD_S7	MISO_SINKS_SUMP	100.0	-1142.8		0.0426	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02763	146.6	115.0
62714_CURRIE_8	MISO_SINKS_SUMP	100.0	-1144.3		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01686	320.5	301.3
60333_HONNERR7	MISO_SINKS_SUMP	100.0	-1144.4		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01706	320.5	301.0
61954_REDFLST7	MISO_SINKS_SUMP	100.0	-1144.4		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01706	320.5	301.0
61956_R_FALLS7	MISO_SINKS_SUMP	100.0	-1144.4		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01706	320.5	301.0
66508_S3_____7	MISO_SINKS_SUMP	100.0	-1145.0		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01715	320.5	300.9
66552_MARS_ER7	MISO_SINKS_SUMP	100.0	-1145.0		0.0488	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01715	320.5	300.9
60070_FEP_13_0	MISO_SINKS_SUMP	100.0	-1145.4		-0.0306	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	-0.02714	-102.8	-71.7
60384_FEPTP_7	MISO_SINKS_SUMP	100.0	-1145.4		-0.0306	-	60103 CANNFLS5 161 60324 CANNFLS7 115 5	C: 60324 CANNFLS7 115 62235 EMPIRE 7 115 1	3986	-222.1	-187.0	-0.02714	-102.8	-71.7
60331_LKFLDXL3	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63011_LGS__31G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63012_LGS__32G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63013_LGS__33G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63014_LGS__34G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63015_LGS__35G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63016_LGS__36G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
63090_TWF___9G	MISO_SINKS_SUMP	100.0	-1145.5		0.0487	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01525	320.5	303.1
61706_KEWTNTP7	MISO_SINKS_SUMP	100.0	-1146.3		0.0425	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02816	146.6	114.3
62455_KEEWATN7	MISO_SINKS_SUMP	100.0	-1146.3		0.0425	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02816	146.6	114.3
60782_VESELI_8	MISO_SINKS_SUMP	100.0	-1147.6		-0.0314	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01813	-168.3	-147.5
60785_NPG_TAP8	MISO_SINKS_SUMP	100.0	-1147.6		-0.0314	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01813	-168.3	-147.5
60936_NPR_TAP8	MISO_SINKS_SUMP	100.0	-1147.6		-0.0314	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01813	-168.3	-147.5
61978_NEW_PRAG	MISO_SINKS_SUMP	100.0	-1147.6		-0.0314	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01813	-168.3	-147.5
61730_78L_TAP7	MISO_SINKS_SUMP	100.0	-1148.4		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02841	146.6	114.0
61709_INLAND_7	MISO_SINKS_SUMP	100.0	-1148.5		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02759	146.6	114.9
61715_INLAND_G	MISO_SINKS_SUMP	100.0	-1148.5		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02759	146.6	114.9
61724_HIBBING7	MISO_SINKS_SUMP	100.0	-1149.4		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02823	146.6	114.1
61734_IRON_TP7	MISO_SINKS_SUMP	100.0	-1149.6		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02750	146.6	115.0
62453_IRON___7	MISO_SINKS_SUMP	100.0	-1149.6		0.0424	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02750	146.6	115.0
61790_COHSSTTP	MISO_SINKS_SUMP	100.0	-1151.3		0.0423	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02949	146.6	112.6
62449_COHASST7	MISO_SINKS_SUMP	100.0	-1151.3		0.0423	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02949	146.6	112.6
34301_NEWPRAG8	MISO_SINKS_SUMP	100.0	-1151.4		-0.0313	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01805	-168.3	-147.6
62491_SIDE_LK8	MISO_SINKS_SUMP	100.0	-1152.2		0.0423	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02797	146.6	114.3
61725_44L_TAP7	MISO_SINKS_SUMP	100.0	-1152.4		0.0423	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02814	146.6	114.2
62586_WINTHRP8	MISO_SINKS_SUMP	100.0	-1153.9		-0.0313	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01346	-168.3	-152.8
61791_LAKEHD_7	MISO_SINKS_SUMP	100.0	-1154.8		0.0422	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02942	146.6	112.6
61780_DEER_RV7	MISO_SINKS_SUMP	100.0	-1154.9		0.0422	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02942	146.6	112.6
62450_DEER_RV7	MISO_SINKS_SUMP	100.0	-1155.3		0.0422	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02941	146.6	112.6
61654_AITKNMN7	MISO_SINKS_SUMP	100.0	-1157.9		0.0995	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.09948	-40.5	-155.7
61722_FORBES_7	MISO_SINKS_SUMP	100.0	-1159.9		0.0420	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02730	146.6	114.9
61728_HIBBTAC7	MISO_SINKS_SUMP	100.0	-1160.1		0.0420	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02810	146.6	114.0
61729_HIBBTACG	MISO_SINKS_SUMP	100.0	-1160.1		0.0420	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02810	146.6	114.0
62474_ARBO___8	MISO_SINKS_SUMP	100.0	-1160.2		0.0420	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02942	146.6	112.4
62484_ARBO_TP8	MISO_SINKS_SUMP	100.0	-1160.2		0.0420	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02942	146.6	112.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62868_WALCOTT8	MISO_SINKS_SUMP	100.0	-1161.0		0.0447	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.04266	233.7	184.2
62869_WALCTTP8	MISO_SINKS_SUMP	100.0	-1161.0		0.0447	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.04266	233.7	184.2
62490_SHANNON8	MISO_SINKS_SUMP	100.0	-1161.5		0.0419	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02795	146.6	114.1
62073_EDEN_TP8	MISO_SINKS_SUMP	100.0	-1163.7		0.0480	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01497	320.5	303.1
62083_EDEN___8	MISO_SINKS_SUMP	100.0	-1163.7		0.0480	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01497	320.5	303.1
61726_HBTCPMP9	MISO_SINKS_SUMP	100.0	-1163.9		0.0419	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02804	146.6	113.9
61727_HTC_PMP7	MISO_SINKS_SUMP	100.0	-1163.9		0.0419	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02804	146.6	113.9
34300_MONTGMY8	MISO_SINKS_SUMP	100.0	-1166.2		-0.0309	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01775	-168.3	-147.6
34310_MONTGG19	MISO_SINKS_SUMP	100.0	-1166.2		-0.0309	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01775	-168.3	-147.6
61562_SHAN1JCT	MISO_SINKS_SUMP	100.0	-1166.5		0.0418	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	113.9
61563_SHAN1TR9	MISO_SINKS_SUMP	100.0	-1166.5		0.0418	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	113.9
61750_SHAN2TR9	MISO_SINKS_SUMP	100.0	-1166.6		0.0418	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	113.9
61785_SHAN2JCT	MISO_SINKS_SUMP	100.0	-1166.6		0.0418	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02799	146.6	113.9
60723_MORGAN_8	MISO_SINKS_SUMP	100.0	-1169.1		0.0478	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01485	320.5	303.2
61710_MINNTAC7	MISO_SINKS_SUMP	100.0	-1169.3		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02729	146.6	114.7
61711_MNTCPTC7	MISO_SINKS_SUMP	100.0	-1169.3		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02729	146.6	114.7
61712_MNTCPTA7	MISO_SINKS_SUMP	100.0	-1169.3		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02729	146.6	114.7
61713_MNTC_C_G	MISO_SINKS_SUMP	100.0	-1169.3		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02729	146.6	114.7
61714_MNTC_A_G	MISO_SINKS_SUMP	100.0	-1169.3		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02729	146.6	114.7
61626_BOSWELL4	MISO_SINKS_SUMP	100.0	-1169.6		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02853	146.6	113.2
61774_BOSWE43G	MISO_SINKS_SUMP	100.0	-1169.6		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02853	146.6	113.2
61775_BOSWE44G	MISO_SINKS_SUMP	100.0	-1169.6		0.0417	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02853	146.6	113.2
60063_MEC_CT1	MISO_SINKS_SUMP	100.0	-1169.8		0.0477	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01359	320.5	304.7
60110_WILMART7	MISO_SINKS_SUMP	100.0	-1169.8		0.0477	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01359	320.5	304.7
60360_MEC_115	MISO_SINKS_SUMP	100.0	-1169.8		0.0477	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01359	320.5	304.7
61749_SHANNON7	MISO_SINKS_SUMP	100.0	-1170.4		0.0416	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	113.9
60380_SUMMIT	MISO_SINKS_SUMP	100.0	-1170.5		0.0477	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01358	320.5	304.7
62518_SHANNONT	MISO_SINKS_SUMP	100.0	-1171.5		0.0416	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02793	146.6	113.9
60857_SLAYTON8	MISO_SINKS_SUMP	100.0	-1171.9		0.0476	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01651	320.5	301.2
60173_ROSEAUN2	MISO_SINKS_SUMP	100.0	-1172.2		-0.1866	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C:DORSEY-FORBES-500	11065	-274.7	-56.0	0.03824	0.0	-44.8
60174_ROSEAUS2	MISO_SINKS_SUMP	100.0	-1172.2		-0.1866	-	61972 OWATANA1 69.0 61973 OWATNA 12.5 1	C:DORSEY-FORBES-500	11065	-274.7	-56.0	0.03433	0.0	-40.2
60365_FIELD_S3	MISO_SINKS_SUMP	100.0	-1172.8		0.0476	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01502	320.5	302.9
60761_SOUTHVN8	MISO_SINKS_SUMP	100.0	-1173.2		-0.0307	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	0.00765	-168.3	-177.3
60730_ARLNGTN8	MISO_SINKS_SUMP	100.0	-1174.7		-0.0307	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01587	-168.3	-149.7
61566_BLBY1JCT	MISO_SINKS_SUMP	100.0	-1175.1		0.0415	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02808	146.6	113.6
61567_BLBY1TR9	MISO_SINKS_SUMP	100.0	-1175.1		0.0415	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02808	146.6	113.6
61568_BLBY2JCT	MISO_SINKS_SUMP	100.0	-1175.1		0.0415	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02808	146.6	113.6
61569_BLBY2TR9	MISO_SINKS_SUMP	100.0	-1175.1		0.0415	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02808	146.6	113.6
62948_BLACKLK8	MISO_SINKS_SUMP	100.0	-1176.4		-0.0307	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00948	-168.3	-157.2
62949_BLKLKTP8	MISO_SINKS_SUMP	100.0	-1176.4		-0.0307	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.00948	-168.3	-157.2
62307_DENHAM_8	MISO_SINKS_SUMP	100.0	-1178.2		-0.0336	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02179	-35.8	-10.1
61811_DENHAM_9	MISO_SINKS_SUMP	100.0	-1179.0		-0.0336	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02157	-35.8	-10.4
62487_DEER_RV8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
62696_JESS_LK8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
62697_BIGFORK8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
62698_WIRT___8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
62699_EVENSON8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
62700_WIRTTPS8	MISO_SINKS_SUMP	100.0	-1179.1		0.0413	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02898	146.6	112.4
60264_LOON_LK7	MISO_SINKS_SUMP	100.0	-1182.1		0.0362	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.02112	67.9	42.9
62515_DEER_RVT	MISO_SINKS_SUMP	100.0	-1182.4		0.0412	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02892	146.6	112.4
62674_JSNLDTP8	MISO_SINKS_SUMP	100.0	-1184.0		-0.0305	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01577	-168.3	-149.7
62692_JESNLND8	MISO_SINKS_SUMP	100.0	-1184.0		-0.0305	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01577	-168.3	-149.7
62712_ELLSBOR7	MISO_SINKS_SUMP	100.0	-1185.7		0.0471	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01623	320.5	301.3
60858_HADLEY_8	MISO_SINKS_SUMP	100.0	-1186.0		0.0471	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01634	320.5	301.2
60693_SACRDHT8	MISO_SINKS_SUMP	100.0	-1186.6		0.0471	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01705	320.5	300.3
61627_SHANNON4	MISO_SINKS_SUMP	100.0	-1187.6		0.0410	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02768	146.6	113.7
60692_CYSTL_T8	MISO_SINKS_SUMP	100.0	-1190.7		-0.0303	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01493	-168.3	-150.6
62715_LKWILSN8	MISO_SINKS_SUMP	100.0	-1193.5		0.0468	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01625	320.5	301.1
60729_GAYLORD8	MISO_SINKS_SUMP	100.0	-1193.8		-0.0302	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01475	-168.3	-150.7
60724_HENDRSN8	MISO_SINKS_SUMP	100.0	-1194.5		-0.0302	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01566	-168.3	-149.6
60835_CHNDLRT8	MISO_SINKS_SUMP	100.0	-1196.4		0.0467	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01622	320.5	301.1

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62876_FRLK_TP8	MISO_SINKS_SUMP	100.0	-1197.3		-0.0301	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01714	-168.3	-147.8
62877_FRNCHLK8	MISO_SINKS_SUMP	100.0	-1197.3		-0.0301	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:780 2	81	-175.1	-139.0	-0.01714	-168.3	-147.8
60113_DOME___7	MISO_SINKS_SUMP	100.0	-1197.5		0.0466	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01307	320.5	304.9
61623_MINNTAC4	MISO_SINKS_SUMP	100.0	-1201.9		0.0405	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02683	146.6	114.3
61805_KERRICK9	MISO_SINKS_SUMP	100.0	-1202.1		-0.0330	-	62284 DALBOTP8 69.0 63022 CAMBRDG8 69.0 1	C: 62296 INDSTTP8 69.0 63022 CAMBRDG8 69.0 1	5514	-63.5	-23.9	-0.02126	-35.8	-10.3
62479_BALLCLB8	MISO_SINKS_SUMP	100.0	-1205.3		0.0404	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02845	146.6	112.3
60395_ERIDGE_8	MISO_SINKS_SUMP	100.0	-1206.4		0.0463	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01610	320.5	301.1
60111_SWAN_LK7	MISO_SINKS_SUMP	100.0	-1211.6		0.0461	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01325	320.5	304.5
62448_HILLCTY7	MISO_SINKS_SUMP	100.0	-1211.9		0.0402	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02872	146.6	111.8
60279_BUFFRID7	MISO_SINKS_SUMP	100.0	-1215.1		0.0460	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01611	320.5	301.0
60708_BUFFRIDG	MISO_SINKS_SUMP	100.0	-1215.1		0.0460	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01611	320.5	301.0
62480_BENA___8	MISO_SINKS_SUMP	100.0	-1217.0		0.0400	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02823	146.6	112.2
62483_BENA_TP8	MISO_SINKS_SUMP	100.0	-1217.0		0.0400	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02823	146.6	112.2
60741_LKLILLN8	MISO_SINKS_SUMP	100.0	-1220.1		0.0458	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01737	320.5	299.4
62710_CHANDLR8	MISO_SINKS_SUMP	100.0	-1220.3		0.0458	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01594	320.5	301.1
60381_YANKEE_7	MISO_SINKS_SUMP	100.0	-1231.2		0.0454	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01601	320.5	300.8
60394_YANKEE_9	MISO_SINKS_SUMP	100.0	-1231.2		0.0454	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01601	320.5	300.8
61560_MINT2JCT	MISO_SINKS_SUMP	100.0	-1232.3		0.0395	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02642	146.6	114.0
61561_MINT2TR9	MISO_SINKS_SUMP	100.0	-1232.3		0.0395	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02642	146.6	114.0
61558_MINT1JCT	MISO_SINKS_SUMP	100.0	-1232.6		0.0395	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02642	146.6	114.0
61559_MINT1TR9	MISO_SINKS_SUMP	100.0	-1232.6		0.0395	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02642	146.6	114.0
60722_SLPY_MU8	MISO_SINKS_SUMP	100.0	-1239.4		0.0451	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01342	320.5	303.9
62071_SLPYJCT8	MISO_SINKS_SUMP	100.0	-1239.4		0.0451	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01342	320.5	303.9
60830_EASTWD18	MISO_SINKS_SUMP	100.0	-1240.0		0.0450	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01231	320.5	305.3
60362_CHANRMB7	MISO_SINKS_SUMP	100.0	-1240.6		0.0450	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01544	320.5	301.4
60715_CHANRMB9	MISO_SINKS_SUMP	100.0	-1240.6		0.0450	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01544	320.5	301.4
36239_POHL___8	MISO_SINKS_SUMP	100.0	-1241.9		0.0450	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01242	320.5	305.1
60683_MINNVAL8	MISO_SINKS_SUMP	100.0	-1243.0		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01679	320.5	299.7
60687_BUSH_PK8	MISO_SINKS_SUMP	100.0	-1243.0		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01679	320.5	299.7
60688_MNTVDEO8	MISO_SINKS_SUMP	100.0	-1243.0		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01679	320.5	299.7
60689_FIESTAC8	MISO_SINKS_SUMP	100.0	-1243.0		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01679	320.5	299.7
60781_MINNLK_8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
60810_POHLRDT8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
60811_MAPLTON8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
60812_BALLARD8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
60813_SIBLYPK8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
60925_HUNGRY_H	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
62344_DECORIA8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
62345_STCLAIR8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
62346_STCLRTP8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
62878_HWY30TP8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
62879_DANVLL_8	MISO_SINKS_SUMP	100.0	-1243.7		0.0449	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01252	320.5	305.0
34006_LAKEFLD3	MISO_SINKS_SUMP	100.0	-1246.2		0.0448	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01446	320.5	302.5
60691_GRNFLCY8	MISO_SINKS_SUMP	100.0	-1247.0		0.0448	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01677	320.5	299.6
60112_FTRIDLY7	MISO_SINKS_SUMP	100.0	-1247.9		0.0447	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01297	320.5	304.4
61670_MDWLNDS7	MISO_SINKS_SUMP	100.0	-1248.4		-0.0709	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.07087	-29.5	59.0
62072_SLPYEYE8	MISO_SINKS_SUMP	100.0	-1252.2		0.0446	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01317	320.5	304.1
60852_ROCKRIV8	MISO_SINKS_SUMP	100.0	-1255.1		0.0445	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01556	320.5	301.0
61663_FLDWDTP7	MISO_SINKS_SUMP	100.0	-1257.3		-0.0704	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.07037	-29.5	59.0
62481_BOY_RIV8	MISO_SINKS_SUMP	100.0	-1259.6		0.0387	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02743	146.6	112.0
62482_SALEMSW8	MISO_SINKS_SUMP	100.0	-1259.6		0.0387	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02743	146.6	112.0
60825_WABASHA8	MISO_SINKS_SUMP	100.0	-1260.2		0.0495	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.05475	233.7	164.7
60402_SOUTHBEN	MISO_SINKS_SUMP	100.0	-1262.7		0.0442	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01282	320.5	304.4
60149_MINVALT4	MISO_SINKS_SUMP	100.0	-1265.6		0.0441	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01690	320.5	299.2
60123_PIPESTN7	MISO_SINKS_SUMP	100.0	-1268.0		0.0440	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01534	320.5	301.1
60150_MNVLTAP4	MISO_SINKS_SUMP	100.0	-1268.2		0.0440	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01688	320.5	299.1
62348_CENTURY8	MISO_SINKS_SUMP	100.0	-1269.1		0.0440	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01284	320.5	304.3
61550_FORB1JCT	MISO_SINKS_SUMP	100.0	-1270.8		0.0383	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02548	146.6	114.2
61551_FORB1TR9	MISO_SINKS_SUMP	100.0	-1270.8		0.0383	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02548	146.6	114.2
60814_RAPIDAN8	MISO_SINKS_SUMP	100.0	-1271.0		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01284	320.5	304.2
60937_SEARLS_J	MISO_SINKS_SUMP	100.0	-1271.1		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01261	320.5	304.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61552_FORB2JCT	MISO_SINKS_SUMP	100.0	-1271.2		0.0383	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02548	146.6	114.2
61553_FORB2TR9	MISO_SINKS_SUMP	100.0	-1271.2		0.0383	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02548	146.6	114.2
60369_FENTON_7	MISO_SINKS_SUMP	100.0	-1271.3		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01484	320.5	301.7
60393_FENTON_9	MISO_SINKS_SUMP	100.0	-1271.3		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01484	320.5	301.7
60859_ROCKTAP8	MISO_SINKS_SUMP	100.0	-1272.3		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01538	320.5	301.0
61190_WOODSTK8	MISO_SINKS_SUMP	100.0	-1272.3		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01538	320.5	301.0
61191_S_RIDGE8	MISO_SINKS_SUMP	100.0	-1272.3		0.0439	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01538	320.5	301.0
62323_PNLPNTP8	MISO_SINKS_SUMP	100.0	-1274.3		0.0406	-	61250 JAMESTP8 69.0 62351 JMSTWTP8 69.0 1	C: 60826 TRAVRSE8 69.0 62323 PNLPNTP8 69.0 1	4373	63.4	11.7	-0.12899	31.8	196.2
60148_MINVALY7	MISO_SINKS_SUMP	100.0	-1276.8		0.0437	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01665	320.5	299.3
60815_GARDNTP8	MISO_SINKS_SUMP	100.0	-1279.0		0.0437	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01287	320.5	304.1
60392_WRIDGE_8	MISO_SINKS_SUMP	100.0	-1279.5		0.0436	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01531	320.5	301.0
62080_HOME_TP8	MISO_SINKS_SUMP	100.0	-1280.3		0.0436	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01265	320.5	304.3
62082_HOME___8	MISO_SINKS_SUMP	100.0	-1280.3		0.0436	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01265	320.5	304.3
60700_LKCRYST8	MISO_SINKS_SUMP	100.0	-1284.8		0.0435	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01289	320.5	304.0
60816_BUTERTP8	MISO_SINKS_SUMP	100.0	-1289.2		0.0433	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01290	320.5	303.9
62335_BUTTRNT8	MISO_SINKS_SUMP	100.0	-1289.2		0.0433	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01290	320.5	303.9
66296_GRANITF29	MISO_SINKS_SUMP	100.0	-1290.8		0.0433	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01660	320.5	299.1
66297_GRANITF9	MISO_SINKS_SUMP	100.0	-1290.8		0.0433	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01660	320.5	299.1
60286_NOBLES_3	MISO_SINKS_SUMP	100.0	-1290.9		0.0433	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01448	320.5	301.9
62807_NOSTART8	MISO_SINKS_SUMP	100.0	-1291.5		0.0432	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01291	320.5	303.9
62808_NO_STAR8	MISO_SINKS_SUMP	100.0	-1291.5		0.0432	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01291	320.5	303.9
66298_GRANITF8	MISO_SINKS_SUMP	100.0	-1292.0		0.0432	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01660	320.5	299.1
66551_GRANITF7	MISO_SINKS_SUMP	100.0	-1292.0		0.0432	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01660	320.5	299.1
62489_REMER__8	MISO_SINKS_SUMP	100.0	-1293.4		0.0377	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02683	146.6	111.9
60147_MINVALY4	MISO_SINKS_SUMP	100.0	-1299.7		0.0430	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01664	320.5	298.9
60065_WEST_PIP	MISO_SINKS_SUMP	100.0	-1300.3		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01509	320.5	300.9
60860_PIPESTN8	MISO_SINKS_SUMP	100.0	-1300.3		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01509	320.5	300.9
60109_SOUTHBE5	MISO_SINKS_SUMP	100.0	-1301.5		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01253	320.5	304.2
66550_GRANITF4	MISO_SINKS_SUMP	100.0	-1301.5		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01664	320.5	298.9
66294_IVANHOE7	MISO_SINKS_SUMP	100.0	-1302.5		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01550	320.5	300.4
66295_IVANHOE8	MISO_SINKS_SUMP	100.0	-1302.5		0.0429	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01550	320.5	300.4
66005_PIPETAP	MISO_SINKS_SUMP	100.0	-1303.2		0.0428	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01507	320.5	300.9
34007_LAKEFLD5	MISO_SINKS_SUMP	100.0	-1304.9		0.0428	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	302.5
66006_H_TAP	MISO_SINKS_SUMP	100.0	-1305.3		0.0428	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01505	320.5	300.9
61624_FORBES_4	MISO_SINKS_SUMP	100.0	-1307.4		0.0373	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02478	146.6	114.2
60721_ESSIG__8	MISO_SINKS_SUMP	100.0	-1309.3		0.0426	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01214	320.5	304.7
34241_LKFLD698	MISO_SINKS_SUMP	100.0	-1311.0		0.0426	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01377	320.5	302.5
34235_LAKFLDM8	MISO_SINKS_SUMP	100.0	-1312.2		0.0426	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01375	320.5	302.5
60701_MADELVL8	MISO_SINKS_SUMP	100.0	-1315.7		0.0424	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01299	320.5	303.5
33972_WILDERJ2	MISO_SINKS_SUMP	100.0	-1317.3		0.0424	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01367	320.5	302.5
34233_WINDMMU8	MISO_SINKS_SUMP	100.0	-1319.5		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01363	320.5	302.6
34238_WINDMSW8	MISO_SINKS_SUMP	100.0	-1319.5		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01363	320.5	302.6
34234_WILDERJ8	MISO_SINKS_SUMP	100.0	-1320.2		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01367	320.5	302.5
62360_WILDER_8	MISO_SINKS_SUMP	100.0	-1320.2		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01367	320.5	302.5
34237_WINDOMT8	MISO_SINKS_SUMP	100.0	-1320.7		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01359	320.5	302.6
33973_HRNLKETH	MISO_SINKS_SUMP	100.0	-1320.8		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34220_FULDAJT8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34221_DOVRAY_8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34222_WESTBKM8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34224_WESTBRK8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34225_HERONLK8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34236_WESTBKT8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34242_JACKN_M8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34246_JACKSNM8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62355_MILOMA_8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62357_MNNEOTA8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62365_ENTPRSW8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62366_ENTRPRS8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62368_RNDLKTP8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62369_RNDLAKE8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62370_WLAKFLD8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62371_WLKFLTP8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62376_MNNE_TP8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62377_CHRJUHL8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62726_WSTSIDE8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
62727_RIVER_8	MISO_SINKS_SUMP	100.0	-1320.9		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01371	320.5	302.4
34005_HRN_LK_5	MISO_SINKS_SUMP	100.0	-1321.3		0.0423	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01381	320.5	302.3
62801_SSTORDN8	MISO_SINKS_SUMP	100.0	-1321.7		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01365	320.5	302.5
62788_LAKESD_8	MISO_SINKS_SUMP	100.0	-1321.8		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01355	320.5	302.6
62798_LKSD_TP8	MISO_SINKS_SUMP	100.0	-1321.8		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01355	320.5	302.6
34226_STORDEN8	MISO_SINKS_SUMP	100.0	-1322.1		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01361	320.5	302.5
62790_JEFFERS8	MISO_SINKS_SUMP	100.0	-1322.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01361	320.5	302.6
62791_JFFRSTP8	MISO_SINKS_SUMP	100.0	-1322.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01361	320.5	302.6
62800_NSTORDN8	MISO_SINKS_SUMP	100.0	-1322.5		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01358	320.5	302.6
34276_BINGLKT8	MISO_SINKS_SUMP	100.0	-1322.9		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01351	320.5	302.7
62797_BNGHMLK8	MISO_SINKS_SUMP	100.0	-1322.9		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01351	320.5	302.7
34227_LAMBRTN8	MISO_SINKS_SUMP	100.0	-1323.0		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01354	320.5	302.6
62734_CTTNWD_8	MISO_SINKS_SUMP	100.0	-1323.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01353	320.5	302.7
34228_WABASSO8	MISO_SINKS_SUMP	100.0	-1323.5		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01349	320.5	302.7
34274_JONVILT8	MISO_SINKS_SUMP	100.0	-1323.5		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01349	320.5	302.7
62730_JHNSNVL8	MISO_SINKS_SUMP	100.0	-1323.5		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01349	320.5	302.7
34232_BATLAKE8	MISO_SINKS_SUMP	100.0	-1323.6		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01348	320.5	302.7
62731_WANDA__8	MISO_SINKS_SUMP	100.0	-1323.8		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01347	320.5	302.7
63459_G375_WF8	MISO_SINKS_SUMP	100.0	-1324.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01346	320.5	302.7
63460_G375_WF9	MISO_SINKS_SUMP	100.0	-1324.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01346	320.5	302.7
63461_G375_WFG	MISO_SINKS_SUMP	100.0	-1324.2		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01346	320.5	302.7
62732_SUNDOWN8	MISO_SINKS_SUMP	100.0	-1324.3		0.0422	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01343	320.5	302.8
62733_BROOKVL8	MISO_SINKS_SUMP	100.0	-1324.8		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01339	320.5	302.8
34229_SPRINGM8	MISO_SINKS_SUMP	100.0	-1325.2		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
62063_CBDNETH8	MISO_SINKS_SUMP	100.0	-1325.2		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
62074_COBDEN_8	MISO_SINKS_SUMP	100.0	-1325.2		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
34240_DOTSON_8	MISO_SINKS_SUMP	100.0	-1325.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01333	320.5	302.9
62065_DOTSON_8	MISO_SINKS_SUMP	100.0	-1325.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01332	320.5	302.9
62066_LVNWRTH8	MISO_SINKS_SUMP	100.0	-1325.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01326	320.5	303.0
62064_SEARLES8	MISO_SINKS_SUMP	100.0	-1325.7		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01313	320.5	303.1
62068_ALBIN__8	MISO_SINKS_SUMP	100.0	-1325.7		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01318	320.5	303.1
62069_ALBNJCT8	MISO_SINKS_SUMP	100.0	-1325.7		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01313	320.5	303.1
62070_SRLS_TP8	MISO_SINKS_SUMP	100.0	-1325.7		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01313	320.5	303.1
34251_MADELIA8	MISO_SINKS_SUMP	100.0	-1325.8		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01302	320.5	303.3
34252_HANSKA_8	MISO_SINKS_SUMP	100.0	-1325.8		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01305	320.5	303.2
62084_LINDEN_8	MISO_SINKS_SUMP	100.0	-1325.8		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01307	320.5	303.2
62802_MADELIA8	MISO_SINKS_SUMP	100.0	-1325.8		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01302	320.5	303.3
34230_COMFREY8	MISO_SINKS_SUMP	100.0	-1326.1		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01334	320.5	302.9
34268_MIDWAY_8	MISO_SINKS_SUMP	100.0	-1326.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
34281_MTLAKET8	MISO_SINKS_SUMP	100.0	-1326.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
62796_MNTN_LK8	MISO_SINKS_SUMP	100.0	-1326.6		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
34231_MT_LAKE8	MISO_SINKS_SUMP	100.0	-1326.7		0.0421	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01336	320.5	302.8
67470_JACKSON	MISO_SINKS_SUMP	100.0	-1328.4		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01353	320.5	302.6
60716_STJ_EAS8	MISO_SINKS_SUMP	100.0	-1329.2		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	303.1
60709_STJMSMU8	MISO_SINKS_SUMP	100.0	-1330.1		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01314	320.5	303.1
60809_SJA_SWS8	MISO_SINKS_SUMP	100.0	-1330.2		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01314	320.5	303.1
62805_STJAMES8	MISO_SINKS_SUMP	100.0	-1330.7		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01315	320.5	303.0
60935_BUTRFLD8	MISO_SINKS_SUMP	100.0	-1330.9		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01324	320.5	302.9
60690_MNARDTP8	MISO_SINKS_SUMP	100.0	-1331.0		0.0420	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01632	320.5	298.8
62803_SVEADHL8	MISO_SINKS_SUMP	100.0	-1331.7		0.0419	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01322	320.5	302.9
62804_SVEADTP8	MISO_SINKS_SUMP	100.0	-1331.7		0.0419	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01322	320.5	302.9
60934_WATOWAN8	MISO_SINKS_SUMP	100.0	-1332.4		0.0419	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01320	320.5	303.0
62806_ECHOLS_8	MISO_SINKS_SUMP	100.0	-1336.9		0.0418	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01318	320.5	302.9
62709_BREWSTR5	MISO_SINKS_SUMP	100.0	-1337.5		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01381	320.5	302.1
66007_HOLLAND	MISO_SINKS_SUMP	100.0	-1338.1		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01483	320.5	300.7
60377_MAYNARD8	MISO_SINKS_SUMP	100.0	-1338.7		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01628	320.5	298.8
60378_MAYNARL8	MISO_SINKS_SUMP	100.0	-1338.7		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01628	320.5	298.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60379_CLARCTY8	MISO_SINKS_SUMP	100.0	-1338.7		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01628	320.5	298.8
62186_THUN_LK8	MISO_SINKS_SUMP	100.0	-1339.1		0.0364	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02608	146.6	111.7
62792_ODIN___8	MISO_SINKS_SUMP	100.0	-1340.1		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01317	320.5	302.9
62793_ODIN_TP8	MISO_SINKS_SUMP	100.0	-1340.1		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01317	320.5	302.9
66008_HOLLAND	MISO_SINKS_SUMP	100.0	-1340.1		0.0417	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01481	320.5	300.7
62067_SRL_JCT8	MISO_SINKS_SUMP	100.0	-1340.8		0.0416	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01161	320.5	305.0
66004_TROSKY	MISO_SINKS_SUMP	100.0	-1341.7		0.0416	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01469	320.5	300.8
62794_DONALDS9	MISO_SINKS_SUMP	100.0	-1343.9		0.0416	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01315	320.5	302.9
34008_FOX_LK_5	MISO_SINKS_SUMP	100.0	-1344.5		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01332	320.5	302.6
34011_FOXLK53G	MISO_SINKS_SUMP	100.0	-1344.5		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01332	320.5	302.6
34250_LEWISVL8	MISO_SINKS_SUMP	100.0	-1344.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01293	320.5	303.2
34004_ELK____5	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34217_WRTHNGT8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34218_WORTHMN8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34219_FULDA_J8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34223_ELK____8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34245_WRTHMN28	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34297_FULDA__9	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62717_FULDA__8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62720_WRTHNG_8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62721_WRT_TP_8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62722_WRT_WTP8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62724_BLOOM__8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
62725_WRT_ETP8	MISO_SINKS_SUMP	100.0	-1345.7		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01380	320.5	302.0
34243_TRIMONT8	MISO_SINKS_SUMP	100.0	-1346.3		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01314	320.5	302.9
62081_NEW_ULM8	MISO_SINKS_SUMP	100.0	-1347.1		0.0415	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01152	320.5	305.0
62795_SHERBRN8	MISO_SINKS_SUMP	100.0	-1350.6		0.0413	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01312	320.5	302.8
62789_LEWISVL8	MISO_SINKS_SUMP	100.0	-1350.9		0.0413	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01291	320.5	303.1
62799_LWSVLTP8	MISO_SINKS_SUMP	100.0	-1350.9		0.0413	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01291	320.5	303.1
34244_SHERBRN8	MISO_SINKS_SUMP	100.0	-1352.5		0.0413	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
34012_FOXLAKE8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
34271_FOXLKG19	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
34272_FOXLKG29	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
34283_FOXLKG49	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62325_BLUEEAR8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62356_EASTCHN8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62358_CEYLON_8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62359_FOXLKTP8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62361_WILBERT8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62362_DUNNEL_8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62363_MDLTWTP8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62364_MIDLTWN8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
62367_CYLN_TP8	MISO_SINKS_SUMP	100.0	-1353.8		0.0412	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01311	320.5	302.8
34249_TRUMAN_8	MISO_SINKS_SUMP	100.0	-1357.2		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01288	320.5	303.1
60647_KEYCT12G	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
60648_KEYCT34G	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
60650_WILMART8	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
61155_JOHNSON8	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
62324_JOHNSON8	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
62338_HUNGRYH8	MISO_SINKS_SUMP	100.0	-1359.0		0.0411	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01017	320.5	306.7
34248_TRUMANM8	MISO_SINKS_SUMP	100.0	-1360.3		0.0410	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01286	320.5	303.0
62306_HARRY_M8	MISO_SINKS_SUMP	100.0	-1363.2		0.0845	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.08450	-40.5	-155.7
60287_NOBLES_7	MISO_SINKS_SUMP	100.0	-1363.4		0.0313	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00626	67.9	59.3
62849_WAKEFLDT	MISO_SINKS_SUMP	100.0	-1364.2		-0.0359	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.00173	-168.3	-166.0
34275_WELCOMT8	MISO_SINKS_SUMP	100.0	-1365.0		0.0409	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01296	320.5	302.9
62374_WELCOME8	MISO_SINKS_SUMP	100.0	-1365.0		0.0409	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01296	320.5	302.9
34280_TRUMANT8	MISO_SINKS_SUMP	100.0	-1369.7		0.0408	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01282	320.5	303.0
62373_TRUMAN_8	MISO_SINKS_SUMP	100.0	-1369.7		0.0408	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01282	320.5	303.0
62375_HARVSTT8	MISO_SINKS_SUMP	100.0	-1371.4		0.0407	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01288	320.5	302.9
62372_HARVSTA8	MISO_SINKS_SUMP	100.0	-1372.7		0.0407	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01286	320.5	302.9
60155_PULASKI7	MISO_SINKS_SUMP	100.0	-1373.3		-0.0357	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02422	-168.3	-135.1

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60762_BUFALOM8	MISO_SINKS_SUMP	100.0	-1373.3		-0.0357	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02422	-168.3	-135.1
60763_PULASKI8	MISO_SINKS_SUMP	100.0	-1373.3		-0.0357	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02422	-168.3	-135.1
60764_LINN_ST8	MISO_SINKS_SUMP	100.0	-1373.3		-0.0357	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02422	-168.3	-135.1
62354_BFFLKET8	MISO_SINKS_SUMP	100.0	-1373.5		0.0407	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01285	320.5	302.9
61936_FAIRMONT	MISO_SINKS_SUMP	100.0	-1374.7		0.0406	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01284	320.5	302.9
61942_10TH_STR	MISO_SINKS_SUMP	100.0	-1374.7		0.0406	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01284	320.5	302.9
34003_MAGNLIA5	MISO_SINKS_SUMP	100.0	-1377.4		0.0405	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01379	320.5	301.6
63071_SPRNGCK5	MISO_SINKS_SUMP	100.0	-1378.4		0.0452	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.15756	233.7	16.5
61934_RUTLAND	MISO_SINKS_SUMP	100.0	-1379.5		0.0405	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01278	320.5	302.9
66003_HARDWICK	MISO_SINKS_SUMP	100.0	-1380.0		0.0405	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01434	320.5	300.8
60005_MNTCE31G	MISO_SINKS_SUMP	100.0	-1393.4		-0.0459	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.03955	-168.3	-113.2
60151_MNTCELO3	MISO_SINKS_SUMP	100.0	-1393.4		-0.0459	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.03955	-168.3	-113.2
60067_DAN_JUHL	MISO_SINKS_SUMP	100.0	-1395.4		0.0400	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	301.2
60370_DAN_JUHL	MISO_SINKS_SUMP	100.0	-1395.4		0.0400	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	301.2
60940_NEWULMT8	MISO_SINKS_SUMP	100.0	-1400.0		0.0399	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01079	320.5	305.4
61932_RUTLAND5	MISO_SINKS_SUMP	100.0	-1402.6		0.0398	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01260	320.5	302.9
61976_LOON_LK8	MISO_SINKS_SUMP	100.0	-1412.7		0.0303	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.01806	67.9	42.4
60167_RUNSWCP4	MISO_SINKS_SUMP	100.0	-1415.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	113.7
66753_RUNNING4	MISO_SINKS_SUMP	100.0	-1415.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	113.7
66765_RUNNINN9	MISO_SINKS_SUMP	100.0	-1415.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	113.7
66778_RUNNINNT	MISO_SINKS_SUMP	100.0	-1415.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	113.7
62196_BLINDLK8	MISO_SINKS_SUMP	100.0	-1416.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02491	146.6	111.3
66001_LUVERNE	MISO_SINKS_SUMP	100.0	-1417.2		0.0394	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01402	320.5	300.7
66002_CTYLUVE	MISO_SINKS_SUMP	100.0	-1417.2		0.0394	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01402	320.5	300.7
34269_ADRIANT8	MISO_SINKS_SUMP	100.0	-1417.6		0.0394	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01333	320.5	301.7
62719_ADRIAN_8	MISO_SINKS_SUMP	100.0	-1417.6		0.0394	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01333	320.5	301.7
34215_MAGNLIA8	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
34239_MAGNLIA9	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
34247_KENNETH9	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
34282_WILMONT9	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
34304_LISMORE9	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
62723_LISMORE8	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
900_G140	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
901_G142	MISO_SINKS_SUMP	100.0	-1419.3		0.0301	-	60110 WILMART7 115 60111 SWAN LK7 115 1	C: 60108 WILMART3 345 60504 HELNASS3 345 1	3484	152.7	110.0	0.00711	67.9	57.8
34216_ADRIANM8	MISO_SINKS_SUMP	100.0	-1420.3		0.0393	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01330	320.5	301.7
66780_RUNNINU8	MISO_SINKS_SUMP	100.0	-1424.6		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02306	146.6	113.7
66764_RUNNINS9	MISO_SINKS_SUMP	100.0	-1424.7		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02305	146.6	113.7
66779_RUNNINST	MISO_SINKS_SUMP	100.0	-1424.7		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02305	146.6	113.7
67017_RUNNING8	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9266_SHOOKS	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9267_NORTHOME	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9268_BIG_FALS	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9271_LITLFORK	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9272_RAT_ROOT	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9273_INTL_FLS	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9274_KABETOGM	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
9425_LITLFORK_2	MISO_SINKS_SUMP	100.0	-1425.9		0.0342	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02303	146.6	113.7
60357_MAYNARD7	MISO_SINKS_SUMP	100.0	-1426.0		0.0392	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01587	320.5	297.9
62185_OX_LAKE8	MISO_SINKS_SUMP	100.0	-1429.5		0.0341	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02483	146.6	111.1
62199_LGVLLTP8	MISO_SINKS_SUMP	100.0	-1431.5		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02463	146.6	111.3
62200_LONGVLL8	MISO_SINKS_SUMP	100.0	-1431.5		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02463	146.6	111.3
34273_RUSHMRT8	MISO_SINKS_SUMP	100.0	-1434.5		0.0389	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01314	320.5	301.7
62184_EMILY__8	MISO_SINKS_SUMP	100.0	-1437.0		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02479	146.6	111.0
62194_FFTYLKS8	MISO_SINKS_SUMP	100.0	-1437.0		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02479	146.6	111.0
9270_LOMAN	MISO_SINKS_SUMP	100.0	-1440.3		0.0338	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02280	146.6	113.7
60284_NEWULMC8	MISO_SINKS_SUMP	100.0	-1441.6		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01026	320.5	305.8
60720_NEWULMS8	MISO_SINKS_SUMP	100.0	-1441.6		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01026	320.5	305.8
60938_FTRIDGL8	MISO_SINKS_SUMP	100.0	-1441.6		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01026	320.5	305.8
60939_NEWULMP8	MISO_SINKS_SUMP	100.0	-1441.6		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01026	320.5	305.8
60941_NEWULMN8	MISO_SINKS_SUMP	100.0	-1441.6		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01026	320.5	305.8
60396_WOLFWI_8	MISO_SINKS_SUMP	100.0	-1444.5		0.0387	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01304	320.5	301.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62198_CRSSLKC8	MISO_SINKS_SUMP	100.0	-1445.6		0.0337	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02474	146.6	110.8
62718_RUSHMOR8	MISO_SINKS_SUMP	100.0	-1445.8		0.0386	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01302	320.5	301.7
66000_STEEN	MISO_SINKS_SUMP	100.0	-1446.1		0.0386	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01378	320.5	300.6
62183_CROSSLK8	MISO_SINKS_SUMP	100.0	-1450.8		0.0336	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02471	146.6	110.7
62192_MISSION8	MISO_SINKS_SUMP	100.0	-1450.8		0.0336	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02471	146.6	110.7
62187_BREZYPT8	MISO_SINKS_SUMP	100.0	-1453.4		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02469	146.6	110.7
62193_BRZYPTS8	MISO_SINKS_SUMP	100.0	-1453.4		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02469	146.6	110.7
60361_ROCKCR_4	MISO_SINKS_SUMP	100.0	-1454.3		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02309	146.6	113.0
61192_ROCKCRK8	MISO_SINKS_SUMP	100.0	-1454.3		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02309	146.6	113.0
62215_WFISHTP8	MISO_SINKS_SUMP	100.0	-1454.7		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02467	146.6	110.7
62218_WFISHLK8	MISO_SINKS_SUMP	100.0	-1454.7		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02467	146.6	110.7
62178_BASSLKE8	MISO_SINKS_SUMP	100.0	-1456.0		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02466	146.6	110.7
62179_STNYTP_8	MISO_SINKS_SUMP	100.0	-1456.0		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02466	146.6	110.7
62188_STONYBK8	MISO_SINKS_SUMP	100.0	-1456.0		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02466	146.6	110.7
62195_PQUOTLK8	MISO_SINKS_SUMP	100.0	-1456.0		0.0335	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02466	146.6	110.7
60120_BLUEETA5	MISO_SINKS_SUMP	100.0	-1459.8		0.0383	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01192	320.5	303.1
60651_BLEARTH8	MISO_SINKS_SUMP	100.0	-1459.8		0.0383	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01192	320.5	303.1
61085_BLUEE__8	MISO_SINKS_SUMP	100.0	-1459.8		0.0383	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01192	320.5	303.1
62275_PINECTY8	MISO_SINKS_SUMP	100.0	-1463.6		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02474	146.6	110.4
63023_ROCKLK1G	MISO_SINKS_SUMP	100.0	-1463.6		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02474	146.6	110.4
38721_PQTLKDST	MISO_SINKS_SUMP	100.0	-1464.1		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02457	146.6	110.6
38724_NISSWA	MISO_SINKS_SUMP	100.0	-1464.1		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02457	146.6	110.6
61648_PEQUOT_7	MISO_SINKS_SUMP	100.0	-1464.1		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02457	146.6	110.6
61848_PEQUOT_9	MISO_SINKS_SUMP	100.0	-1464.1		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02457	146.6	110.6
62189_WABDO__8	MISO_SINKS_SUMP	100.0	-1464.1		0.0333	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02406	146.6	111.4
62211_PQUOTLKT	MISO_SINKS_SUMP	100.0	-1465.1		0.0332	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02456	146.6	110.6
62180_RIVTON_8	MISO_SINKS_SUMP	100.0	-1465.2		0.0332	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02468	146.6	110.4
34009_WINBAGO5	MISO_SINKS_SUMP	100.0	-1469.3		0.0380	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01189	320.5	303.1
34013_WNBAGOS5	MISO_SINKS_SUMP	100.0	-1469.6		0.0380	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01189	320.5	303.1
62336_JHNSNTP8	MISO_SINKS_SUMP	100.0	-1470.2		0.0380	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00856	320.5	308.0
62206_BAXTER_7	MISO_SINKS_SUMP	100.0	-1473.7		0.0331	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02455	146.6	110.4
63197_CASS_LKY	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
63247_CASS_LK7	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
63248_CASS_N_7	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
63347_CASS_LK8	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
63348_NO_PIPE9	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
63349_CASSPIP9	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
7918_NO_CASS	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
7949_POTLCH	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
7950_POTLATCH	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
8536_STUDMILL	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
8537_OLD_MILL	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
9371_GUTH_TP	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
9372_GUTHRIE	MISO_SINKS_SUMP	100.0	-1477.9		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02293	146.6	112.7
66801_LUND__8	MISO_SINKS_SUMP	100.0	-1478.4		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	113.7
9256_WILLMS_T	MISO_SINKS_SUMP	100.0	-1478.4		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	113.7
9257_WILLIAMS	MISO_SINKS_SUMP	100.0	-1478.4		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	113.7
9258_PITT	MISO_SINKS_SUMP	100.0	-1478.4		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	113.7
9260_BAUDETTE	MISO_SINKS_SUMP	100.0	-1478.4		0.0330	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	113.7
38671_531_534T	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
38672_PILLAGER	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
38673_503_531T	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
38674_PINE_BCH	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
38675_MPL_BAX	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
38676_GULL__LK	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
61645_BAXTER_7	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
61845_BAXTER_9	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
62205_MOTLEY_9	MISO_SINKS_SUMP	100.0	-1480.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02442	146.6	110.4
62076_SCHLLNG8	MISO_SINKS_SUMP	100.0	-1483.8		0.0376	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00975	320.5	306.1
62077_SCHLTP_8	MISO_SINKS_SUMP	100.0	-1483.8		0.0376	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00975	320.5	306.1
66760_LUND___4	MISO_SINKS_SUMP	100.0	-1485.0		0.0328	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02211	146.6	113.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60793_MORISTN8	MISO_SINKS_SUMP	100.0	-1490.8		0.0348	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.03317	233.7	184.3
34253_GARDNCY8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34254_FARMLND8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34255_VERNNCY8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34256_WBGO___8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34257_WBGOJ_N8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34266_AMBOY_8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34277_STRLNGT8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
34278_WILWCKT8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
62326_WLL_CRK8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
62327_STERLNG8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
62328_GARDENC8	MISO_SINKS_SUMP	100.0	-1492.2		0.0374	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01176	320.5	303.0
38722_PNRVR_TP	MISO_SINKS_SUMP	100.0	-1501.1		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02379	146.6	110.9
38723_PINE_RIV	MISO_SINKS_SUMP	100.0	-1501.1		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02379	146.6	110.9
61854_PINE_RV9	MISO_SINKS_SUMP	100.0	-1501.1		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02379	146.6	110.9
62201_PINE_R7	MISO_SINKS_SUMP	100.0	-1501.1		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02379	146.6	110.9
62207_PLSNTLK8	MISO_SINKS_SUMP	100.0	-1502.6		0.0324	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02341	146.6	111.4
61751_LITLFRK7	MISO_SINKS_SUMP	100.0	-1503.3		0.0324	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02184	146.6	113.7
63345_WILTON_4	MISO_SINKS_SUMP	100.0	-1508.9		0.0323	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02239	146.6	112.8
34258_WBGOJ_S8	MISO_SINKS_SUMP	100.0	-1510.1		0.0370	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01172	320.5	302.8
66710_NARY___7	MISO_SINKS_SUMP	100.0	-1513.6		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02251	146.6	112.5
62926_DCKSNSS7	MISO_SINKS_SUMP	100.0	-1513.8		-0.0324	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02148	-168.3	-135.8
34259_WBGO__T8	MISO_SINKS_SUMP	100.0	-1513.9		0.0369	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01170	320.5	302.8
34261_BL_EART8	MISO_SINKS_SUMP	100.0	-1514.4		0.0369	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01164	320.5	302.9
38744_ONGM_TP	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
38745_10MILELK	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
38746_HACKENSK	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
38750_BACKUS	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
61855_HACKREG9	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
62208_BIRCHLK9	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
62209_BIRCHLK8	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
62507_ONIGUM_9	MISO_SINKS_SUMP	100.0	-1514.9		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02321	146.6	111.4
62213_STHDLTP7	MISO_SINKS_SUMP	100.0	-1515.0		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02376	146.6	110.6
34961_CORNPLUS	MISO_SINKS_SUMP	100.0	-1515.5		0.0368	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01170	320.5	302.8
62875_WARSAW_8	MISO_SINKS_SUMP	100.0	-1515.6		0.0361	-	61250 JAMESTP8 69.0 62351 JMSTWTP8 69.0 1	C: 60650 WILMART8 69.0 62336 JHNSNTP8 69.0 1	4103	66.5	11.7	0.04439	31.8	-35.5
62329_WNBGOTP8	MISO_SINKS_SUMP	100.0	-1518.7		0.0368	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01168	320.5	302.8
62334_WNNBAGO8	MISO_SINKS_SUMP	100.0	-1518.7		0.0368	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01168	320.5	302.8
62925_DICKNSN7	MISO_SINKS_SUMP	100.0	-1521.6		-0.0322	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02134	-168.3	-135.9
63081_DICKNSNT	MISO_SINKS_SUMP	100.0	-1521.9		-0.0322	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02153	-168.3	-135.6
60831_EASTWD28	MISO_SINKS_SUMP	100.0	-1523.0		0.0367	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00791	320.5	308.5
62339_POHL___8	MISO_SINKS_SUMP	100.0	-1523.0		0.0367	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00791	320.5	308.5
63030_DICKNSN3	MISO_SINKS_SUMP	100.0	-1523.2		-0.0322	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.02240	-168.3	-134.2
34307_B_EARTT8	MISO_SINKS_SUMP	100.0	-1526.6		0.0366	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01158	320.5	302.9
29486_FROHN__8	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
63146_BEMIDJI9	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
63196_BEMIDJIY	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
63246_BEMIDJI7	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
63346_BEMIDJ19	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
66789_BEMIDJIT	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
67015_BEMIDJI8	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7909_AIRPRT_J	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7910_AIRPORT	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7915_NYMORE	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7916_HYDRO_T	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7920_NYMORE_J	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7924_BEM_IPAR	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7925_BI_PARK	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7927_COLGETAP	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7928_BEM25TH	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
7929_BEMCOLGE	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
8535_BEMJ_HY	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
9261_REDBY	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9262_PUPOSKY	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9332_AARDH_TP	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9383_QUIRNG_J	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9384_BATTLE	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9436_BEM_HOS	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9437_AARDAHL	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9461_MISSION8	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
9481_RED_LAKE	MISO_SINKS_SUMP	100.0	-1527.5		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02220	146.6	112.7
62210_STHDALE7	MISO_SINKS_SUMP	100.0	-1527.6		0.0319	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02354	146.6	110.6
60727_FARFXNU8	MISO_SINKS_SUMP	100.0	-1528.3		0.0365	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00966	320.5	305.8
63145_WILTON_9	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
63245_WILTON_7	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
66776_WILTON_T	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
66968_WILTON_8	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
7907_LK_PIPE	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
7908_PIPETAP	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
7911_NORTHT	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
7912_NORTHWD	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
7931_WILTON	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9264_LONG_LK	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9265_BLACKDCK	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9365_BAGLEY8	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9366_SHEVLIN8	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9367_DUDLEY	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9369_BEM_RUR	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9424_BUSY_COR	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
9431_NORTHERN	MISO_SINKS_SUMP	100.0	-1530.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02214	146.6	112.7
66715_LEECHLK7	MISO_SINKS_SUMP	100.0	-1531.6		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02241	146.6	112.3
66716_LAPORTE7	MISO_SINKS_SUMP	100.0	-1531.6		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02241	146.6	112.3
63186_WILTON_Y	MISO_SINKS_SUMP	100.0	-1533.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02210	146.6	112.7
63343_WILTON19	MISO_SINKS_SUMP	100.0	-1533.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02210	146.6	112.7
66797_WILTON29	MISO_SINKS_SUMP	100.0	-1533.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02210	146.6	112.7
66798_WILTON2T	MISO_SINKS_SUMP	100.0	-1533.1		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02210	146.6	112.7
62181_OAKLAWN8	MISO_SINKS_SUMP	100.0	-1534.2		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02345	146.6	110.6
62190_OKLWNTP8	MISO_SINKS_SUMP	100.0	-1534.2		0.0318	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02345	146.6	110.6
34260_DELEAST8	MISO_SINKS_SUMP	100.0	-1535.4		0.0364	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01162	320.5	302.7
62202_NOKAY__7	MISO_SINKS_SUMP	100.0	-1535.6		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02340	146.6	110.6
66719_MORANVI7	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66757_MORANVI4	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66768_MORANV19	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66769_MORANV29	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66770_MORANV39	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66771_MORANV49	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66790_MORANV1T	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66793_MORANV2T	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66794_MORANV3T	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66795_MORANV4T	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
66999_MORANVI8	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9241_STAFFORD	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9242_ROSEAU_8	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9243_POLARIS8	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9244_MALUNG	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9245_PENCER	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9247_HASLERUD	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9255_WARROAD	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9483_SALOLTAP	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
9484_SALOL__8	MISO_SINKS_SUMP	100.0	-1536.3		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02137	146.6	113.7
34263_ELMORE_8	MISO_SINKS_SUMP	100.0	-1536.8		0.0363	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01152	320.5	302.8
38651_SYLVAN	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
38653_F_RIPLEY	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38654_BRAINRUL	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
38655_NW_PAPER	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
38656_NWP_TAP	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
61652_BRAINRD7	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
61851_BRD_NWP	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
61852_BRAINRD9	MISO_SINKS_SUMP	100.0	-1538.0		0.0317	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02336	146.6	110.7
60713_BECKER_8	MISO_SINKS_SUMP	100.0	-1542.1		-0.0318	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.01726	-168.3	-141.7
62137_LIBERTY8	MISO_SINKS_SUMP	100.0	-1542.1		-0.0318	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.01726	-168.3	-141.7
60175_ROSEAU_4	MISO_SINKS_SUMP	100.0	-1545.3		0.0315	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02125	146.6	113.7
62333_EASTON_8	MISO_SINKS_SUMP	100.0	-1551.4		0.0360	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01155	320.5	302.6
34284_MINNLKT8	MISO_SINKS_SUMP	100.0	-1559.1		0.0358	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01152	320.5	302.6
60766_COSMSTP8	MISO_SINKS_SUMP	100.0	-1561.4		0.0358	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01543	320.5	296.5
62626_COSMOS_8	MISO_SINKS_SUMP	100.0	-1561.4		0.0358	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01543	320.5	296.5
60206_CROWRVR7	MISO_SINKS_SUMP	100.0	-1561.9		-0.0314	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.01995	-168.3	-137.2
63280_WILTPIPE	MISO_SINKS_SUMP	100.0	-1562.6		0.0312	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02168	146.6	112.7
63281_WILT_TAP	MISO_SINKS_SUMP	100.0	-1562.6		0.0312	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02168	146.6	112.7
62177_BIRCHLK7	MISO_SINKS_SUMP	100.0	-1563.0		0.0312	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02246	146.6	111.5
38741_BDOURATP	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
38742_AKELEY	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
38743_WALKER	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
38751_NEVIS	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
38752_DORSET34	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
61638_AKELEY7	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
61838_AKELEY9	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
62418_NEVIS__9	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
62422_KRAMRLK7	MISO_SINKS_SUMP	100.0	-1564.1		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	111.8
61938_WELLS	MISO_SINKS_SUMP	100.0	-1565.1		0.0357	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01150	320.5	302.5
61612_RIVERTN4	MISO_SINKS_SUMP	100.0	-1566.7		0.0311	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02242	146.6	111.4
62332_CLARK__8	MISO_SINKS_SUMP	100.0	-1567.8		0.0356	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01149	320.5	302.5
60157_STCLOUD7	MISO_SINKS_SUMP	100.0	-1568.2		-0.0457	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	-210.7	-139.0	-0.02390	-168.3	-130.9
62214_BIRCHLKT	MISO_SINKS_SUMP	100.0	-1569.6		0.0310	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02237	146.6	111.5
63111_CANBY__9	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
63211_CANBY__7	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7832_OLD_BUR	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7834_CANBY	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7835_BURRJCT	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7837_MINEAST	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7840_CANBYWRR	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7841_JCT	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7842_SAMJONES	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7843_PORTER	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7844_TAUTON	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7845_CANBYNE	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7846_CANBYR	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7847_HENDKT	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7848_IVANT	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7849_BENTON	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7850_IVNHOE	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7853_GREENV	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7854_GHENT	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7855_MINNEOTA	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7856_HENDRIKS	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7866_BURR	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
7879_VERDI	MISO_SINKS_SUMP	100.0	-1571.0		0.0355	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01498	320.5	297.0
62343_PENELTP8	MISO_SINKS_SUMP	100.0	-1577.8		0.0354	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00722	320.5	309.1
69042_T_BRC	MISO_SINKS_SUMP	100.0	-1578.5		0.0354	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01134	320.5	302.7
63285_SOLWAY_7	MISO_SINKS_SUMP	100.0	-1578.8		0.0309	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02146	146.6	112.7
61794_BADOUJCT	MISO_SINKS_SUMP	100.0	-1580.0		0.0308	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	111.5
61795_BADOUTR9	MISO_SINKS_SUMP	100.0	-1580.0		0.0308	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02221	146.6	111.5
62412_TRIPPLK7	MISO_SINKS_SUMP	100.0	-1581.4		0.0308	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02219	146.6	111.5
34262_BRCLYNT8	MISO_SINKS_SUMP	100.0	-1582.0		0.0353	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01137	320.5	302.6

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
34264_BRICLYN8	MISO_SINKS_SUMP	100.0	-1582.0		0.0353	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01137	320.5	302.6
62330_BRICLYN8	MISO_SINKS_SUMP	100.0	-1582.0		0.0353	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01137	320.5	302.6
62981_MCLEOD_7	MISO_SINKS_SUMP	100.0	-1583.2		0.0353	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01084	320.5	303.4
61640_BADOURA7	MISO_SINKS_SUMP	100.0	-1585.5		0.0307	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02213	146.6	111.5
34265_WALTERS8	MISO_SINKS_SUMP	100.0	-1586.8		0.0352	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01142	320.5	302.4
34287_SBRDWAY8	MISO_SINKS_SUMP	100.0	-1596.9		0.0350	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01158	320.5	302.1
60000_SHERC31G	MISO_SINKS_SUMP	100.0	-1597.4		-0.0400	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02964	-168.3	-121.0
60001_SHERC32G	MISO_SINKS_SUMP	100.0	-1597.4		-0.0400	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02964	-168.3	-121.0
60002_SHERC33G	MISO_SINKS_SUMP	100.0	-1597.4		-0.0400	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02964	-168.3	-121.0
60160_SHERCO_3	MISO_SINKS_SUMP	100.0	-1597.4		-0.0400	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02964	-168.3	-121.0
63243_SHEVLIN7	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
63244_ITASCA_7	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
63282_NWOOD__7	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
63344_ITASCA_9	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
66727_RICELKT7	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
66729_RICELAK7	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
7932_SOLWAY	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
7933_SHEVLIN	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
7947_NWOOD_9	MISO_SINKS_SUMP	100.0	-1597.7		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02120	146.6	112.7
61578_MUDLKJCT	MISO_SINKS_SUMP	100.0	-1598.2		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02237	146.6	110.8
61579_MUDLKTR9	MISO_SINKS_SUMP	100.0	-1598.2		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02237	146.6	110.8
63212_BURR__7	MISO_SINKS_SUMP	100.0	-1600.0		0.0349	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01484	320.5	296.8
60107_W_FARIB7	MISO_SINKS_SUMP	100.0	-1601.8		0.0389	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.02359	233.7	195.9
60003_PR_IS31G	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60004_PR_IS32G	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60105_PR_ISLD3	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60667_PI1_RCP9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60668_PI1__LD9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60669_PI1_4KV9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60670_PI2_RCP9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60671_PI2__LD9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
60672_PI2_4KV9	MISO_SINKS_SUMP	100.0	-1603.0		0.0323	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C:760	158	278.8	227.0	0.00920	233.7	219.0
34285_ALDEN_J8	MISO_SINKS_SUMP	100.0	-1603.3		0.0348	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01139	320.5	302.3
68984_ALDEN	MISO_SINKS_SUMP	100.0	-1603.3		0.0348	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01139	320.5	302.3
68988_FREEBORN	MISO_SINKS_SUMP	100.0	-1603.3		0.0348	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01139	320.5	302.3
38701_ALDRICH	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
38702_STAPLES	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
38703_WARDTAP	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
38704_DOGLKTAP	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
38705_MOTLEY	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
38706_STPLSRRL	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
61644_DOGLAKE7	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
61844_DOGLAKE9	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
62219_SHIMNTP9	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
62220_SHIMNLK9	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
62905_STAPLES9	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
62906_WARD___9	MISO_SINKS_SUMP	100.0	-1603.4		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
61646_DOGLKTP7	MISO_SINKS_SUMP	100.0	-1603.7		0.0304	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02215	146.6	111.1
61651_MUDLAKE7	MISO_SINKS_SUMP	100.0	-1607.3		0.0303	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02217	146.6	110.9
62191_PINCTRT8	MISO_SINKS_SUMP	100.0	-1608.8		0.0303	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02224	146.6	110.8
60100_FORBECA2	MISO_SINKS_SUMP	100.0	-1609.7		0.0303	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02020	146.6	114.1
60101_FORBES_2	MISO_SINKS_SUMP	100.0	-1609.7		0.0303	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02020	146.6	114.1
62410_PALMRLK7	MISO_SINKS_SUMP	100.0	-1610.1		0.0303	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02176	146.6	111.5
62653_WILSNLKT	MISO_SINKS_SUMP	100.0	-1611.1		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02213	146.6	110.9
38753_MANTRPTP	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38754_515_520T	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38781_LLCAPBNK	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38783_OSAGE_MP	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38784_PARKRPTP	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38785_PARKRPDS	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
38786_RDO_MP	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38792_MP_LNGLK	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62379_EAGELK9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62411_LONG_LK7	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62413_PINEPT_9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62414_OSAGE__9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62416_PRK_RPD9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62417_MANTRAP9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62421_LONG_LK9	MISO_SINKS_SUMP	100.0	-1611.3		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02174	146.6	111.5
62639_WILSNLK7	MISO_SINKS_SUMP	100.0	-1611.7		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02213	146.6	110.9
62347_EAGLELK8	MISO_SINKS_SUMP	100.0	-1617.3		0.0345	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00682	320.5	309.5
62415_RDO____7	MISO_SINKS_SUMP	100.0	-1617.9		0.0301	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02165	146.6	111.6
62420_RDO_TAP7	MISO_SINKS_SUMP	100.0	-1617.9		0.0301	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02165	146.6	111.6
63078_HUBBARDT	MISO_SINKS_SUMP	100.0	-1618.5		0.0301	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02164	146.6	111.6
60769_CAIRO_R8	MISO_SINKS_SUMP	100.0	-1621.3		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00867	320.5	306.5
62646_WILSONL8	MISO_SINKS_SUMP	100.0	-1621.5		0.0300	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 61673 ARROWHD7 115 61679 GARY 7 115 1	5041	230.7	182.0	0.02203	146.6	110.9
60882_DELANO_8	MISO_SINKS_SUMP	100.0	-1621.9		-0.0302	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60348 BENCTP7 115 1	3596	-188.0	-139.0	-0.01980	-168.3	-136.2
34286_ALEAWST8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
34288_ALEA_NW8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
60780_CLRKGNS8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
62880_MATAWAN8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
62881_ST_OLAF8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
62887_STOLAFT8	MISO_SINKS_SUMP	100.0	-1622.7		0.0344	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
34291_ALEA__E8	MISO_SINKS_SUMP	100.0	-1626.7		0.0343	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01136	320.5	302.1
63075_BENTON1T	MISO_SINKS_SUMP	100.0	-1627.0		-0.0303	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:009 2	127	-188.3	-139.0	-0.01928	-168.3	-137.0
62618_CEDARML8	MISO_SINKS_SUMP	100.0	-1634.9		0.0342	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01512	320.5	295.8
62619_CDRMLTP8	MISO_SINKS_SUMP	100.0	-1634.9		0.0342	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01512	320.5	295.8
60805_WATRVIL8	MISO_SINKS_SUMP	100.0	-1641.3		0.0380	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.02481	233.7	193.0
63173_DAWS_TP7	MISO_SINKS_SUMP	100.0	-1655.6		0.0337	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01460	320.5	296.4
63174_DAWSON_7	MISO_SINKS_SUMP	100.0	-1655.6		0.0337	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01460	320.5	296.4
62005_KERKHOT7	MISO_SINKS_SUMP	100.0	-1675.4		0.0333	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01490	320.5	295.6
34292_ALEA19_8	MISO_SINKS_SUMP	100.0	-1692.9		0.0330	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01088	320.5	302.1
63113_MARIETT9	MISO_SINKS_SUMP	100.0	-1703.6		0.0328	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01438	320.5	296.1
63213_MARIETT7	MISO_SINKS_SUMP	100.0	-1703.6		0.0328	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01438	320.5	296.1
63206_LOUSBRG7	MISO_SINKS_SUMP	100.0	-1707.9		0.0327	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01439	320.5	296.0
62342_PENELOP8	MISO_SINKS_SUMP	100.0	-1711.5		0.0326	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00579	320.5	310.6
60808_EAGLELK8	MISO_SINKS_SUMP	100.0	-1717.7		0.0325	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00579	320.5	310.6
61250_JAMESTP8	MISO_SINKS_SUMP	100.0	-1718.7		0.0325	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00578	320.5	310.6
69054_SOUTH_SH	MISO_SINKS_SUMP	100.0	-1739.5		0.0321	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01058	320.5	302.1
62025_SHBL_TP9	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
62040_SHBL_LK9	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
63217_APPLETN7	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
7452_APPLE	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
7456_MILANJT	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
7457_MILANJT2	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
7458_HOLLOWAY	MISO_SINKS_SUMP	100.0	-1742.3		0.0320	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01426	320.5	295.7
63289_CORRELL7	MISO_SINKS_SUMP	100.0	-1771.6		0.0315	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01415	320.5	295.5
34293_HAYWD_18	MISO_SINKS_SUMP	100.0	-1780.1		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01035	320.5	302.1
34305_GLENVIL8	MISO_SINKS_SUMP	100.0	-1780.1		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01035	320.5	302.1
69009_T_LERD	MISO_SINKS_SUMP	100.0	-1780.1		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01035	320.5	302.1
69074_RICELND8	MISO_SINKS_SUMP	100.0	-1780.1		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01035	320.5	302.1
69076_LERDAL	MISO_SINKS_SUMP	100.0	-1780.1		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01035	320.5	302.1
68976_T_GLEN	MISO_SINKS_SUMP	100.0	-1780.7		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01034	320.5	302.1
68978_GLENVILL	MISO_SINKS_SUMP	100.0	-1780.9		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01034	320.5	302.1
69326_EXOL	MISO_SINKS_SUMP	100.0	-1781.0		0.0314	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01034	320.5	302.1
62000_MARSHLK7	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62019_AKRON__9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62020_ARTCKTP9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62021_FRFLDSW9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62022_FAIRFLD9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62024_ARTICHK9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
62038_MARSHLK9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62042_AKRONTP9	MISO_SINKS_SUMP	100.0	-1781.4		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01411	320.5	295.4
68980_TWIN_LAK	MISO_SINKS_SUMP	100.0	-1781.6		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01033	320.5	302.1
68982_MANSFIEL	MISO_SINKS_SUMP	100.0	-1781.6		0.0313	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01033	320.5	302.1
62006_KERKHO_7	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
62026_KERKHO_9	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
62036_KILDARE9	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
7463_DEGRAFF	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
7464_MURDOCK	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
7465_KERKTP	MISO_SINKS_SUMP	100.0	-1795.5		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01451	320.5	294.5
62224_RAVENNA5	MISO_SINKS_SUMP	100.0	-1795.7		0.0347	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.12347	233.7	12.0
62426_WILLMR1T	MISO_SINKS_SUMP	100.0	-1796.1		0.0311	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01454	320.5	294.4
62425_WILLMAR7	MISO_SINKS_SUMP	100.0	-1808.5		0.0309	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01450	320.5	294.3
62337_JAMESTW8	MISO_SINKS_SUMP	100.0	-1811.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00491	320.5	311.7
62351_JMSTWTP8	MISO_SINKS_SUMP	100.0	-1811.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.00491	320.5	311.7
34289_NBRIDGE8	MISO_SINKS_SUMP	100.0	-1812.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01014	320.5	302.2
34294_HAYWD_28	MISO_SINKS_SUMP	100.0	-1812.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01014	320.5	302.2
34295_CO_LINE8	MISO_SINKS_SUMP	100.0	-1812.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01014	320.5	302.2
69199_BANCROFT	MISO_SINKS_SUMP	100.0	-1812.7		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01014	320.5	302.2
63288_ODESSA_7	MISO_SINKS_SUMP	100.0	-1815.1		0.0308	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01400	320.5	295.1
61564_FORB4JCT	MISO_SINKS_SUMP	100.0	-1830.4		-0.0375	-	61554 AWHD1JCT 115 61615 ARROWHD4 230 1	C:AHD 98L	293	-388.6	-320.0	-0.01995	-175.8	-139.3
61565_FORB4TR9	MISO_SINKS_SUMP	100.0	-1830.4		-0.0375	-	61554 AWHD1JCT 115 61615 ARROWHD4 230 1	C:AHD 98L	293	-388.6	-320.0	-0.01995	-175.8	-139.3
63287_ORTQUAR7	MISO_SINKS_SUMP	100.0	-1838.8		0.0304	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01391	320.5	295.0
63116_ORTONVL9	MISO_SINKS_SUMP	100.0	-1855.5		0.0301	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	294.8
63216_ORTONVL7	MISO_SINKS_SUMP	100.0	-1855.5		0.0301	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	294.8
9495_BURDICK	MISO_SINKS_SUMP	100.0	-1855.5		0.0301	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	294.8
9562_ORT_MUN	MISO_SINKS_SUMP	100.0	-1855.5		0.0301	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	294.8
9570_BURDJT	MISO_SINKS_SUMP	100.0	-1855.5		0.0301	-	60262 EDEN PR3 345 60263 EDEN PR7 115 9	C:705 2	154	503.8	448.0	0.01386	320.5	294.8
60106_PR_ISLD5	MISO_SINKS_SUMP	100.0	-1858.1		0.0335	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.11969	233.7	11.3
39449_ARROWHD	MISO_SINKS_SUMP	100.0	-1862.3		-0.0375	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01609	-244.8	-214.9
60153_MNTCELO7	MISO_SINKS_SUMP	100.0	-1873.1		-0.0341	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.03008	-168.3	-112.0
61952_S_FARIB5	MISO_SINKS_SUMP	100.0	-1923.1		0.0324	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.02044	233.7	194.4
60158_STCLTP_7	MISO_SINKS_SUMP	100.0	-1958.1		-0.0366	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	-210.7	-139.0	-0.02277	-168.3	-123.7
62162_LIBERTYT	MISO_SINKS_SUMP	100.0	-1965.3		-0.0325	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02863	-168.3	-112.1
62815_I94PARK7	MISO_SINKS_SUMP	100.0	-1985.2		-0.0361	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	-210.7	-139.0	-0.02219	-168.3	-124.3
62955_OAKWOOD7	MISO_SINKS_SUMP	100.0	-2012.4		-0.0318	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02757	-168.3	-112.9
62310_SAND_MP8	MISO_SINKS_SUMP	100.0	-2023.8		0.0569	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.05692	-40.5	-155.7
62678_ELYSIAN8	MISO_SINKS_SUMP	100.0	-2034.9		0.0306	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.01949	233.7	194.1
62679_ELYSNTP8	MISO_SINKS_SUMP	100.0	-2034.9		0.0306	-	60324 CANNFLS7 115 62235 EMPIRE 7 115 1	C: 60103 CANNFLS5 161 60324 CANNFLS7 115 5	3465	289.3	227.0	0.01949	233.7	194.1
62816_STAUGST7	MISO_SINKS_SUMP	100.0	-2056.2		-0.0349	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	-210.7	-139.0	-0.02072	-168.3	-125.7
62308_SAND_TP8	MISO_SINKS_SUMP	100.0	-2070.3		0.0556	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.05564	-40.5	-155.7
39448_AWHD_PST	MISO_SINKS_SUMP	100.0	-2074.0		-0.0337	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01541	-244.8	-212.9
60166_SALIDA_7	MISO_SINKS_SUMP	100.0	-2127.7		-0.0301	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C:BENTON COUNTY 41RB5 STUCK	259	-202.9	-139.0	-0.02726	-168.3	-110.3
60601_SHERCO	MISO_SINKS_SUMP	100.0	-2136.0		-0.0304	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60142 BENTON 3 345 60160 SHERCO 3 345 1	3579	-203.9	-139.0	-0.02679	-168.3	-111.1
62093_LIBERTY7	MISO_SINKS_SUMP	100.0	-2143.3		-0.0303	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60142 BENTON 3 345 60160 SHERCO 3 345 1	3579	-203.9	-139.0	-0.02674	-168.3	-111.0
60159_STCTPW_7	MISO_SINKS_SUMP	100.0	-2146.6		-0.0334	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60146 GRANCTY7 115 60164 XRDS 7 115 1	3594	-210.7	-139.0	-0.01900	-168.3	-127.6
62466_GRANDLK8	MISO_SINKS_SUMP	100.0	-2155.0		0.0535	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.05345	-40.5	-155.7
62927_LKCONST7	MISO_SINKS_SUMP	100.0	-2155.4		-0.0301	-	60154 SAUK RV7 115 65900 WAITEPK7 115 1	C: 60142 BENTON 3 345 60160 SHERCO 3 345 1	3579	-203.9	-139.0	-0.02569	-168.3	-113.0
61679_GARY___7	MISO_SINKS_SUMP	100.0	-2218.8		-0.0315	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01502	-244.8	-211.5
61676_HIBBARD7	MISO_SINKS_SUMP	100.0	-2268.1		-0.0308	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61677_HIBRD12G	MISO_SINKS_SUMP	100.0	-2268.1		-0.0308	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61681_LSPI___7	MISO_SINKS_SUMP	100.0	-2268.7		-0.0308	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61682_LSPI___9	MISO_SINKS_SUMP	100.0	-2268.7		-0.0308	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61576_HILTPJCT	MISO_SINKS_SUMP	100.0	-2271.2		-0.0307	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61577_HILTPTR9	MISO_SINKS_SUMP	100.0	-2271.2		-0.0307	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01490	-244.8	-211.0
61672_HILLTOP7	MISO_SINKS_SUMP	100.0	-2274.9		-0.0307	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01489	-244.8	-211.0
61686_15TH_AV7	MISO_SINKS_SUMP	100.0	-2284.9		-0.0306	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01487	-244.8	-210.9
61615_ARROWHD4	MISO_SINKS_SUMP	100.0	-2296.7		-0.0304	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01484	-244.8	-210.8
61616_HILLTOP4	MISO_SINKS_SUMP	100.0	-2298.1		-0.0304	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01484	-244.8	-210.8
61614_98L_TAP4	MISO_SINKS_SUMP	100.0	-2301.7		-0.0303	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01483	-244.8	-210.7
61687_MIDWAY_7	MISO_SINKS_SUMP	100.0	-2306.0		-0.0303	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01482	-244.8	-210.7
61673_ARROWHD7	MISO_SINKS_SUMP	100.0	-2308.1		-0.0303	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01481	-244.8	-210.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62516_4CORNRST	MISO_SINKS_SUMP	100.0	-2316.2		-0.0301	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01479	-244.8	-210.6
62445_4CORNRS7	MISO_SINKS_SUMP	100.0	-2317.0		-0.0301	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01479	-244.8	-210.6
61674_HANESRD7	MISO_SINKS_SUMP	100.0	-2321.3		-0.0301	-	39328 GRANVL 6 138 91318 GRANVL3 345 1	C: 38870 GRANVL2 345 39329 GRANVL1 345 1	8946	-547.8	-478.0	-0.01478	-244.8	-210.5
62314_BEAR_CK8	MISO_SINKS_SUMP	100.0	-2453.1		0.0470	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04696	-40.5	-155.7
62305_SANDSTN8	MISO_SINKS_SUMP	100.0	-2454.6		0.0469	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04693	-40.5	-155.7
62309_SAND_SW8	MISO_SINKS_SUMP	100.0	-2454.6		0.0469	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04693	-40.5	-155.7
62312_HINCKMP8	MISO_SINKS_SUMP	100.0	-2506.5		0.0460	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04596	-40.5	-155.7
62313_GRNDSTN8	MISO_SINKS_SUMP	100.0	-2506.5		0.0460	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04596	-40.5	-155.7
61556_AWHD2JCT	MISO_SINKS_SUMP	100.0	-2536.0		-0.0349	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.03489	-29.5	59.0
61557_AWHD2TR9	MISO_SINKS_SUMP	100.0	-2536.0		-0.0349	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.03489	-29.5	59.0
61554_AWHD1JCT	MISO_SINKS_SUMP	100.0	-2540.4		-0.0348	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.03483	-29.5	59.0
61555_AWHD1TR9	MISO_SINKS_SUMP	100.0	-2540.4		-0.0348	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	-178.5	-90.0	-0.03483	-29.5	59.0
62311_HINCKTP8	MISO_SINKS_SUMP	100.0	-2670.3		0.0431	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04314	-40.5	-155.7
62304_HNCKLEY8	MISO_SINKS_SUMP	100.0	-2804.5		0.0411	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.04107	-40.5	-155.7
61796_RIVERJCT	MISO_SINKS_SUMP	100.0	-3045.9		0.0378	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03782	-40.5	-155.7
61797_RIVERTR9	MISO_SINKS_SUMP	100.0	-3045.9		0.0378	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03782	-40.5	-155.7
62212_RIVTON_T	MISO_SINKS_SUMP	100.0	-3299.9		0.0349	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03491	-40.5	-155.7
38601_RVTNRUAL	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38602_IRNTNTSW	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38603_IRNTNTAP	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38604_IRONTON	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38605_CRSBYTAP	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38606_505_06SW	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38607_506_DIST	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38608_MAROCO44	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38609_CROSBY	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38610_TROMMALD	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38611_MARCOTAP	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38612_CYUNATAP	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38613_506_TAP	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38614_DEERWOOD	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38615_CUYUNA	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38616_CRSBYMFG	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38617_RVRTN_DT	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38618_TJMACRG1	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38619_MACMLNTR	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38620_MACMILAN	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38621_WAFERIZR	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38622_TJMACRG2	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38623_532_06TS	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
38624_HWY12	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
61653_RIVERTN7	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
61853_RIVERTN9	MISO_SINKS_SUMP	100.0	-3330.2		0.0346	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03459	-40.5	-155.7
62176_MERRFLD7	MISO_SINKS_SUMP	100.0	-3513.6		0.0328	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3393	235.2	120.0	0.03278	-40.5	-155.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

FCITC MULTIPLE TRANSFER REPORT

PSS(tm)MUST 9.1a -- Managing and Utilizing System Transmission -- SAT, APR 18 2009 20:02 <FCM003>X
MTEP06 - 2011 SUMMER PEAK PHASE 3 CONTRACTUAL DISPATCH CASE
MTEP-2013_SUOP_FINAL(V1)_TOPOLOGY-(052307), DRG 2013 SUOP
Case.File C:\Projects\Xcel-DRG\MUST\DRG_Phase_II_2013_SUOP_BASE_PLAN_MODEL_Ver6a_sced_041709_2final-c.sav
Subsys.File C:\Projects\Xcel-DRG\MUST\MN_allbus_SUOP.sub
Monit.File C:\Projects\Xcel-DRG\MUST\MN.mon
Contin.File C:\Projects\Xcel-DRG\MUST\MN_SUOP.con
Exclud.File C:\Projects\Xcel-DRG\MUST\MN.exc

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61679_GARY___7	MISO_SINKS_SUOP	100.0	-418.8		-0.1227	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.06707	-62.2	-34.1
34306_ADAMS__8	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
68930_T_RC_8	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
68936_LONDON	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
69078_ROSE_CRE	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
69098_MCNEILS8	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
69122_TAOPI	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
69130_T_TAOPI	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
907_G330	MISO_SINKS_SUOP	100.0	-449.6		0.0538	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04417	181.1	161.2
34572_ADAMS_S5	MISO_SINKS_SUOP	100.0	-470.5		0.0514	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04218	181.1	161.2
34014_ADAMS__5	MISO_SINKS_SUOP	100.0	-470.6		0.0514	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04218	181.1	161.2
34570_ADAMS_N5	MISO_SINKS_SUOP	100.0	-470.6		0.0514	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04217	181.1	161.2
60102_ADAMS__3	MISO_SINKS_SUOP	100.0	-481.7		0.0503	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04169	181.1	161.0
61676_HIBBARD7	MISO_SINKS_SUOP	100.0	-483.5		-0.1063	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05405	-62.2	-36.1
61677_HIBRD12G	MISO_SINKS_SUOP	100.0	-483.5		-0.1063	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05405	-62.2	-36.1
61681_LSPI___7	MISO_SINKS_SUOP	100.0	-485.3		-0.1058	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05371	-62.2	-36.2
61682_LSPI___9	MISO_SINKS_SUOP	100.0	-485.3		-0.1058	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05371	-62.2	-36.2
61576_HILTPJCT	MISO_SINKS_SUOP	100.0	-487.9		-0.1053	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05329	-62.2	-36.2
61577_HILTPTR9	MISO_SINKS_SUOP	100.0	-487.9		-0.1053	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05329	-62.2	-36.2
34323_WOLFCRK8	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
61984_AUSTIN_5	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
61985_AUSTIN	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
61986_AUSTIN	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
61988_AUSTIN	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
61990_BLOOM_PR	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
69052_BROWNSDA	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
69077_SARGENT	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
69084_CORNING	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
69086_T_BP	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
69100_T_AUST	MISO_SINKS_SUOP	100.0	-489.9		0.0494	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.04032	181.1	161.3
63420_IBM	MISO_SINKS_SUOP	100.0	-494.3		0.0490	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03854	181.1	162.0
63410_WILLOW_C	MISO_SINKS_SUOP	100.0	-495.6		0.0488	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03858	181.1	162.0
63435_BAMBER_V	MISO_SINKS_SUOP	100.0	-496.1		0.0488	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03851	181.1	162.0
63440_SILVER_L	MISO_SINKS_SUOP	100.0	-496.2		0.0488	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03843	181.1	162.0
63405_CROSSTWN	MISO_SINKS_SUOP	100.0	-496.4		0.0488	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03842	181.1	162.0
63430_CASCADE	MISO_SINKS_SUOP	100.0	-496.8		0.0487	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03840	181.1	162.0
63073_PL_VLLYT	MISO_SINKS_SUOP	100.0	-499.2		0.0485	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03910	181.1	161.6
63006_PVS__51G	MISO_SINKS_SUOP	100.0	-499.5		0.0485	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.5
63007_PVS__52G	MISO_SINKS_SUOP	100.0	-499.5		0.0485	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.5
63008_PVS__53G	MISO_SINKS_SUOP	100.0	-499.5		0.0485	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.5
63070_PL_VLLY5	MISO_SINKS_SUOP	100.0	-499.5		0.0485	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.5
34010_HAYWARD5	MISO_SINKS_SUOP	100.0	-499.8		0.0484	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03970	181.1	161.2
63032_PL_VLLY3	MISO_SINKS_SUOP	100.0	-500.9		0.0483	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03922	181.1	161.4
34291_ALEA__E8	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2
34293_HAYWD_18	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2
34305_GLENVIL8	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2
69009_T_LERD	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2
69074_RICELND8	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2
69076_LERDAL	MISO_SINKS_SUOP	100.0	-502.0		0.0482	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03954	181.1	161.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61906_MAPLE_LF	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69161_PLESNT_V	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69162_PLNVW_TP	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69164_ROCKDELL	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69166_CANISTEO	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69168_KALMAR	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69170_MAPLE_LF	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
69172_GENOA_8	MISO_SINKS_SUOP	100.0	-503.0		0.0481	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03804	181.1	162.0
61672_HILLTOP7	MISO_SINKS_SUOP	100.0	-504.0		-0.1019	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.05040	-62.2	-36.8
68976_T_GLEN	MISO_SINKS_SUOP	100.0	-504.4		0.0480	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03938	181.1	161.2
68978_GLENVILL	MISO_SINKS_SUOP	100.0	-505.3		0.0479	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03932	181.1	161.2
69326_EXOL	MISO_SINKS_SUOP	100.0	-505.7		0.0479	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03929	181.1	161.2
60066_GMW	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
60798_DODGCEN8	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
60799_KASSON_8	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
60800_PINEISL8	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
60916_GARWINDG	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
61161_WBYRON_8	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
61948_BYRON__5	MISO_SINKS_SUOP	100.0	-507.2		0.0477	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03780	181.1	161.9
68980_TWIN_LAK	MISO_SINKS_SUOP	100.0	-508.2		0.0476	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.2
68982_MANSFIEL	MISO_SINKS_SUOP	100.0	-508.2		0.0476	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03912	181.1	161.2
34289_NBRIDGE8	MISO_SINKS_SUOP	100.0	-509.9		0.0475	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03879	181.1	161.3
34294_HAYWD_28	MISO_SINKS_SUOP	100.0	-509.9		0.0475	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03879	181.1	161.3
34295_CO_LINE8	MISO_SINKS_SUOP	100.0	-509.9		0.0475	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03879	181.1	161.3
69199_BANCROFT	MISO_SINKS_SUOP	100.0	-509.9		0.0475	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03879	181.1	161.3
69054_SOUTH_SH	MISO_SINKS_SUOP	100.0	-514.1		0.0471	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03843	181.1	161.3
34292_ALEA19_8	MISO_SINKS_SUOP	100.0	-517.0		0.0468	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03818	181.1	161.3
61950_BYRON__3	MISO_SINKS_SUOP	100.0	-521.5		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03697	181.1	161.8
34286_ALEAWST8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
34287_SBRDWAY8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
34288_ALEA_NW8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
60780_CLRKGNS8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
62880_MATAWAN8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
62881_ST_OLAF8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
62887_STOLAFT8	MISO_SINKS_SUOP	100.0	-521.8		0.0464	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03778	181.1	161.4
61686_15TH_AV7	MISO_SINKS_SUOP	100.0	-523.7		-0.0981	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.04730	-62.2	-37.5
34285_ALDEN_J8	MISO_SINKS_SUOP	100.0	-529.4		0.0457	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03716	181.1	161.4
68984_ALDEN	MISO_SINKS_SUOP	100.0	-529.4		0.0457	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03716	181.1	161.4
68988_FREEBORN	MISO_SINKS_SUOP	100.0	-529.4		0.0457	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03716	181.1	161.4
34265_WALTERS8	MISO_SINKS_SUOP	100.0	-536.1		0.0451	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03662	181.1	161.5
62867_AL_CORN5	MISO_SINKS_SUOP	100.0	-536.9		0.0451	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03527	181.1	162.2
62332_CLARK__8	MISO_SINKS_SUOP	100.0	-541.8		0.0447	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03616	181.1	161.5
34262_BRCLYNT8	MISO_SINKS_SUOP	100.0	-542.3		0.0446	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03617	181.1	161.5
34264_BRICLYN8	MISO_SINKS_SUOP	100.0	-542.3		0.0446	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03617	181.1	161.5
62330_BRICLYN8	MISO_SINKS_SUOP	100.0	-542.3		0.0446	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03617	181.1	161.5
61938_WELLS	MISO_SINKS_SUOP	100.0	-542.6		0.0446	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03610	181.1	161.5
34284_MINNLKT8	MISO_SINKS_SUOP	100.0	-544.4		0.0445	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03595	181.1	161.5
69042_T_BRC	MISO_SINKS_SUOP	100.0	-546.7		0.0443	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03585	181.1	161.5
62333_EASTON_8	MISO_SINKS_SUOP	100.0	-546.8		0.0443	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03576	181.1	161.5
34260_DELEAST8	MISO_SINKS_SUOP	100.0	-552.0		0.0439	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03536	181.1	161.6
62329_WNBGOTP8	MISO_SINKS_SUOP	100.0	-557.5		0.0434	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03493	181.1	161.6
62334_WNNBAGO8	MISO_SINKS_SUOP	100.0	-557.5		0.0434	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03493	181.1	161.6
34263_ELMORE_8	MISO_SINKS_SUOP	100.0	-558.1		0.0434	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03495	181.1	161.6
34961_CORNPLUS	MISO_SINKS_SUOP	100.0	-558.6		0.0433	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03485	181.1	161.6
34259_WBGO__T8	MISO_SINKS_SUOP	100.0	-559.2		0.0433	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03481	181.1	161.6
34258_WBGOJ_S8	MISO_SINKS_SUOP	100.0	-560.5		0.0432	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03471	181.1	161.6
34307_B_EARTT8	MISO_SINKS_SUOP	100.0	-560.6		0.0432	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03476	181.1	161.6
34261_BL_EART8	MISO_SINKS_SUOP	100.0	-563.6		0.0430	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03452	181.1	161.6
34256_WBGO___8	MISO_SINKS_SUOP	100.0	-569.3		0.0425	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03408	181.1	161.7
34257_WBGOJ_N8	MISO_SINKS_SUOP	100.0	-569.3		0.0425	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03408	181.1	161.7
61687_MIDWAY_7	MISO_SINKS_SUOP	100.0	-570.2		-0.0901	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.04085	-62.2	-38.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61964_OWATNNA5	MISO_SINKS_SUOP	100.0	-570.3		0.0424	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03273	181.1	162.4
61673_ARROWHD7	MISO_SINKS_SUOP	100.0	-575.2		-0.0893	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.04022	-62.2	-39.1
34013_WNBAGOS5	MISO_SINKS_SUOP	100.0	-575.4		0.0421	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03362	181.1	161.7
34009_WINBAGO5	MISO_SINKS_SUOP	100.0	-575.5		0.0421	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03361	181.1	161.7
60120_BLUEETA5	MISO_SINKS_SUOP	100.0	-577.0		0.0420	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03349	181.1	161.8
60651_BLEARTH8	MISO_SINKS_SUOP	100.0	-577.0		0.0420	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03349	181.1	161.8
61085_BLUEE__8	MISO_SINKS_SUOP	100.0	-577.0		0.0420	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03349	181.1	161.8
34279_PRAT_T_8	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
34296_STELCTR8	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
61968_OWATANA2	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
61972_OWATANA1	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
62883_BIXBY__8	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
62884_RIVERPT8	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
62885_PRATT__8	MISO_SINKS_SUOP	100.0	-578.4		0.0419	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03218	181.1	162.5
62516_4CORNRST	MISO_SINKS_SUOP	100.0	-578.9		-0.0887	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03996	-62.2	-39.1
62445_4CORNRS7	MISO_SINKS_SUOP	100.0	-579.3		-0.0887	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03993	-62.2	-39.1
34298_MEDFRDJ8	MISO_SINKS_SUOP	100.0	-580.1		0.0417	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03206	181.1	162.5
62873_CLARMNT8	MISO_SINKS_SUOP	100.0	-580.1		0.0417	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03206	181.1	162.5
62882_MERTON_8	MISO_SINKS_SUOP	100.0	-580.1		0.0417	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03206	181.1	162.5
62886_OWATNNA8	MISO_SINKS_SUOP	100.0	-580.1		0.0417	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03206	181.1	162.5
34278_WILWCKT8	MISO_SINKS_SUOP	100.0	-581.5		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WBGO 869.0-WILWCKT869.0-1+SW122	758	-106.6	-69.0	0.01048	-103.3	-109.4
62326_WLL_CRK8	MISO_SINKS_SUOP	100.0	-581.5		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WBGO 869.0-WILWCKT869.0-1+SW122	758	-106.6	-69.0	0.01048	-103.3	-109.4
61667_POTLTCH7	MISO_SINKS_SUOP	100.0	-581.7		-0.0883	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.04126	-62.2	-38.2
61674_HANESRD7	MISO_SINKS_SUOP	100.0	-582.7		-0.0882	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03963	-62.2	-39.1
34253_GARDNCY8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
34254_FARMLND8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
34255_VERNNCY8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
34266_AMBOY_8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
34277_STRLNGT8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
62327_STERLNG8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
62328_GARDENC8	MISO_SINKS_SUOP	100.0	-583.0		-0.0646	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	0.01048	-103.3	-109.4
61952_S_FARIB5	MISO_SINKS_SUOP	100.0	-584.7		0.0414	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03173	181.1	162.5
61668_CLOQUET7	MISO_SINKS_SUOP	100.0	-585.5		-0.0877	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.04075	-62.2	-38.4
61675_RIDGEVW7	MISO_SINKS_SUOP	100.0	-586.8		-0.0875	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03931	-62.2	-39.2
34299_WASECAJ8	MISO_SINKS_SUOP	100.0	-588.2		0.0412	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03151	181.1	162.6
61160_MERIDAN8	MISO_SINKS_SUOP	100.0	-588.8		0.0411	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03148	181.1	162.6
34308_WASECAT8	MISO_SINKS_SUOP	100.0	-589.7		0.0410	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03143	181.1	162.6
60829_WASMUN18	MISO_SINKS_SUOP	100.0	-591.7		0.0409	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03133	181.1	162.5
60644_JANESVL9	MISO_SINKS_SUOP	100.0	-591.8		0.0409	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03133	181.1	162.5
60806_WASECA_8	MISO_SINKS_SUOP	100.0	-591.8		0.0409	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03133	181.1	162.5
61976_LOON_LK8	MISO_SINKS_SUOP	100.0	-591.9		0.0409	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03132	181.1	162.5
61688_COLBYVL7	MISO_SINKS_SUOP	100.0	-596.2		-0.0862	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03860	-62.2	-39.2
60264_LOON_LK7	MISO_SINKS_SUOP	100.0	-597.5		0.0405	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03099	181.1	162.6
61932_RUTLAND5	MISO_SINKS_SUOP	100.0	-597.6		0.0405	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03223	181.1	161.8
60107_W_FARIB7	MISO_SINKS_SUOP	100.0	-600.4		0.0403	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03068	181.1	162.7
69526_BVR_CRK5	MISO_SINKS_SUOP	100.0	-604.5		0.0311	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 34572 ADAMS_S5 161 69526 BVR CRK5 161 1	2858	65.8	47.0	0.01948	67.6	55.8
60265_LOONLKTP	MISO_SINKS_SUOP	100.0	-604.9		0.0400	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03056	181.1	162.6
60109_SOUTHBE5	MISO_SINKS_SUOP	100.0	-606.4		0.0399	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03120	181.1	162.2
34280_TRUMANT8	MISO_SINKS_SUOP	100.0	-606.6		0.0399	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03163	181.1	161.9
62373_TRUMAN_8	MISO_SINKS_SUOP	100.0	-606.6		0.0399	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03163	181.1	161.9
62875_WARSAW_8	MISO_SINKS_SUOP	100.0	-606.7		0.0399	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03031	181.1	162.7
34012_FOXLAKE8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
34271_FOXLKG19	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
34272_FOXLKG29	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
34283_FOXLKG49	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62325_BLUEEAR8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62356_EASTCHN8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62358_CEYLON_8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62359_FOXLKTP8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62361_WILBERT8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9
62367_CYLN_TP8	MISO_SINKS_SUOP	100.0	-615.3		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03117	181.1	161.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
34244_SHERBRN8	MISO_SINKS_SUOP	100.0	-615.7		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03114	181.1	161.9
62795_SHERBRN8	MISO_SINKS_SUOP	100.0	-616.2		0.0393	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03111	181.1	161.9
61689_FRNCHRV7	MISO_SINKS_SUOP	100.0	-616.6		-0.0833	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03714	-62.2	-39.3
34243_TRIMONT8	MISO_SINKS_SUOP	100.0	-617.3		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03103	181.1	161.9
62807_NOSTART8	MISO_SINKS_SUOP	100.0	-617.6		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03065	181.1	162.2
62808_NO_STAR8	MISO_SINKS_SUOP	100.0	-617.6		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03065	181.1	162.2
60816_BUTERTP8	MISO_SINKS_SUOP	100.0	-617.7		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03064	181.1	162.2
62335_BUTTRNT8	MISO_SINKS_SUOP	100.0	-617.7		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03064	181.1	162.2
60700_LKCRYST8	MISO_SINKS_SUOP	100.0	-617.8		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03060	181.1	162.2
62794_DONALDS9	MISO_SINKS_SUOP	100.0	-617.9		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03099	181.1	161.9
60815_GARDNTP8	MISO_SINKS_SUOP	100.0	-618.0		0.0392	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03055	181.1	162.2
62792_ODIN___8	MISO_SINKS_SUOP	100.0	-618.9		0.0391	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03092	181.1	162.0
62793_ODIN_TP8	MISO_SINKS_SUOP	100.0	-618.9		0.0391	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03092	181.1	162.0
62362_DUNNEL_8	MISO_SINKS_SUOP	100.0	-619.5		-0.0539	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:FOXLKTP869.0-DUNNEL 869.0-1+SW300	1134	-102.4	-69.0	0.15844	-103.3	-201.4
62806_ECHOLS_8	MISO_SINKS_SUOP	100.0	-619.8		0.0391	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03086	181.1	162.0
62064_SEARLES8	MISO_SINKS_SUOP	100.0	-620.3		-0.0896	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.15580	-103.3	-6.7
62069_ALBNJCT8	MISO_SINKS_SUOP	100.0	-620.3		-0.0896	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.15580	-103.3	-6.7
62070_SRLS_TP8	MISO_SINKS_SUOP	100.0	-620.3		-0.0896	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	4475	-124.6	-69.0	-0.15580	-103.3	-6.7
60934_WATOWAN8	MISO_SINKS_SUOP	100.0	-620.9		0.0390	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03078	181.1	162.0
34008_FOX_LK_5	MISO_SINKS_SUOP	100.0	-621.5		0.0390	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03086	181.1	161.9
34011_FOXLK53G	MISO_SINKS_SUOP	100.0	-621.5		0.0390	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03086	181.1	161.9
62068_ALBIN__8	MISO_SINKS_SUOP	100.0	-621.5		0.0390	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03071	181.1	162.0
61665_THOMSON7	MISO_SINKS_SUOP	100.0	-623.0		0.3235	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.32346	8.3	-193.3
62172_CLOVERV7	MISO_SINKS_SUOP	100.0	-623.9		-0.0823	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03664	-62.2	-39.4
62363_MDLTWTP8	MISO_SINKS_SUOP	100.0	-625.0		-0.0539	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:DUNNEL 869.0-MDLTWTP869.0-1+SW300	1135	-102.7	-69.0	0.15844	-103.3	-202.3
62364_MIDLTWN8	MISO_SINKS_SUOP	100.0	-625.0		-0.0539	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:DUNNEL 869.0-MDLTWTP869.0-1+SW300	1135	-102.7	-69.0	0.15844	-103.3	-202.3
34240_DOTSON_8	MISO_SINKS_SUOP	100.0	-625.7		0.0387	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03053	181.1	162.0
62065_DOTSON_8	MISO_SINKS_SUOP	100.0	-625.7		0.0387	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03053	181.1	162.0
34230_COMFREY8	MISO_SINKS_SUOP	100.0	-626.1		0.0387	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03052	181.1	162.0
67470_JACKSON	MISO_SINKS_SUOP	100.0	-629.0		0.0385	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03046	181.1	161.9
34237_WINDOMT8	MISO_SINKS_SUOP	100.0	-633.8		0.0382	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03016	181.1	162.0
34233_WINDMMU8	MISO_SINKS_SUOP	100.0	-635.4		0.0381	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03009	181.1	162.0
34238_WINDMSW8	MISO_SINKS_SUOP	100.0	-635.4		0.0381	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.03009	181.1	162.0
61616_HILLTOP4	MISO_SINKS_SUOP	100.0	-635.6		-0.0808	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03228	-62.2	-41.7
34007_LAKEFLD5	MISO_SINKS_SUOP	100.0	-640.6		0.0378	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02985	181.1	162.0
62789_LEWISVL8	MISO_SINKS_SUOP	100.0	-641.5		-0.0552	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34007 LAKEFLD5 161 34008 FOX LK 5 161 1	2028	-104.4	-69.0	-0.06249	-103.3	-63.2
62799_LWSVLTP8	MISO_SINKS_SUOP	100.0	-641.5		-0.0552	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34007 LAKEFLD5 161 34008 FOX LK 5 161 1	2028	-104.4	-69.0	-0.06249	-103.3	-63.2
34005_HRN_LK_5	MISO_SINKS_SUOP	100.0	-643.1		0.0376	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02975	181.1	162.0
60365_FIELD_S3	MISO_SINKS_SUOP	100.0	-644.0		0.0376	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02930	181.1	162.2
61690_TWO_HBR7	MISO_SINKS_SUOP	100.0	-645.0		-0.0796	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03525	-62.2	-39.5
34250_LEWISVL8	MISO_SINKS_SUOP	100.0	-645.9		-0.0308	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34008 FOX LK 5 161 34012 FOXLAKE8 69.0 1	2033	-88.9	-69.0	-0.08280	-103.3	-49.8
62709_BREWSTR5	MISO_SINKS_SUOP	100.0	-646.9		0.0374	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02959	181.1	161.9
34006_LAKEFLD3	MISO_SINKS_SUOP	100.0	-647.9		0.0374	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02935	181.1	162.1
62718_RUSHMOR8	MISO_SINKS_SUOP	100.0	-649.2		0.0373	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02977	181.1	161.8
60396_WOLFWI_8	MISO_SINKS_SUOP	100.0	-649.3		0.0373	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02976	181.1	161.8
62170_WALDO__7	MISO_SINKS_SUOP	100.0	-650.2		-0.0790	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03493	-62.2	-39.5
34273_RUSHMRT8	MISO_SINKS_SUOP	100.0	-650.3		0.0372	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02968	181.1	161.8
34216_ADRIANM8	MISO_SINKS_SUOP	100.0	-651.7		0.0371	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02957	181.1	161.8
61671_BURNETT7	MISO_SINKS_SUOP	100.0	-651.8		-0.0788	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03593	-62.2	-38.8
34269_ADRIANT8	MISO_SINKS_SUOP	100.0	-652.0		0.0371	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02955	181.1	161.8
62719_ADRIAN_8	MISO_SINKS_SUOP	100.0	-652.0		0.0371	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02955	181.1	161.8
61664_WRENSHL7	MISO_SINKS_SUOP	100.0	-652.7		0.3087	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.30872	8.3	-193.3
34215_MAGNLIA8	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
34239_MAGNLIA9	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
34247_KENNETH9	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
34282_WILMONT9	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
34304_LISMORE9	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
62723_LISMORE8	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
900_G140	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
901_G142	MISO_SINKS_SUOP	100.0	-653.8		0.0370	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02941	181.1	161.9
62803_SVEADHL8	MISO_SINKS_SUOP	100.0	-656.0		-0.0523	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62804 SVEADTP8 69.0 1	4474	-103.3	-69.0	-0.32198	-103.3	107.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62804_SVEADTP8	MISO_SINKS_SUOP	100.0	-656.0		-0.0523	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62804 SVEADTP8 69.0 1	4474	-103.3	-69.0	-0.32198	-103.3	107.9
60286_NOBLES_3	MISO_SINKS_SUOP	100.0	-656.2		0.0369	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02903	181.1	162.0
60287_NOBLES_7	MISO_SINKS_SUOP	100.0	-656.3		0.0369	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02899	181.1	162.1
61614_98L_TAP4	MISO_SINKS_SUOP	100.0	-662.6		-0.0775	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02946	-62.2	-42.7
39448_AWHD_PST	MISO_SINKS_SUOP	100.0	-662.7		-0.0775	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02066	-62.2	-48.5
39449_ARROWHD	MISO_SINKS_SUOP	100.0	-662.7		-0.0775	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01055	-62.2	-55.2
61615_ARROWHD4	MISO_SINKS_SUOP	100.0	-662.7		-0.0775	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02929	-62.2	-42.8
60067_DAN_JUHL	MISO_SINKS_SUOP	100.0	-662.8		0.0365	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02893	181.1	161.9
60370_DAN_JUHL	MISO_SINKS_SUOP	100.0	-662.8		0.0365	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02893	181.1	161.9
66001_LUVERNE	MISO_SINKS_SUOP	100.0	-671.9		0.0360	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02857	181.1	161.9
66002_CTYLUVE	MISO_SINKS_SUOP	100.0	-671.9		0.0360	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02857	181.1	161.9
66000_STEEN	MISO_SINKS_SUOP	100.0	-673.6		0.0359	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02858	181.1	161.8
62446_BERGNLK7	MISO_SINKS_SUOP	100.0	-685.3		-0.0750	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03284	-62.2	-39.7
62447_BERGNTP7	MISO_SINKS_SUOP	100.0	-685.3		-0.0750	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.03284	-62.2	-39.7
33972_WILDERJ2	MISO_SINKS_SUOP	100.0	-691.0		0.1044	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.06304	47.6	4.0
34004_ELK____5	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34217_WRTHNGT8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34218_WORTHMN8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34219_FULDA_J8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34223_ELK____8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34245_WRTHMN28	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34297_FULDA__9	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62717_FULDA__8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62720_WRTHNG_8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62721_WRT_TP_8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62722_WRT_WTP8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62724_BLOOM__8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
62725_WRT_ETP8	MISO_SINKS_SUOP	100.0	-708.0		-0.0500	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00953	-103.3	-96.6
34229_SPRINGM8	MISO_SINKS_SUOP	100.0	-737.8		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34229 SPRINGM8 69.0 34240 DOTSON 8 69.0 1	2460	-101.8	-69.0	-0.16606	-103.3	19.2
62063_CBDNETH8	MISO_SINKS_SUOP	100.0	-737.8		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34229 SPRINGM8 69.0 34240 DOTSON 8 69.0 1	2460	-101.8	-69.0	-0.16606	-103.3	19.2
62074_COBDEN_8	MISO_SINKS_SUOP	100.0	-737.8		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34229 SPRINGM8 69.0 34240 DOTSON 8 69.0 1	2460	-101.8	-69.0	-0.16606	-103.3	19.2
62733_BROOKVL8	MISO_SINKS_SUOP	100.0	-737.8		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34229 SPRINGM8 69.0 34240 DOTSON 8 69.0 1	2460	-101.8	-69.0	-0.15474	-103.3	10.9
61691_SLVRBYH7	MISO_SINKS_SUOP	100.0	-740.7		-0.0694	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02997	-62.2	-40.0
61692_SLVRBAY7	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61762_NSM_3A_G	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61763_SBAYP_1G	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61764_NSM_B1_G	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61765_NSM_3B_G	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61766_SBAYP_2G	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61767_NSM_2ABG	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61783_NSMSYNC9	MISO_SINKS_SUOP	100.0	-741.4		-0.0693	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02993	-62.2	-40.0
61666_FONDULAC	MISO_SINKS_SUOP	100.0	-746.1		0.2701	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.27008	8.3	-193.3
60814_RAPIDAN8	MISO_SINKS_SUOP	100.0	-752.7		-0.0474	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34231 MT LAKE8 69.0 34281 MTLAKET8 69.0 1	2465	-104.7	-69.0	-0.05024	-103.3	-65.5
61803_THOM46_9	MISO_SINKS_SUOP	100.0	-756.4		0.2664	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26638	8.3	-193.3
34234_WILDERJ8	MISO_SINKS_SUOP	100.0	-760.5		0.0948	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.05621	47.6	4.9
62360_WILDER_8	MISO_SINKS_SUOP	100.0	-760.5		0.0948	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.05621	47.6	4.9
60828_LACRSNT8	MISO_SINKS_SUOP	100.0	-766.3		0.0665	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.06171	67.6	20.3
61656_MAHTOWA7	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61809_MAHV46_9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61813_BARNUM_9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61814_MAHTOWV9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61815_MAHT24_9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61817_CARLTAP9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
62405_PETERSN9	MISO_SINKS_SUOP	100.0	-768.1		0.2623	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.26232	8.3	-193.3
61694_FINLAND7	MISO_SINKS_SUOP	100.0	-768.7		-0.0668	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02867	-62.2	-40.2
62171_FINLAND7	MISO_SINKS_SUOP	100.0	-768.7		-0.0668	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02867	-62.2	-40.2
62731_WANDA__8	MISO_SINKS_SUOP	100.0	-778.5		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 62732 SUNDOWN8 69.0 62733 BROOKVL8 69.0 1	5762	-103.6	-69.0	-0.12894	-103.3	-2.9
62732_SUNDOWN8	MISO_SINKS_SUOP	100.0	-778.5		-0.0444	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 62732 SUNDOWN8 69.0 62733 BROOKVL8 69.0 1	5762	-103.6	-69.0	-0.14293	-103.3	8.0
34268_MIDWAY_8	MISO_SINKS_SUOP	100.0	-788.8		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.21838	-103.3	69.0
34281_MTLAKET8	MISO_SINKS_SUOP	100.0	-788.8		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.21838	-103.3	69.0
62796_MNTN_LK8	MISO_SINKS_SUOP	100.0	-788.8		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.21838	-103.3	69.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
34228_WABASSO8	MISO_SINKS_SUOP	100.0	-789.2		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.12294	-103.3	-6.3
34274_JONVILT8	MISO_SINKS_SUOP	100.0	-789.2		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.12294	-103.3	-6.3
62730_JHNSNVL8	MISO_SINKS_SUOP	100.0	-789.2		-0.0531	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.12294	-103.3	-6.3
62404_FOND_DU9	MISO_SINKS_SUOP	100.0	-792.4		0.2543	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.25429	8.3	-193.3
62409_FOND_DU8	MISO_SINKS_SUOP	100.0	-792.4		0.2543	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.25429	8.3	-193.3
68868_PINE_CK	MISO_SINKS_SUOP	100.0	-793.3		0.0642	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.05949	67.6	20.4
34231_MT_LAKE8	MISO_SINKS_SUOP	100.0	-802.1		-0.0523	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.21966	-103.3	72.9
60935_BUTRFLD8	MISO_SINKS_SUOP	100.0	-802.1		-0.0523	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.30558	-103.3	141.8
61720_COTTNTP7	MISO_SINKS_SUOP	100.0	-806.1		0.0300	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02277	181.1	162.7
62452_COTTON_7	MISO_SINKS_SUOP	100.0	-806.1		0.0300	-	39010 NED 161 161 39021 NLD 2 138 1	C:050 3	117	234.2	210.0	0.02277	181.1	162.7
62348_CENTURY8	MISO_SINKS_SUOP	100.0	-810.7		-0.0440	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34231 MT LAKE8 69.0 34281 MTLAKET8 69.0 1	2465	-104.7	-69.0	-0.04666	-103.3	-65.5
61572_TACHBJCT	MISO_SINKS_SUOP	100.0	-827.8		-0.0621	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02621	-62.2	-40.5
61573_TACHBTR9	MISO_SINKS_SUOP	100.0	-827.8		-0.0621	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02621	-62.2	-40.5
61697_TAC_HBR7	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
61918_GRAND_MA	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62049_TAC_HART	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62050_TAC_HAR8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62051_SCHRDER8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62052_LUTSEN_8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62053_MAPLE_H8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62054_GNDMRTP9	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62055_COLVILL8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62056_MPLHLTP8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
62057_CASCADE8	MISO_SINKS_SUOP	100.0	-834.2		-0.0616	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02597	-62.2	-40.6
61669_FLDWOOD7	MISO_SINKS_SUOP	100.0	-835.4		0.2412	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.24121	8.3	-193.3
61693_TAC_HBRG	MISO_SINKS_SUOP	100.0	-856.8		-0.0600	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02513	-62.2	-40.7
61696_TAC_HBR6	MISO_SINKS_SUOP	100.0	-856.8		-0.0600	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02513	-62.2	-40.7
68731_MND_PRAR	MISO_SINKS_SUOP	100.0	-862.6		0.0591	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.05443	67.6	20.6
34275_WELCOMT8	MISO_SINKS_SUOP	100.0	-881.0		0.0327	-	34237 WINDOMT8 69.0 34238 WINDMSW8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	79.8	51.0	0.06890	37.8	-22.9
62374_WELCOME8	MISO_SINKS_SUOP	100.0	-881.0		0.0327	-	34237 WINDOMT8 69.0 34238 WINDMSW8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	79.8	51.0	0.06890	37.8	-22.9
62734_CTTNWD_8	MISO_SINKS_SUOP	100.0	-882.4		-0.0475	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.11301	-103.3	-3.6
62084_LINDEN_8	MISO_SINKS_SUOP	100.0	-892.6		-0.0623	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.15066	-103.3	31.2
68730_T_LAC	MISO_SINKS_SUOP	100.0	-903.5		0.0564	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.05181	67.6	20.8
61655_CROMWLL7	MISO_SINKS_SUOP	100.0	-924.7		0.2179	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.21792	8.3	-193.3
62514_CROMWLLT	MISO_SINKS_SUOP	100.0	-927.2		0.2173	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.21733	8.3	-193.3
62801_SSTORDN8	MISO_SINKS_SUOP	100.0	-927.5		0.0778	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03874	47.6	11.7
34227_LAMBRTN8	MISO_SINKS_SUOP	100.0	-936.8		-0.0447	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.10813	-103.3	-2.0
61807_MAH_46_9	MISO_SINKS_SUOP	100.0	-939.3		0.2145	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.21453	8.3	-193.3
68729_HOUSTON	MISO_SINKS_SUOP	100.0	-953.2		0.0535	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.04893	67.6	20.9
61699_POLYMET6	MISO_SINKS_SUOP	100.0	-963.5		-0.0533	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02172	-62.2	-41.3
68724_FOUNTAIN	MISO_SINKS_SUOP	100.0	-964.8		0.0317	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02494	67.6	43.5
69134_CHERRY_8	MISO_SINKS_SUOP	100.0	-971.1		0.0315	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02478	67.6	43.5
61934_RUTLAND	MISO_SINKS_SUOP	100.0	-974.7		-0.0378	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.05131	-16.2	33.8
34311_CHESTTP8	MISO_SINKS_SUOP	100.0	-976.3		0.0313	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02466	67.6	43.5
61698_HOYT_LK6	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61716_PLANT_4G	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61717_PLANT_3G	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61719_PLANT_2G	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61786_PLNT2CAG	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61787_PLNT3CAG	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
61788_PLNT4CAG	MISO_SINKS_SUOP	100.0	-977.0		-0.0526	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02134	-62.2	-41.4
69138_SPRING_8	MISO_SINKS_SUOP	100.0	-994.4		0.0307	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02423	67.6	43.5
63055_BEARCK_4	MISO_SINKS_SUOP	100.0	-998.1		-0.0515	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01938	-62.2	-42.9
62315_BEAR_CKT	MISO_SINKS_SUOP	100.0	-998.7		-0.0514	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01933	-62.2	-42.9
61701_LASKIN_6	MISO_SINKS_SUOP	100.0	-1000.9		-0.0513	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02070	-62.2	-41.5
63459_G375_WF8	MISO_SINKS_SUOP	100.0	-1001.5		-0.0419	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.17605	-103.3	73.0
63460_G375_WF9	MISO_SINKS_SUOP	100.0	-1001.5		-0.0419	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.17605	-103.3	73.0
63461_G375_WFG	MISO_SINKS_SUOP	100.0	-1001.5		-0.0419	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.17605	-103.3	73.0
34314_SPRVALL8	MISO_SINKS_SUOP	100.0	-1002.8		0.0305	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02404	67.6	43.5
61940_SPRING_V	MISO_SINKS_SUOP	100.0	-1002.8		0.0305	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02404	67.6	43.5
69527_HARMONY5	MISO_SINKS_SUOP	100.0	-1005.8		0.0304	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:GENOA-N-STK	359	77.6	47.0	0.02520	67.6	42.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61718_16L_TAP7	MISO_SINKS_SUOP	100.0	-1010.1		-0.0509	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02046	-62.2	-41.6
62454_PEARY__7	MISO_SINKS_SUOP	100.0	-1011.0		-0.0508	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02044	-62.2	-41.6
61812_BARNTAP9	MISO_SINKS_SUOP	100.0	-1012.3		0.1991	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.19906	8.3	-193.3
61721_ETCO___7	MISO_SINKS_SUOP	100.0	-1026.7		-0.0500	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02004	-62.2	-41.7
61723_ETCO___G	MISO_SINKS_SUOP	100.0	-1026.7		-0.0500	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.02004	-62.2	-41.7
34249_TRUMAN_8	MISO_SINKS_SUOP	100.0	-1027.7		-0.0345	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34007 LAKEFLD5 161 34008 FOX LK 5 161 1	2028	-104.4	-69.0	-0.04219	-103.3	-59.9
34313_STEWVLJ8	MISO_SINKS_SUOP	100.0	-1032.5		0.0318	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 69507 SENECA 5 161 69523 GENOA 5 161 1	7315	79.9	47.0	0.02232	67.6	44.5
34315_CHATFLD8	MISO_SINKS_SUOP	100.0	-1032.5		0.0318	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 69507 SENECA 5 161 69523 GENOA 5 161 1	7315	79.9	47.0	0.02232	67.6	44.5
34324_JOR_TAP	MISO_SINKS_SUOP	100.0	-1032.5		0.0318	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 69507 SENECA 5 161 69523 GENOA 5 161 1	7315	79.9	47.0	0.02232	67.6	44.5
69350_JORDAN	MISO_SINKS_SUOP	100.0	-1032.5		0.0318	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 69507 SENECA 5 161 69523 GENOA 5 161 1	7315	79.9	47.0	0.02232	67.6	44.5
38460_LSKN_9	MISO_SINKS_SUOP	100.0	-1033.3		-0.0497	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01987	-62.2	-41.7
38461_ARORAVIL	MISO_SINKS_SUOP	100.0	-1033.3		-0.0497	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01987	-62.2	-41.7
38463_HOYT_LKS	MISO_SINKS_SUOP	100.0	-1033.3		-0.0497	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01987	-62.2	-41.7
38464_ERIE	MISO_SINKS_SUOP	100.0	-1033.3		-0.0497	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01987	-62.2	-41.7
61702_LASKIN_7	MISO_SINKS_SUOP	100.0	-1033.3		-0.0497	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01987	-62.2	-41.7
61805_KERRICK9	MISO_SINKS_SUOP	100.0	-1039.7		0.1938	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.19382	8.3	-193.3
61574_LASKNJCT	MISO_SINKS_SUOP	100.0	-1041.5		-0.0493	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01967	-62.2	-41.7
61575_LASKNTR9	MISO_SINKS_SUOP	100.0	-1041.5		-0.0493	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01967	-62.2	-41.7
33973_HRNLKETH	MISO_SINKS_SUOP	100.0	-1049.9		0.0687	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03996	47.6	5.6
62463_CEDARVL8	MISO_SINKS_SUOP	100.0	-1050.8		0.1918	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.19176	8.3	-193.3
62451_LAKELND7	MISO_SINKS_SUOP	100.0	-1054.5		-0.0487	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01936	-62.2	-41.8
34232_BATLAKE8	MISO_SINKS_SUOP	100.0	-1055.2		-0.0397	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.16712	-103.3	73.1
62513_BLCKBRYT	MISO_SINKS_SUOP	100.0	-1059.0		-0.0485	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01912	-62.2	-42.0
61739_BLCKBRY7	MISO_SINKS_SUOP	100.0	-1060.1		-0.0485	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01910	-62.2	-42.0
61704_34L_TAP7	MISO_SINKS_SUOP	100.0	-1062.2		-0.0484	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01918	-62.2	-41.9
62508_TOWER13	MISO_SINKS_SUOP	100.0	-1066.2		-0.0482	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01908	-62.2	-41.9
61883_TOWER7	MISO_SINKS_SUOP	100.0	-1066.9		-0.0482	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01906	-62.2	-41.9
62500_TOWER8	MISO_SINKS_SUOP	100.0	-1073.0		-0.0479	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01892	-62.2	-41.9
61882_TOWER	MISO_SINKS_SUOP	100.0	-1073.3		-0.0479	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01892	-62.2	-41.9
61873_SUDNMPRK	MISO_SINKS_SUOP	100.0	-1073.4		-0.0479	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01891	-62.2	-41.9
61874_TWR_SUDN	MISO_SINKS_SUOP	100.0	-1073.5		-0.0479	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01891	-62.2	-41.9
62502_CLEARLK9	MISO_SINKS_SUOP	100.0	-1074.7		-0.0478	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01889	-62.2	-41.9
62506_VRMLLN_9	MISO_SINKS_SUOP	100.0	-1074.8		-0.0478	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01888	-62.2	-41.9
34312_STWRTVL8	MISO_SINKS_SUOP	100.0	-1075.6		0.0306	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 69507 SENECA 5 161 69523 GENOA 5 161 1	7315	79.9	47.0	0.02152	67.6	44.4
61936_FAIRMONT	MISO_SINKS_SUOP	100.0	-1075.8		-0.0342	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.05935	-16.2	47.7
61942_10TH_STR	MISO_SINKS_SUOP	100.0	-1075.8		-0.0342	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.05935	-16.2	47.7
61879_ESUBA_TP	MISO_SINKS_SUOP	100.0	-1076.0		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01886	-62.2	-41.9
61872_ELY_B	MISO_SINKS_SUOP	100.0	-1076.2		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01885	-62.2	-41.9
61861_WINTON_9	MISO_SINKS_SUOP	100.0	-1076.8		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
61862_ELY_A	MISO_SINKS_SUOP	100.0	-1076.8		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
61864_STCROIX9	MISO_SINKS_SUOP	100.0	-1076.8		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
61880_32_31TIE	MISO_SINKS_SUOP	100.0	-1076.8		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
62503_WINTON_9	MISO_SINKS_SUOP	100.0	-1076.8		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
61863_31_32TIE	MISO_SINKS_SUOP	100.0	-1076.9		-0.0477	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01884	-62.2	-41.9
61736_T_BIRD_7	MISO_SINKS_SUOP	100.0	-1079.0		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01879	-62.2	-42.0
62501_FRAZERB8	MISO_SINKS_SUOP	100.0	-1079.4		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
38415_INLNDSTL	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
38416_MCKINLEY	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
38417_BIWABEKV	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
38418_GNT_PNVI	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
38421_LTVLAURN	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
61870_VIRGNIA9	MISO_SINKS_SUOP	100.0	-1079.5		-0.0476	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01877	-62.2	-42.0
61865_BABT_VL9	MISO_SINKS_SUOP	100.0	-1080.5		-0.0475	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01875	-62.2	-42.0
62504_BABBITT9	MISO_SINKS_SUOP	100.0	-1080.5		-0.0475	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01875	-62.2	-42.0
61625_BLCKBRY4	MISO_SINKS_SUOP	100.0	-1080.7		-0.0475	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01848	-62.2	-42.3
61860_BABBITT9	MISO_SINKS_SUOP	100.0	-1080.7		-0.0475	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01875	-62.2	-42.0
62488_BLCKBRY8	MISO_SINKS_SUOP	100.0	-1080.9		-0.0475	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01871	-62.2	-42.0
61705_BABBITT7	MISO_SINKS_SUOP	100.0	-1083.0		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01870	-62.2	-42.0
62517_VIRGNIAT	MISO_SINKS_SUOP	100.0	-1083.0		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01870	-62.2	-42.0
61708_VIRGNIA7	MISO_SINKS_SUOP	100.0	-1083.1		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01870	-62.2	-42.0
62497_VIRGNIA8	MISO_SINKS_SUOP	100.0	-1083.5		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01868	-62.2	-42.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62496_PIKE_RV8	MISO_SINKS_SUOP	100.0	-1083.9		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01867	-62.2	-42.0
62495_SAND_LK8	MISO_SINKS_SUOP	100.0	-1084.2		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01867	-62.2	-42.0
62499_SNDLKTP8	MISO_SINKS_SUOP	100.0	-1084.2		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01867	-62.2	-42.0
62494_POTLTCH8	MISO_SINKS_SUOP	100.0	-1084.6		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01865	-62.2	-42.0
62498_PTLCHSW8	MISO_SINKS_SUOP	100.0	-1084.6		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01865	-62.2	-42.0
62493_COOK___8	MISO_SINKS_SUOP	100.0	-1084.8		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01865	-62.2	-42.0
62505_ORR	MISO_SINKS_SUOP	100.0	-1084.8		-0.0474	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01865	-62.2	-42.0
60402_SOUTHBEN	MISO_SINKS_SUOP	100.0	-1084.9		-0.0327	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34007 LAKEFLD5 161 34008 FOX LK 5 161 1	2028	-104.4	-69.0	-0.03498	-103.3	-65.3
61707_MNTACT27	MISO_SINKS_SUOP	100.0	-1085.1		-0.0473	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01865	-62.2	-42.0
34220_FULDAJT8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34221_DOVRAY_8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34222_WESTBKM8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34224_WESTBRK8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34225_HERONLK8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34236_WESTBKT8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34242_JACKN_M8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
34246_JACKSNM8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62355_MILOMA_8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62357_MNNEOTA8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62365_ENTPRSW8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62366_ENTRPRS8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62368_RNDLKTP8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62369_RNDLAKE8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62370_WLAKFLD8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62371_WLKFLTP8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62376_MNNE_TP8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62377_CHRJUHL8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62726_WSTSIDE8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62727_RIVER_8	MISO_SINKS_SUOP	100.0	-1086.2		0.0664	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03854	47.6	5.7
62478_GOODLND8	MISO_SINKS_SUOP	100.0	-1086.9		-0.0473	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01861	-62.2	-42.0
62485_WARBASW8	MISO_SINKS_SUOP	100.0	-1086.9		-0.0473	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01861	-62.2	-42.0
61781_20L_TAP7	MISO_SINKS_SUOP	100.0	-1087.6		-0.0472	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01860	-62.2	-42.0
38500_NASHWK23	MISO_SINKS_SUOP	100.0	-1087.7		-0.0472	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01855	-62.2	-42.0
61737_NASHWAK7	MISO_SINKS_SUOP	100.0	-1087.7		-0.0472	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01855	-62.2	-42.0
62510_LWRNCLK7	MISO_SINKS_SUOP	100.0	-1088.3		-0.0472	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01855	-62.2	-42.0
62511_LWRNCTP7	MISO_SINKS_SUOP	100.0	-1088.3		-0.0472	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01855	-62.2	-42.0
61779_BLANDIN7	MISO_SINKS_SUOP	100.0	-1089.6		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01856	-62.2	-42.0
61778_BLNDTAP7	MISO_SINKS_SUOP	100.0	-1090.1		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01854	-62.2	-42.0
61740_GR_RPDS7	MISO_SINKS_SUOP	100.0	-1090.8		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01854	-62.2	-42.0
61748_BOSWELL7	MISO_SINKS_SUOP	100.0	-1091.2		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01852	-62.2	-42.0
61776_BOSWE71G	MISO_SINKS_SUOP	100.0	-1091.2		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01852	-62.2	-42.0
61777_BOSWE72G	MISO_SINKS_SUOP	100.0	-1091.2		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01852	-62.2	-42.0
61735_TBIRD_S7	MISO_SINKS_SUOP	100.0	-1091.7		-0.0471	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01851	-62.2	-42.0
62492_MEADWBK8	MISO_SINKS_SUOP	100.0	-1092.5		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01847	-62.2	-42.0
61731_14L_TAP7	MISO_SINKS_SUOP	100.0	-1092.7		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01845	-62.2	-42.1
62477_LKHD_BB8	MISO_SINKS_SUOP	100.0	-1093.0		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01850	-62.2	-42.0
62486_LKHD_TP8	MISO_SINKS_SUOP	100.0	-1093.0		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01850	-62.2	-42.0
61732_NATIONLG	MISO_SINKS_SUOP	100.0	-1093.3		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01843	-62.2	-42.1
61733_NATIONL7	MISO_SINKS_SUOP	100.0	-1093.3		-0.0470	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01843	-62.2	-42.1
62476_BLKBRYD8	MISO_SINKS_SUOP	100.0	-1094.6		-0.0469	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01847	-62.2	-42.0
61709_INLAND_7	MISO_SINKS_SUOP	100.0	-1096.0		-0.0469	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01841	-62.2	-42.1
61715_INLAND_G	MISO_SINKS_SUOP	100.0	-1096.0		-0.0469	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01841	-62.2	-42.1
68728_CAL_CITY	MISO_SINKS_SUOP	100.0	-1096.0		0.0465	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.04210	67.6	21.4
61706_KEWTNTP7	MISO_SINKS_SUOP	100.0	-1096.3		-0.0469	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01839	-62.2	-42.1
62455_KEEWATN7	MISO_SINKS_SUOP	100.0	-1096.3		-0.0469	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01839	-62.2	-42.1
61566_BLBY1JCT	MISO_SINKS_SUOP	100.0	-1099.0		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.5
61567_BLBY1TR9	MISO_SINKS_SUOP	100.0	-1099.0		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.5
61568_BLBY2JCT	MISO_SINKS_SUOP	100.0	-1099.0		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.5
61569_BLBY2TR9	MISO_SINKS_SUOP	100.0	-1099.0		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.5
61724_HIBBING7	MISO_SINKS_SUOP	100.0	-1099.1		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01832	-62.2	-42.1
62491_SIDE_LK8	MISO_SINKS_SUOP	100.0	-1100.1		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01830	-62.2	-42.1

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61725_44L_TAP7	MISO_SINKS_SUOP	100.0	-1101.1		-0.0467	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01828	-62.2	-42.1
62475_GUNN___8	MISO_SINKS_SUOP	100.0	-1101.8		-0.0466	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01834	-62.2	-42.0
62354_BFFLKET8	MISO_SINKS_SUOP	100.0	-1103.7		-0.0334	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.06130	-16.2	51.5
61722_FORBES_7	MISO_SINKS_SUOP	100.0	-1104.3		-0.0465	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01823	-62.2	-42.1
61960_LAKECITY	MISO_SINKS_SUOP	100.0	-1106.5		-0.0391	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02912	-34.7	-2.5
61728_HIBBTAC7	MISO_SINKS_SUOP	100.0	-1107.0		-0.0464	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01815	-62.2	-42.1
61729_HIBBTACG	MISO_SINKS_SUOP	100.0	-1107.0		-0.0464	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01815	-62.2	-42.1
62490_SHANNON8	MISO_SINKS_SUOP	100.0	-1107.5		-0.0464	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01814	-62.2	-42.1
61726_HBTCPMP9	MISO_SINKS_SUOP	100.0	-1109.7		-0.0463	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01809	-62.2	-42.2
61727_HTC_PMP7	MISO_SINKS_SUOP	100.0	-1109.7		-0.0463	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01809	-62.2	-42.2
61626_BOSWELL4	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.3
61710_MINNTAC7	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01807	-62.2	-42.1
61711_MNTCPTC7	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01807	-62.2	-42.1
61712_MNTCPTA7	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01807	-62.2	-42.1
61713_MNTC_C_G	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01807	-62.2	-42.1
61714_MNTC_A_G	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01807	-62.2	-42.1
61774_BOSWE43G	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.3
61775_BOSWE44G	MISO_SINKS_SUOP	100.0	-1111.5		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01795	-62.2	-42.3
61562_SHAN1JCT	MISO_SINKS_SUOP	100.0	-1111.6		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01805	-62.2	-42.2
61563_SHAN1TR9	MISO_SINKS_SUOP	100.0	-1111.6		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01805	-62.2	-42.2
61750_SHAN2TR9	MISO_SINKS_SUOP	100.0	-1111.7		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01804	-62.2	-42.2
61785_SHAN2JCT	MISO_SINKS_SUOP	100.0	-1111.7		-0.0462	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01804	-62.2	-42.2
62470_CROMWLL8	MISO_SINKS_SUOP	100.0	-1112.9		0.1811	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.18107	8.3	-193.3
61749_SHANNON7	MISO_SINKS_SUOP	100.0	-1114.4		-0.0461	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01799	-62.2	-42.2
61790_COHSSTTP	MISO_SINKS_SUOP	100.0	-1114.7		-0.0461	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01812	-62.2	-42.0
62449_COHASST7	MISO_SINKS_SUOP	100.0	-1114.7		-0.0461	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01812	-62.2	-42.0
62518_SHANNONT	MISO_SINKS_SUOP	100.0	-1115.3		-0.0461	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01797	-62.2	-42.2
60824_FRONTNC8	MISO_SINKS_SUOP	100.0	-1115.9		-0.0388	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02755	-34.7	-4.0
61791_LAKEHD_7	MISO_SINKS_SUOP	100.0	-1118.1		-0.0459	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01806	-62.2	-42.0
61780_DEER_RV7	MISO_SINKS_SUOP	100.0	-1118.2		-0.0459	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01806	-62.2	-42.0
62450_DEER_RV7	MISO_SINKS_SUOP	100.0	-1118.7		-0.0459	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01805	-62.2	-42.0
62800_NSTORDN8	MISO_SINKS_SUOP	100.0	-1122.3		-0.0374	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.09505	-103.3	3.4
34235_LAKFLDM8	MISO_SINKS_SUOP	100.0	-1123.0		0.0642	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.04019	47.6	2.5
62372_HARVSTA8	MISO_SINKS_SUOP	100.0	-1124.1		-0.0328	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.06268	-16.2	54.3
62474_ARBO___8	MISO_SINKS_SUOP	100.0	-1124.4		-0.0457	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01796	-62.2	-42.0
62484_ARBO_TP8	MISO_SINKS_SUOP	100.0	-1124.4		-0.0457	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01796	-62.2	-42.0
60823_REDWING8	MISO_SINKS_SUOP	100.0	-1126.1		-0.0384	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02585	-34.7	-5.6
61627_SHANNON4	MISO_SINKS_SUOP	100.0	-1126.9		-0.0456	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01772	-62.2	-42.3
34252_HANSKA_8	MISO_SINKS_SUOP	100.0	-1134.2		-0.0490	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.14817	-103.3	64.8
68791_CLDNA_SS	MISO_SINKS_SUOP	100.0	-1135.4		0.0449	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.04052	67.6	21.6
61623_MINNTAC4	MISO_SINKS_SUOP	100.0	-1135.5		-0.0452	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01757	-62.2	-42.3
34003_MAGNLIA5	MISO_SINKS_SUOP	100.0	-1140.4		-0.0310	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 34005 HRN LK 5 161 34007 LAKEFLD5 161 1	2020	-104.4	-69.0	-0.00602	-103.3	-96.4
62487_DEER_RV8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62696_JESS_LK8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62697_BIGFORK8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62698_WIRT___8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62699_EVENSON8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62700_WIRTTPS8	MISO_SINKS_SUOP	100.0	-1142.1		-0.0450	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01767	-62.2	-42.0
62515_DEER_RVT	MISO_SINKS_SUOP	100.0	-1145.4		-0.0449	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01761	-62.2	-42.0
34276_BINGLKT8	MISO_SINKS_SUOP	100.0	-1145.7		-0.0366	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.15399	-103.3	73.1
62797_BNGHMLK8	MISO_SINKS_SUOP	100.0	-1145.7		-0.0366	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.15399	-103.3	73.1
68727_CLDNIA_8	MISO_SINKS_SUOP	100.0	-1150.2		0.0443	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03994	67.6	21.6
61560_MINT2JCT	MISO_SINKS_SUOP	100.0	-1157.6		-0.0444	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01713	-62.2	-42.4
61561_MINT2TR9	MISO_SINKS_SUOP	100.0	-1157.6		-0.0444	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01713	-62.2	-42.4
61558_MINT1JCT	MISO_SINKS_SUOP	100.0	-1157.8		-0.0444	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01712	-62.2	-42.4
61559_MINT1TR9	MISO_SINKS_SUOP	100.0	-1157.8		-0.0444	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01712	-62.2	-42.4
62375_HARVSTT8	MISO_SINKS_SUOP	100.0	-1158.2		-0.0318	-	34231 MT LAKE8 69.0 60935 BUTRFLD8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	-72.8	-36.0	-0.06485	-16.2	58.9
34248_TRUMANM8	MISO_SINKS_SUOP	100.0	-1160.1		-0.0325	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:AMBOY 869.0-WILWCKT869.0-1+SW122	760	-106.7	-69.0	-0.03247	-103.3	-65.6
62302_ISLE___8	MISO_SINKS_SUOP	100.0	-1160.2		0.0373	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.02021	128.9	105.5
61811_DENHAM_9	MISO_SINKS_SUOP	100.0	-1163.9		0.1731	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17313	8.3	-193.3
62459_CRMWLLD8	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62460_WRIGHT_8	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3
62461_ROUNDLK8	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3
62519_BIGSANDT	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3
62520_BIGSAND8	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3
62649_PALISAD8	MISO_SINKS_SUOP	100.0	-1164.9		0.1730	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.17298	8.3	-193.3
62479_BALLCLB8	MISO_SINKS_SUOP	100.0	-1167.4		-0.0440	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01727	-62.2	-42.1
60822_ZUMBFLS8	MISO_SINKS_SUOP	100.0	-1172.0		-0.0369	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02508	-34.7	-5.3
62642_ONAMIA_8	MISO_SINKS_SUOP	100.0	-1176.6		0.0368	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01988	128.9	105.5
62394_SPRNGC2T	MISO_SINKS_SUOP	100.0	-1177.4		-0.0367	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02339	-34.7	-7.2
61550_FORB1JCT	MISO_SINKS_SUOP	100.0	-1178.0		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01665	-62.2	-42.6
61551_FORB1TR9	MISO_SINKS_SUOP	100.0	-1178.0		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01665	-62.2	-42.6
61552_FORB2JCT	MISO_SINKS_SUOP	100.0	-1178.3		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01665	-62.2	-42.6
61553_FORB2TR9	MISO_SINKS_SUOP	100.0	-1178.3		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01665	-62.2	-42.6
69549_WABACO_5	MISO_SINKS_SUOP	100.0	-1178.4		-0.0367	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03052	-34.7	1.2
62480_BENA___8	MISO_SINKS_SUOP	100.0	-1178.6		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01710	-62.2	-42.1
62483_BENA_TP8	MISO_SINKS_SUOP	100.0	-1178.6		-0.0436	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01710	-62.2	-42.1
62652_RUMRVTP8	MISO_SINKS_SUOP	100.0	-1178.9		0.0367	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01984	128.9	105.5
62393_SPRNGC1T	MISO_SINKS_SUOP	100.0	-1181.8		-0.0366	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02319	-34.7	-7.3
62216_KNIFELK8	MISO_SINKS_SUOP	100.0	-1182.4		0.0366	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01970	128.9	105.6
62217_KNIFETP8	MISO_SINKS_SUOP	100.0	-1182.4		0.0366	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01970	128.9	105.6
62448_HILLCTY7	MISO_SINKS_SUOP	100.0	-1183.0		-0.0434	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01710	-62.2	-42.0
68737_T_BRN	MISO_SINKS_SUOP	100.0	-1183.3		0.0431	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03885	67.6	21.6
68739_BROWNS_1	MISO_SINKS_SUOP	100.0	-1183.3		0.0431	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03885	67.6	21.6
63009_CGS__82G	MISO_SINKS_SUOP	100.0	-1183.9		0.0366	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01926	128.9	106.1
63022_CAMBRDG8	MISO_SINKS_SUOP	100.0	-1183.9		0.0366	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01926	128.9	106.1
63336_AUDUBON4	MISO_SINKS_SUOP	100.0	-1186.2		0.0365	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01959	128.9	105.7
62066_LVNWRTH8	MISO_SINKS_SUOP	100.0	-1189.1		0.0607	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	-0.02634	47.6	78.9
62387_SPRNGCK8	MISO_SINKS_SUOP	100.0	-1189.2		-0.0364	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02285	-34.7	-7.5
60817_BURNSID8	MISO_SINKS_SUOP	100.0	-1189.7		-0.0364	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02282	-34.7	-7.6
62557_LKEUNIC9	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
62567_LKENCTP9	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
63136_AUDUBON9	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
7182_ERIEJCT	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
7184_LK_PARK	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
7214_AUDBNTWN	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
7998_HITTRDAL	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
7999_ULEN	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
8000_SYRE	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
9412_ERIEMPC	MISO_SINKS_SUOP	100.0	-1193.2		0.0363	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01944	128.9	105.7
60833_SPRCRKT8	MISO_SINKS_SUOP	100.0	-1199.4		-0.0361	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02250	-34.7	-7.7
62280_OGILVIE8	MISO_SINKS_SUOP	100.0	-1205.5		0.0359	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01918	128.9	105.8
60821_MAZEPPA8	MISO_SINKS_SUOP	100.0	-1205.8		-0.0359	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02317	-34.7	-6.8
62386_BNSD_TP8	MISO_SINKS_SUOP	100.0	-1207.3		-0.0358	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02195	-34.7	-8.2
61624_FORBES_4	MISO_SINKS_SUOP	100.0	-1208.8		-0.0425	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01619	-62.2	-42.7
38820_9K_10K	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
38824_INPK_REG	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38825_INPK_REG	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
38826_IND_PRK	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38827_501_535S	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38828_LP_RURAL	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38829_527_535T	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
38830_LPGUTGRV	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38831_LNG_P77	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38833_LP_PACKN	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
38834_HRT_PRS	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
38835_12K	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
38836_11K	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01923	128.9	105.6
61647_LONG_PR7	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
61847_LONG_PR9	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
62853_PLLBURY9	MISO_SINKS_SUOP	100.0	-1213.2		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01923	128.9	105.6
62270_INDSTRL8	MISO_SINKS_SUOP	100.0	-1214.0		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01869	128.9	106.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62296_INDSTTP8	MISO_SINKS_SUOP	100.0	-1214.0		0.0357	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01869	128.9	106.2
62383_BLVDRML8	MISO_SINKS_SUOP	100.0	-1216.9		-0.0355	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02192	-34.7	-8.0
62384_BLVDMTP8	MISO_SINKS_SUOP	100.0	-1216.9		-0.0355	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02192	-34.7	-8.0
62481_BOY_RIV8	MISO_SINKS_SUOP	100.0	-1219.5		-0.0421	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01650	-62.2	-42.1
62482_SALEMSW8	MISO_SINKS_SUOP	100.0	-1219.5		-0.0421	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01650	-62.2	-42.1
62385_GOODHUE8	MISO_SINKS_SUOP	100.0	-1220.2		-0.0355	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02181	-34.7	-8.1
62382_LENA_TP8	MISO_SINKS_SUOP	100.0	-1221.3		-0.0354	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02233	-34.7	-7.4
62392_LENA___8	MISO_SINKS_SUOP	100.0	-1221.3		-0.0354	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02233	-34.7	-7.4
62380_WELLSCK8	MISO_SINKS_SUOP	100.0	-1221.4		-0.0354	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02177	-34.7	-8.1
38854_BERTRAM	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
38881_SWANVLLE	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
38885_508_27T7	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
61636_SWANVIL7	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
61836_SWANVIL9	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
62852_GREFLNSB	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
62854_FLNSBRG9	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
62855_NPARKER9	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
62857_NPKRJCT9	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
62859_PINELK9	MISO_SINKS_SUOP	100.0	-1222.7		0.0354	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01905	128.9	105.6
60775_E_WINON8	MISO_SINKS_SUOP	100.0	-1225.8		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03219	-34.7	4.8
60776_WINONA_8	MISO_SINKS_SUOP	100.0	-1225.8		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03219	-34.7	4.8
60777_GOODV2_8	MISO_SINKS_SUOP	100.0	-1225.8		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03219	-34.7	4.8
60778_GOODV1_8	MISO_SINKS_SUOP	100.0	-1225.8		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03219	-34.7	4.8
60942_WIN_TAP8	MISO_SINKS_SUOP	100.0	-1225.8		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.03219	-34.7	4.8
60804_VASATAP8	MISO_SINKS_SUOP	100.0	-1227.2		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02100	-34.7	-8.9
62388_VASA__8	MISO_SINKS_SUOP	100.0	-1227.2		-0.0353	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02100	-34.7	-8.9
69139_SPRI_GR8	MISO_SINKS_SUOP	100.0	-1230.1		0.0414	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03704	67.6	22.0
69142_SPGR_TP	MISO_SINKS_SUOP	100.0	-1230.1		0.0414	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03704	67.6	22.0
38840_61K_DIST	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38841_LTL_ROCK	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38842_RICE_TP	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38843_RYLTNRG2	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38844_RYLTNRG1	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38845_15K_DIST	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38847_511_508T	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38848_508_511T	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38850_508_525T	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38852_BLAN_6KV	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38853_UPSALA	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38855_521_08SW	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38856_MN_PIPE	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38871_C_RIPLEY	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38882_508_521T	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38883_MP_FNSBG	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
38902_508_502T	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
61649_BLNCHRD7	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
61849_BLNCHRD9	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
61856_BLNCHD29	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01888	128.9	105.6
62856_SOBIESK9	MISO_SINKS_SUOP	100.0	-1232.2		0.0351	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01888	128.9	105.6
38839_511_5261	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38858_529_T77	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38859_EAST88	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38860_529_DIST	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38861_529_36ES	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38865_21K	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38866_22K	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38867_529_REG	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38868_529_526T	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38869_526_529T	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38872_LF_HE	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38873_MW_HENN	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38874_525_08T8	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38875_525_2988	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38876_526_5261	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38877_PIERZ	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38878_PIERZ_RG	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38879_PIERZ_RG2	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38880_RICH_PR	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38884_BUCKMAN	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38886_SUNBRST	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38887_LF_SOUTH	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38888_529_REG2	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38889_FAIRGND	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38890_HWY10_77	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38891_536_REGL	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38892_E_SUB_TP	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38893_HIGH_SCH	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38894_LARSON	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38895_536_REG	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38896_MP_TAP	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38897_MN_POWER	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38898_OAKES_SC	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38899_CRSTLNER	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38901_525_529T	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38903_529_525T	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38904_525_08T7	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38905_LF_WEST	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38906_525_REG2	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38907_525_REG1	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38908_LF_HE_88	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38909_13K	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38910_IND_PK	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38911_14K	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38912_NORTH_S	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38914_RIVER_F	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38915_RIVER_44	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38916_529_36SW	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38917_529_36E	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38919_36_K1	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38920_ETHANOL	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
38921_CMEC	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
61650_LITTLEF7	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
61850_LITTLEF9	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
62203_LASTRUP9	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
62204_LTTLFLS9	MISO_SINKS_SUOP	100.0	-1238.7		0.0350	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01877	128.9	105.7
61734_IRON_TP7	MISO_SINKS_SUOP	100.0	-1240.4		-0.0326	-	61721 ETCO 7 115 61722 FORBES 7 115 1	C:80-90LW B2	320	-138.5	-98.0	-0.03981	-98.6	-49.2
62453_IRON___7	MISO_SINKS_SUOP	100.0	-1240.4		-0.0326	-	61721 ETCO 7 115 61722 FORBES 7 115 1	C:80-90LW B2	320	-138.5	-98.0	-0.03981	-98.6	-49.2
62817_LSAUKTP7	MISO_SINKS_SUOP	100.0	-1242.7		0.0348	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01869	128.9	105.7
62818_LTLSAUK7	MISO_SINKS_SUOP	100.0	-1242.7		0.0348	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01869	128.9	105.7
62468_KETTLER8	MISO_SINKS_SUOP	100.0	-1246.3		0.1617	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16168	8.3	-193.3
62469_STURGEN8	MISO_SINKS_SUOP	100.0	-1246.3		0.1617	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16168	8.3	-193.3
62473_MOOSETP8	MISO_SINKS_SUOP	100.0	-1246.3		0.1617	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16168	8.3	-193.3
62970_MOOSELK8	MISO_SINKS_SUOP	100.0	-1246.3		0.1617	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16168	8.3	-193.3
62971_MOOSEMN8	MISO_SINKS_SUOP	100.0	-1246.3		0.1617	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16168	8.3	-193.3
60818_ZUMBRTA8	MISO_SINKS_SUOP	100.0	-1248.8		-0.0346	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02089	-34.7	-8.6
60820_LENATAP8	MISO_SINKS_SUOP	100.0	-1248.8		-0.0346	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02089	-34.7	-8.6
62489_REMER__8	MISO_SINKS_SUOP	100.0	-1252.0		-0.0410	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01605	-62.2	-42.1
62321_NMILACA8	MISO_SINKS_SUOP	100.0	-1255.0		0.0345	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01835	128.9	105.9
62636_MCGREGR7	MISO_SINKS_SUOP	100.0	-1257.3		0.1603	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.16026	8.3	-193.3
62283_DALBO__8	MISO_SINKS_SUOP	100.0	-1258.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01801	128.9	106.3
62284_DALBOTP8	MISO_SINKS_SUOP	100.0	-1258.0		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01801	128.9	106.3
62790_JEFFERS8	MISO_SINKS_SUOP	100.0	-1258.5		-0.0333	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.08790	-103.3	7.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62791_JFFRSTP8	MISO_SINKS_SUOP	100.0	-1258.5		-0.0333	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.08790	-103.3	7.3
63331_FERGSFL4	MISO_SINKS_SUOP	100.0	-1259.7		0.0344	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01835	128.9	105.8
66202_GRNDFKS8	MISO_SINKS_SUOP	100.0	-1260.9		0.0626	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.05355	268.8	201.3
61152_PARK___8	MISO_SINKS_SUOP	100.0	-1262.3		0.0625	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.05347	268.8	201.3
9298_HUNTSVIL	MISO_SINKS_SUOP	100.0	-1264.6		0.0624	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.05335	268.8	201.3
9300_TABOR	MISO_SINKS_SUOP	100.0	-1264.6		0.0624	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.05335	268.8	201.3
9302_EUCLID	MISO_SINKS_SUOP	100.0	-1264.6		0.0624	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.05335	268.8	201.3
60803_MIESTAP8	MISO_SINKS_SUOP	100.0	-1269.1		-0.0341	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01908	-34.7	-10.5
62462_GOWAN__8	MISO_SINKS_SUOP	100.0	-1272.6		0.1583	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.15834	8.3	-193.3
63231_FERGSFL7	MISO_SINKS_SUOP	100.0	-1273.6		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01811	128.9	105.8
66706_FALCONR7	MISO_SINKS_SUOP	100.0	-1273.7		0.0530	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.05371	268.8	200.4
62532_FERGUS_7	MISO_SINKS_SUOP	100.0	-1274.1		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01810	128.9	105.9
63232_EDGETWN7	MISO_SINKS_SUOP	100.0	-1274.1		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01810	128.9	105.9
63233_EDGETAP7	MISO_SINKS_SUOP	100.0	-1274.1		0.0340	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01810	128.9	105.9
62391_HADER__8	MISO_SINKS_SUOP	100.0	-1275.3		-0.0339	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01941	-34.7	-10.0
62538_TEN_MIL9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62540_MAINE__9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62541_KRSTJCT9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
62542_BAT_LK_9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
62545_ORWELL_9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
62549_CRLISTP9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62550_CARLISL9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
62554_ROTHSAY9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62555_UNDWDTP9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62556_UNDERWD9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
62575_ELZBETH9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
63123_HOOT_LK9	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
63223_HOOT_LK7	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
63323_HOOTLK2G	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
63324_HOOTLK3G	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7139_DIVERS	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7140_FRIBERG	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7141_ELZBTHJT	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7142_ROTHJCT	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7143_ERHARD	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7144_ROTHSAY	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7145_TAPGORGE	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7147_AURDAL	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7148_UNDERWD	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7154_DAYTON_R	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7155_DAYTON	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7156_FOXHTP	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7157_FOXHOME	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01806	128.9	105.9
7163_CASCJT	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7164_DALTON	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7209_KRISTE	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
7210_OTTERSUB	MISO_SINKS_SUOP	100.0	-1276.2		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
63194_FERGSFLY	MISO_SINKS_SUOP	100.0	-1276.7		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
63332_FERGSFL9	MISO_SINKS_SUOP	100.0	-1276.7		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01806	128.9	105.9
61730_78L_TAP7	MISO_SINKS_SUOP	100.0	-1277.2		-0.0317	-	61721 ETCO 7 115 61722 FORBES 7 115 1	C:80-90LW B2	320	-138.5	-98.0	-0.03942	-98.6	-48.2
60144_DGLASCO7	MISO_SINKS_SUOP	100.0	-1277.5		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01808	128.9	105.8
60819_CHERYTP8	MISO_SINKS_SUOP	100.0	-1277.6		-0.0339	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01987	-34.7	-9.3
62381_CHERRYG8	MISO_SINKS_SUOP	100.0	-1277.6		-0.0339	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01987	-34.7	-9.3
9337_HALSTDMC	MISO_SINKS_SUOP	100.0	-1278.9		0.0339	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01780	128.9	106.2
61806_ASKOV__9	MISO_SINKS_SUOP	100.0	-1280.4		0.1574	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.15738	8.3	-193.3
62260_BYLLSBY8	MISO_SINKS_SUOP	100.0	-1280.4		-0.0338	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01867	-34.7	-10.8
63166_SILVRLK9	MISO_SINKS_SUOP	100.0	-1284.0		0.0432	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01990	84.1	58.6
63366_SILVRLK4	MISO_SINKS_SUOP	100.0	-1284.0		0.0432	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01990	84.1	58.6
62471_GOWANSW8	MISO_SINKS_SUOP	100.0	-1288.6		0.1564	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.15637	8.3	-193.3
62390_SCANNON8	MISO_SINKS_SUOP	100.0	-1292.6		-0.0335	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01848	-34.7	-10.8
62109_ISANTI_8	MISO_SINKS_SUOP	100.0	-1295.4		0.0334	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01727	128.9	106.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62141_ISANTTP8	MISO_SINKS_SUOP	100.0	-1295.4		0.0334	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01727	128.9	106.5
62186_THUN_LK8	MISO_SINKS_SUOP	100.0	-1295.8		-0.0396	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01549	-62.2	-42.2
60802_CANFLS_8	MISO_SINKS_SUOP	100.0	-1300.9		-0.0333	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01804	-34.7	-11.2
34226_STORDEN8	MISO_SINKS_SUOP	100.0	-1305.0		-0.0321	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.08580	-103.3	8.7
60646_BYLSBY9G	MISO_SINKS_SUOP	100.0	-1305.3		-0.0331	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01781	-34.7	-11.5
63071_SPRNGCK5	MISO_SINKS_SUOP	100.0	-1308.5		-0.0331	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01795	-34.7	-11.2
62788_LAKESD_8	MISO_SINKS_SUOP	100.0	-1308.8		-0.0320	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.13488	-103.3	73.2
62798_LKSD_TP8	MISO_SINKS_SUOP	100.0	-1308.8		-0.0320	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60935 BUTRFLD8 69.0 62804 SVEADTP8 69.0 1	4477	-110.9	-69.0	-0.13488	-103.3	73.2
34241_LKFLD698	MISO_SINKS_SUOP	100.0	-1310.2		0.0551	-	60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	C: 34243 TRIMONT8 69.0 62794 DONALDS9 69.0 1	2480	108.1	36.0	0.03496	47.6	1.8
60361_ROCKCR_4	MISO_SINKS_SUOP	100.0	-1310.8		-0.0392	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01449	-62.2	-43.2
61192_ROCKCRK8	MISO_SINKS_SUOP	100.0	-1310.8		-0.0392	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01449	-62.2	-43.2
67467_MPSBROOK	MISO_SINKS_SUOP	100.0	-1315.6		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01734	128.9	106.1
61564_FORB4JCT	MISO_SINKS_SUOP	100.0	-1316.2		-0.0390	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01443	-62.2	-43.2
61565_FORB4TR9	MISO_SINKS_SUOP	100.0	-1316.2		-0.0390	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01443	-62.2	-43.2
67466_MPSSE	MISO_SINKS_SUOP	100.0	-1316.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01733	128.9	106.1
67459_MPSCENT	MISO_SINKS_SUOP	100.0	-1317.4		0.0329	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01731	128.9	106.1
69141_RICEFRD8	MISO_SINKS_SUOP	100.0	-1318.8		0.0386	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03424	67.6	22.4
69177_RICFD_TP	MISO_SINKS_SUOP	100.0	-1318.8		0.0386	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.03424	67.6	22.4
67460_MPSNE	MISO_SINKS_SUOP	100.0	-1318.9		0.0328	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01729	128.9	106.1
60796_KENYON_8	MISO_SINKS_SUOP	100.0	-1321.7		-0.0327	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01838	-34.7	-10.4
62874_CMNTJCT8	MISO_SINKS_SUOP	100.0	-1321.7		-0.0327	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01838	-34.7	-10.4
38838_RICE	MISO_SINKS_SUOP	100.0	-1323.1		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01732	128.9	106.0
61637_PLATTRV7	MISO_SINKS_SUOP	100.0	-1323.1		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01732	128.9	106.0
61837_PLATTRV9	MISO_SINKS_SUOP	100.0	-1323.1		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01732	128.9	106.0
62268_LANGLTP7	MISO_SINKS_SUOP	100.0	-1323.1		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01732	128.9	106.0
62269_LANGOLA7	MISO_SINKS_SUOP	100.0	-1323.1		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01732	128.9	106.0
60167_RUNSWCP4	MISO_SINKS_SUOP	100.0	-1324.5		-0.0388	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01492	-62.2	-42.5
66753_RUNNING4	MISO_SINKS_SUOP	100.0	-1324.5		-0.0388	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01492	-62.2	-42.5
66765_RUNNINN9	MISO_SINKS_SUOP	100.0	-1324.5		-0.0388	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01492	-62.2	-42.5
66778_RUNNINNT	MISO_SINKS_SUOP	100.0	-1324.5		-0.0388	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01492	-62.2	-42.5
66587_MOORHED7	MISO_SINKS_SUOP	100.0	-1325.3		0.0327	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01720	128.9	106.1
62224_RAVENNA5	MISO_SINKS_SUOP	100.0	-1329.8		-0.0325	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01722	-34.7	-11.8
60749_DGLAS_C8	MISO_SINKS_SUOP	100.0	-1330.0		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01724	128.9	106.0
62464_LKHD_GW8	MISO_SINKS_SUOP	100.0	-1331.5		0.1513	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.15134	8.3	-193.3
61921_PRINNTH	MISO_SINKS_SUOP	100.0	-1331.7		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01690	128.9	106.4
60106_PR_ISLD5	MISO_SINKS_SUOP	100.0	-1332.2		-0.0325	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01714	-34.7	-11.9
66780_RUNNINU8	MISO_SINKS_SUOP	100.0	-1332.2		-0.0386	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01483	-62.2	-42.5
66764_RUNNINS9	MISO_SINKS_SUOP	100.0	-1332.3		-0.0386	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01482	-62.2	-42.5
66779_RUNNINST	MISO_SINKS_SUOP	100.0	-1332.3		-0.0386	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01482	-62.2	-42.5
67017_RUNNING8	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9266_SHOOKS	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9267_NORTHOME	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9268_BIG_FALS	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9271_LITLFORK	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9272_RAT_ROOT	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9273_INTL_FLS	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9274_KABETOGM	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
9425_LITLFORK_2	MISO_SINKS_SUOP	100.0	-1333.3		-0.0385	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01481	-62.2	-42.5
66553_MOORHED4	MISO_SINKS_SUOP	100.0	-1333.6		0.0325	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01708	128.9	106.1
60795_KENYNVL8	MISO_SINKS_SUOP	100.0	-1333.7		-0.0324	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01800	-34.7	-10.7
60797_KENYNTP8	MISO_SINKS_SUOP	100.0	-1333.7		-0.0324	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01800	-34.7	-10.7
60750_OSAKIS_8	MISO_SINKS_SUOP	100.0	-1336.1		0.0324	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01715	128.9	106.0
62273_MILACAD8	MISO_SINKS_SUOP	100.0	-1341.6		0.0323	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01687	128.9	106.3
62301_MILACA_8	MISO_SINKS_SUOP	100.0	-1341.6		0.0323	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01687	128.9	106.3
9270_LOMAN	MISO_SINKS_SUOP	100.0	-1344.8		-0.0382	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01467	-62.2	-42.5
62143_ATHNSSW8	MISO_SINKS_SUOP	100.0	-1345.0		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01648	128.9	106.7
62271_LONGSDG8	MISO_SINKS_SUOP	100.0	-1346.1		0.0322	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01671	128.9	106.4
62292_PRINCTN8	MISO_SINKS_SUOP	100.0	-1346.8		0.0321	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01668	128.9	106.4
62389_KENYON_8	MISO_SINKS_SUOP	100.0	-1352.8		-0.0320	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01739	-34.7	-11.2
60794_NRSTRND8	MISO_SINKS_SUOP	100.0	-1359.4		-0.0318	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01719	-34.7	-11.3
62196_BLINDLK8	MISO_SINKS_SUOP	100.0	-1369.7		-0.0375	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01461	-62.2	-42.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
63219_GRANTCO7	MISO_SINKS_SUOP	100.0	-1374.2		-0.0376	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03529	-1652.3	-1603.8
66801_LUND__8	MISO_SINKS_SUOP	100.0	-1375.3		-0.0374	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01430	-62.2	-42.6
9256_WILLMS_T	MISO_SINKS_SUOP	100.0	-1375.3		-0.0374	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01430	-62.2	-42.6
9257_WILLIAMS	MISO_SINKS_SUOP	100.0	-1375.3		-0.0374	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01430	-62.2	-42.6
9258_PITT	MISO_SINKS_SUOP	100.0	-1375.3		-0.0374	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01430	-62.2	-42.6
9260_BAUDETTE	MISO_SINKS_SUOP	100.0	-1375.3		-0.0374	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01430	-62.2	-42.6
61810_ANDRCRN9	MISO_SINKS_SUOP	100.0	-1375.5		0.1465	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.14650	8.3	-193.3
66760_LUND___4	MISO_SINKS_SUOP	100.0	-1380.6		-0.0372	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01423	-62.2	-42.6
62820_W_UNION8	MISO_SINKS_SUOP	100.0	-1380.7		0.0314	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01649	128.9	106.1
60748_WESTPRT8	MISO_SINKS_SUOP	100.0	-1381.4		0.0313	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01649	128.9	106.1
62199_LGVLLTP8	MISO_SINKS_SUOP	100.0	-1382.6		-0.0372	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01446	-62.2	-42.2
62200_LONGVLL8	MISO_SINKS_SUOP	100.0	-1382.6		-0.0372	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01446	-62.2	-42.2
62185_OX_LAKE8	MISO_SINKS_SUOP	100.0	-1386.2		-0.0371	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01445	-62.2	-42.2
62755_OMMEN__8	MISO_SINKS_SUOP	100.0	-1389.0		0.0312	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01639	128.9	106.2
63197_CASS_LKY	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
63247_CASS_LK7	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
63248_CASS_N_7	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
63347_CASS_LK8	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
63348_NO_PIPE9	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
63349_CASSPIP9	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
7918_NO_CASS	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
7949_POTLCH	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
7950_POTLATCH	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
8536_STUDMILL	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
8537_OLD_MILL	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
9371_GUTH_TP	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
9372_GUTHRIE	MISO_SINKS_SUOP	100.0	-1389.2		-0.0370	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01418	-62.2	-42.5
62184_EMILY__8	MISO_SINKS_SUOP	100.0	-1395.3		-0.0368	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01436	-62.2	-42.2
62194_FFTYLKS8	MISO_SINKS_SUOP	100.0	-1395.3		-0.0368	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01436	-62.2	-42.2
61920_PRINPLNT	MISO_SINKS_SUOP	100.0	-1395.4		0.0310	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01598	128.9	106.6
61922_PRINCTAP	MISO_SINKS_SUOP	100.0	-1395.4		0.0310	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01598	128.9	106.6
61924_PRINCETN	MISO_SINKS_SUOP	100.0	-1395.4		0.0310	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01598	128.9	106.6
62155_PRINCID8	MISO_SINKS_SUOP	100.0	-1395.4		0.0310	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01598	128.9	106.6
62275_PINECTY8	MISO_SINKS_SUOP	100.0	-1398.2		-0.0367	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.6
63023_ROCKLK1G	MISO_SINKS_SUOP	100.0	-1398.2		-0.0367	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.6
62127_STFRNCT8	MISO_SINKS_SUOP	100.0	-1401.8		0.0309	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01572	128.9	106.9
61751_LITLFRK7	MISO_SINKS_SUOP	100.0	-1402.5		-0.0366	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01407	-62.2	-42.5
62198_CRSSLKC8	MISO_SINKS_SUOP	100.0	-1405.8		-0.0365	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01426	-62.2	-42.2
62189_WABDO__8	MISO_SINKS_SUOP	100.0	-1409.6		-0.0364	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01415	-62.2	-42.3
60751_SAUKCMU8	MISO_SINKS_SUOP	100.0	-1411.1		0.0470	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02382	110.1	76.5
62192_MISSION8	MISO_SINKS_SUOP	100.0	-1412.2		-0.0364	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01420	-62.2	-42.2
62183_CROSSLK8	MISO_SINKS_SUOP	100.0	-1412.3		-0.0364	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01420	-62.2	-42.2
63345_WILTON_4	MISO_SINKS_SUOP	100.0	-1413.2		-0.0364	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01391	-62.2	-42.6
60747_VILLARD8	MISO_SINKS_SUOP	100.0	-1415.1		0.0306	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01603	128.9	106.2
62187_BREZYPT8	MISO_SINKS_SUOP	100.0	-1415.1		-0.0363	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01417	-62.2	-42.2
62193_BRZYPTS8	MISO_SINKS_SUOP	100.0	-1415.1		-0.0363	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01417	-62.2	-42.2
69176_ORONOCO	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69178_RINGE	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69180_T_RING	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69182_CHESTER	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69185_ORONO_TP	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69186_MARVALE	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69187_MARVL_TP	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69188_T_AIR	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69190_AIRPORT	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69194_MARION	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
69547_ROCHSTR5	MISO_SINKS_SUOP	100.0	-1416.2		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02208	-34.7	-3.4
62215_WFISHTP8	MISO_SINKS_SUOP	100.0	-1416.6		-0.0363	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01416	-62.2	-42.2
62218_WFISHLK8	MISO_SINKS_SUOP	100.0	-1416.6		-0.0363	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01416	-62.2	-42.2
63445_CHESTER	MISO_SINKS_SUOP	100.0	-1416.7		-0.0305	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02207	-34.7	-3.4
62821_KANDOTA8	MISO_SINKS_SUOP	100.0	-1416.9		0.0468	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02371	110.1	76.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62822_KANDTTP8	MISO_SINKS_SUOP	100.0	-1416.9		0.0468	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02371	110.1	76.5
62099_BALDWIN8	MISO_SINKS_SUOP	100.0	-1417.1		0.0305	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01567	128.9	106.7
62178_BASSLKE8	MISO_SINKS_SUOP	100.0	-1418.0		-0.0362	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01414	-62.2	-42.2
62179_STNYTP_8	MISO_SINKS_SUOP	100.0	-1418.0		-0.0362	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01414	-62.2	-42.2
62188_STONYBK8	MISO_SINKS_SUOP	100.0	-1418.0		-0.0362	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01414	-62.2	-42.2
62195_PQUOTLK8	MISO_SINKS_SUOP	100.0	-1418.0		-0.0362	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01414	-62.2	-42.2
60746_GLENWD_8	MISO_SINKS_SUOP	100.0	-1419.2		0.0467	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02371	110.1	76.4
60375_LOWRYTP8	MISO_SINKS_SUOP	100.0	-1419.4		0.0467	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02371	110.1	76.4
60376_LOWRY	MISO_SINKS_SUOP	100.0	-1419.4		0.0467	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02371	110.1	76.4
62768_RSVLLTP9	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
62769_ROSEVLL9	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
63220_ELBOWLK7	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7198_CATSEYE	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7199_WENDEL	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7200_ASHBYJT	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7201_ELBOWJ	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7204_NASUAJCT	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7205_NASHUA	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7215_ELBOWLK	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7444_HOFFJT	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7445_HOFFMN	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7446_BARRET	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7448_DONALLY	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
7449_HERMAN	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
9529_ELBOWM	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
9530_ELBOWM_2	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
9539_ELB_MUN	MISO_SINKS_SUOP	100.0	-1420.9		-0.0364	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03414	-1652.3	-1603.8
66719_MORANVI7	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66757_MORANVI4	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66768_MORANV19	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66769_MORANV29	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66770_MORANV39	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66771_MORANV49	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66790_MORANV1T	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66793_MORANV2T	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66794_MORANV3T	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66795_MORANV4T	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
66999_MORANVI8	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9241_STAFFORD	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9242_ROSEAU_8	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9243_POLARIS8	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9244_MALUNG	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9245_PENCER	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9247_HASLERUD	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9255_WARROAD	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9483_SALOLTAP	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
9484_SALOL__8	MISO_SINKS_SUOP	100.0	-1421.2		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01377	-62.2	-42.7
60790_FAIRPRK8	MISO_SINKS_SUOP	100.0	-1422.5		-0.0304	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01520	-34.7	-13.1
66710_NARY___7	MISO_SINKS_SUOP	100.0	-1423.8		-0.0361	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01383	-62.2	-42.5
62124_ZIMERMN8	MISO_SINKS_SUOP	100.0	-1424.6		0.0466	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02312	110.1	77.1
62287_OAKPARK8	MISO_SINKS_SUOP	100.0	-1425.2		0.0466	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02325	110.1	76.9
62288_OAKPKTP8	MISO_SINKS_SUOP	100.0	-1425.2		0.0466	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02325	110.1	76.9
62290_MAYHWSW8	MISO_SINKS_SUOP	100.0	-1425.2		0.0466	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02325	110.1	76.9
60791_FARIBLT8	MISO_SINKS_SUOP	100.0	-1426.9		-0.0303	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01515	-34.7	-13.1
38721_PQTLKDST	MISO_SINKS_SUOP	100.0	-1427.0		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.2
38724_NISSWA	MISO_SINKS_SUOP	100.0	-1427.0		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.2
61648_PEQUOT_7	MISO_SINKS_SUOP	100.0	-1427.0		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.2
61848_PEQUOT_9	MISO_SINKS_SUOP	100.0	-1427.0		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01406	-62.2	-42.2
62211_PQUOTLKT	MISO_SINKS_SUOP	100.0	-1428.2		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01405	-62.2	-42.2
60175_ROSEAU_4	MISO_SINKS_SUOP	100.0	-1428.3		-0.0360	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01369	-62.2	-42.7
63425_ZUMBRO_R	MISO_SINKS_SUOP	100.0	-1430.9		-0.0302	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02168	-34.7	-3.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60792_WFARBLT8	MISO_SINKS_SUOP	100.0	-1431.1		-0.0302	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01510	-34.7	-13.1
29486_FROHN__8	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
63146_BEMIDJI9	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
63196_BEMIDJIY	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
63246_BEMIDJI7	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
63346_BEMIDJ19	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
66789_BEMIDJIT	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
67015_BEMIDJI8	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7909_AIRPRT_J	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7910_AIRPORT	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7915_NYMORE	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7916_HYDRO_T	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7920_NYMORE_J	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7924_BEM_IPAR	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7925_BI_PARK	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7927_COLGETAP	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7928_BEM25TH	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
7929_BEMCOLGE	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
8535_BEMJ_HY	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9261_REDBY	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9262_PUPOSKY	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9332_AARDH_TP	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9383_QUIRNG_J	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9384_BATTLE	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9436_BEM_HOS	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9437_AARDAHL	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9461_MISSION8	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
9481_RED_LAKE	MISO_SINKS_SUOP	100.0	-1431.7		-0.0359	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01373	-62.2	-42.6
62757_GLENWD_8	MISO_SINKS_SUOP	100.0	-1432.1		0.0463	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02347	110.1	76.5
62272_GILMAN_8	MISO_SINKS_SUOP	100.0	-1432.9		0.0302	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	225.3	182.0	0.01558	128.9	106.6
63145_WILTON_9	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
63245_WILTON_7	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
66776_WILTON_T	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
66968_WILTON_8	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
7907_LK_PIPE	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
7908_PIPETAP	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
7911_NORTHT	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
7912_NORTHWD	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
7931_WILTON	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9264_LONG_LK	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9265_BLACKDCK	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9365_BAGLEY8	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9366_SHEVLIN8	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9367_DUDLEY	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9369_BEM_RUR	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9424_BUSY_COR	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
9431_NORTHERN	MISO_SINKS_SUOP	100.0	-1433.2		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01371	-62.2	-42.6
63186_WILTON_Y	MISO_SINKS_SUOP	100.0	-1436.1		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.6
63343_WILTON19	MISO_SINKS_SUOP	100.0	-1436.1		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.6
66797_WILTON29	MISO_SINKS_SUOP	100.0	-1436.1		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.6
66798_WILTON2T	MISO_SINKS_SUOP	100.0	-1436.1		-0.0358	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.6
63415_N_HILLS	MISO_SINKS_SUOP	100.0	-1436.8		-0.0301	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.02153	-34.7	-3.8
62868_WALCOTT8	MISO_SINKS_SUOP	100.0	-1439.4		-0.0301	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01487	-34.7	-13.3
62869_WALCTTP8	MISO_SINKS_SUOP	100.0	-1439.4		-0.0301	-	60290 ST LAKE5 161 69561 WASHCO 5 161 1	C:NSP - ATC STONE LK - STINSON	187	-163.3	-120.0	-0.01487	-34.7	-13.3
62286_PIPE2TP8	MISO_SINKS_SUOP	100.0	-1439.7		0.0461	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02298	110.1	77.0
62289_PIPE_2_8	MISO_SINKS_SUOP	100.0	-1439.7		0.0461	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02298	110.1	77.0
62756_LEVEN__8	MISO_SINKS_SUOP	100.0	-1439.9		0.0301	-	61676 HIBBARD7 115 61680 WNTR ST7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	225.3	182.0	0.01570	128.9	106.3
62207_PLSNTLK8	MISO_SINKS_SUOP	100.0	-1441.3		-0.0356	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01379	-62.2	-42.3
61910_MILACA_4	MISO_SINKS_SUOP	100.0	-1441.8		0.0460	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02295	110.1	77.0
62819_FSCHRHL7	MISO_SINKS_SUOP	100.0	-1445.0		0.0459	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02300	110.1	76.8
62281_MAYHEW_8	MISO_SINKS_SUOP	100.0	-1449.7		0.0458	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02279	110.1	77.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62298_POPPLCR8	MISO_SINKS_SUOP	100.0	-1449.7		0.0458	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02279	110.1	77.0
38744_ONGM_TP	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
38745_10MILELK	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
38746_HACKENSK	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
38750_BACKUS	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
61855_HACKREG9	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
62208_BIRCHLK9	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
62209_BIRCHLK8	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
62507_ONIGUM_9	MISO_SINKS_SUOP	100.0	-1451.4		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01368	-62.2	-42.4
38722_PNRVR_TP	MISO_SINKS_SUOP	100.0	-1452.3		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01375	-62.2	-42.3
38723_PINE_RIV	MISO_SINKS_SUOP	100.0	-1452.3		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01375	-62.2	-42.3
61854_PINE_RV9	MISO_SINKS_SUOP	100.0	-1452.3		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01375	-62.2	-42.3
62201_PINE_R7	MISO_SINKS_SUOP	100.0	-1452.3		-0.0354	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01375	-62.2	-42.3
60100_FORBECA2	MISO_SINKS_SUOP	100.0	-1457.5		-0.0352	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01316	-62.2	-43.0
60101_FORBES_2	MISO_SINKS_SUOP	100.0	-1457.5		-0.0352	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01316	-62.2	-43.0
61909_MILACA_T	MISO_SINKS_SUOP	100.0	-1458.5		0.0455	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02264	110.1	77.0
63280_WILTPIPE	MISO_SINKS_SUOP	100.0	-1460.7		-0.0352	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01343	-62.2	-42.6
63281_WILT_TAP	MISO_SINKS_SUOP	100.0	-1460.7		-0.0352	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01343	-62.2	-42.6
62847_GROVE__8	MISO_SINKS_SUOP	100.0	-1462.4		0.0454	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02283	110.1	76.7
63079_BENTON2T	MISO_SINKS_SUOP	100.0	-1462.4		0.0454	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02257	110.1	77.1
62546_ERHARD_9	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
62551_PELCNLK9	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
63234_PEL_RPD7	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7176_PELITURK	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7185_PELICTA	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7186_PELICJC	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7187_PELICN	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7188_PELICW	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
7208_PELICAN	MISO_SINKS_SUOP	100.0	-1463.7		0.0379	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01822	84.1	57.5
60752_BLCKOAK8	MISO_SINKS_SUOP	100.0	-1464.1		0.0453	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02279	110.1	76.7
60745_SEDAN__8	MISO_SINKS_SUOP	100.0	-1464.5		0.0453	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02286	110.1	76.6
62213_STHDLTP7	MISO_SINKS_SUOP	100.0	-1470.7		-0.0349	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01359	-62.2	-42.2
69160_LTL_VLY8	MISO_SINKS_SUOP	100.0	-1472.0		0.0305	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02372	67.6	32.6
63285_SOLWAY_7	MISO_SINKS_SUOP	100.0	-1474.3		-0.0348	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01329	-62.2	-42.6
62149_RICELKS8	MISO_SINKS_SUOP	100.0	-1474.9		0.0450	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02218	110.1	77.4
60173_ROSEAUN2	MISO_SINKS_SUOP	100.0	-1475.1		-0.0348	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01301	-62.2	-43.0
69140_GRANGER	MISO_SINKS_SUOP	100.0	-1475.8		0.0304	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02553	67.6	29.9
60754_MELRSMU8	MISO_SINKS_SUOP	100.0	-1477.6		0.0449	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02254	110.1	76.8
34318_ELGIN__8	MISO_SINKS_SUOP	100.0	-1479.1		0.0304	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02357	67.6	32.7
62210_STHDALE7	MISO_SINKS_SUOP	100.0	-1480.2		-0.0347	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01348	-62.2	-42.3
63045_BENTON_4	MISO_SINKS_SUOP	100.0	-1481.5		0.0448	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02222	110.1	77.1
62812_SRTLLTP7	MISO_SINKS_SUOP	100.0	-1482.6		0.0447	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02228	110.1	77.0
62813_SARTELL7	MISO_SINKS_SUOP	100.0	-1482.6		0.0447	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02228	110.1	77.0
60753_MEIRGRV8	MISO_SINKS_SUOP	100.0	-1482.8		0.0447	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02246	110.1	76.8
38741_BDOURATP	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
38742_AKELEY	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
38743_WALKER	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
38751_NEVIS	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
38752_DORSET34	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
61638_AKELEY7	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
61838_AKELEY9	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
62418_NEVIS__9	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
62422_KRAMRLK7	MISO_SINKS_SUOP	100.0	-1483.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01331	-62.2	-42.5
62181_OAKLAWN8	MISO_SINKS_SUOP	100.0	-1484.8		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01341	-62.2	-42.3
62190_OKLWNTP8	MISO_SINKS_SUOP	100.0	-1484.8		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01341	-62.2	-42.3
60686_E_MELRO8	MISO_SINKS_SUOP	100.0	-1485.3		0.0447	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02239	110.1	76.8
62202_NOKAY__7	MISO_SINKS_SUOP	100.0	-1486.2		-0.0346	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01341	-62.2	-42.3
62968_ELKRNTH8	MISO_SINKS_SUOP	100.0	-1486.2		0.0446	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02197	110.1	77.4
62297_BENTON_8	MISO_SINKS_SUOP	100.0	-1486.3		0.0446	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02213	110.1	77.2
62300_MINDEN_8	MISO_SINKS_SUOP	100.0	-1486.3		0.0446	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02213	110.1	77.2
38651_SYLVAN	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
38653_F_RIPLEY	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
38654_BRAINRUL	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
38655_NW_PAPER	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
38656_NWP_TAP	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
61652_BRAINRD7	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
61851_BRD_NWP	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
61852_BRAINRD9	MISO_SINKS_SUOP	100.0	-1488.0		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01339	-62.2	-42.3
62637_KIMBRLY7	MISO_SINKS_SUOP	100.0	-1488.3		0.1354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.13539	8.3	-193.3
61992_PRESTON	MISO_SINKS_SUOP	100.0	-1489.8		0.0302	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02525	67.6	29.9
68700_PREST_TP	MISO_SINKS_SUOP	100.0	-1489.8		0.0302	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02525	67.6	29.9
68722_T_PRES	MISO_SINKS_SUOP	100.0	-1489.8		0.0302	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02525	67.6	29.9
34319_PLAINVW8	MISO_SINKS_SUOP	100.0	-1490.1		0.0301	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02334	67.6	32.8
61994_N_PRESTN	MISO_SINKS_SUOP	100.0	-1490.2		0.0301	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02524	67.6	29.9
63243_SHEVLIN7	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
63244_ITASCA_7	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
63282_NWOOD__7	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
63344_ITASCA_9	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
66727_RICELKT7	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
66729_RICELAK7	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
69305_N_PRES_T	MISO_SINKS_SUOP	100.0	-1490.2		0.0301	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02524	67.6	29.9
7932_SOLWAY	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
7933_SHEVLIN	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
7947_NWOOD_9	MISO_SINKS_SUOP	100.0	-1490.2		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.6
62177_BIRCHLK7	MISO_SINKS_SUOP	100.0	-1490.5		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01328	-62.2	-42.4
60767_WLMSTAP8	MISO_SINKS_SUOP	100.0	-1491.0		0.0445	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02239	110.1	76.7
61612_RIVERTN4	MISO_SINKS_SUOP	100.0	-1491.1		-0.0345	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01324	-62.2	-42.5
60825_WABASHA8	MISO_SINKS_SUOP	100.0	-1494.6		0.0301	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02236	67.6	34.1
62214_BIRCHLKT	MISO_SINKS_SUOP	100.0	-1495.9		-0.0343	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01322	-62.2	-42.4
62825_BANGOR_8	MISO_SINKS_SUOP	100.0	-1496.4		0.0443	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02229	110.1	76.7
62826_BANGRTP8	MISO_SINKS_SUOP	100.0	-1496.4		0.0443	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02229	110.1	76.7
68703_PLAINVIE	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
68705_WHITEWAT	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
68706_T_WHWATR	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
68707_T_ZUM	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
68709_ZUMBRO	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
68711_WEST_ALB	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
69158_T_PLV_8	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
69198_WABACO_8	MISO_SINKS_SUOP	100.0	-1497.0		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C:050 2	116	91.9	47.0	0.02320	67.6	32.8
62157_ELKR142T	MISO_SINKS_SUOP	100.0	-1499.0		0.0443	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02170	110.1	77.5
62009_LKJOHNA8	MISO_SINKS_SUOP	100.0	-1499.2		0.0443	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02225	110.1	76.7
62156_ELKR141T	MISO_SINKS_SUOP	100.0	-1499.3		0.0443	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02169	110.1	77.5
63043_ELK_RIV4	MISO_SINKS_SUOP	100.0	-1499.7		0.0442	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02169	110.1	77.5
62543_STLLKTP9	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
62544_HENNNGD9	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
62552_STLKRLK9	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
63051_HENNING4	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
63309_HENNING9	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7149_BATTLE_T	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7166_OTTERJT	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7167_DEERCK	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7169_VINING	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7170_CLITHRAL	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
7171_BAT_LAKE	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
9531_HEN_MUN	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
9585_HENMUN_T	MISO_SINKS_SUOP	100.0	-1502.4		-0.0344	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03323	-1652.3	-1602.3
60143_BENTON_7	MISO_SINKS_SUOP	100.0	-1502.7		0.0442	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02187	110.1	77.2
60744_BROOTEN8	MISO_SINKS_SUOP	100.0	-1502.9		0.0441	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02217	110.1	76.7
68725_T_HENRY8	MISO_SINKS_SUOP	100.0	-1503.3		0.0339	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02946	67.6	23.3
68822_HENRY8	MISO_SINKS_SUOP	100.0	-1503.3		0.0339	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02946	67.6	23.3
61794_BADOUJCT	MISO_SINKS_SUOP	100.0	-1504.4		-0.0342	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.5
61795_BADOUTR9	MISO_SINKS_SUOP	100.0	-1504.4		-0.0342	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01314	-62.2	-42.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62412_TRIPPLK7	MISO_SINKS_SUOP	100.0	-1505.4		-0.0341	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01313	-62.2	-42.5
36238_E_BL_TP8	MISO_SINKS_SUOP	100.0	-1506.4		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02163	110.1	77.5
62965_ELKRWS18	MISO_SINKS_SUOP	100.0	-1506.5		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02161	110.1	77.5
62967_ELKRWS28	MISO_SINKS_SUOP	100.0	-1506.5		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02161	110.1	77.5
62134_ELKR14S8	MISO_SINKS_SUOP	100.0	-1506.6		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02160	110.1	77.5
62010_WILLIAM8	MISO_SINKS_SUOP	100.0	-1507.4		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02212	110.1	76.7
60768_ELRSATP8	MISO_SINKS_SUOP	100.0	-1507.5		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02203	110.1	76.9
62823_ELROSA_8	MISO_SINKS_SUOP	100.0	-1507.5		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02203	110.1	76.9
61640_BADOURA7	MISO_SINKS_SUOP	100.0	-1508.7		-0.0341	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01309	-62.2	-42.5
62828_MILLWD_8	MISO_SINKS_SUOP	100.0	-1508.9		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02195	110.1	76.9
62829_MILWDTP8	MISO_SINKS_SUOP	100.0	-1508.9		0.0440	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02195	110.1	76.9
63020_ELK_RIV8	MISO_SINKS_SUOP	100.0	-1510.4		0.0439	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02153	110.1	77.5
60755_FREEPRT8	MISO_SINKS_SUOP	100.0	-1511.7		0.0439	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02190	110.1	77.0
62102_CABLE__8	MISO_SINKS_SUOP	100.0	-1512.1		0.0439	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02167	110.1	77.3
62139_CABLETP8	MISO_SINKS_SUOP	100.0	-1512.1		0.0439	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02167	110.1	77.3
62015_GILCHRST	MISO_SINKS_SUOP	100.0	-1514.5		0.0438	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02200	110.1	76.7
62100_BIG_LAK8	MISO_SINKS_SUOP	100.0	-1515.7		0.0438	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02149	110.1	77.5
62114_RDFTAP_8	MISO_SINKS_SUOP	100.0	-1519.7		0.0437	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02138	110.1	77.6
62115_RDF____8	MISO_SINKS_SUOP	100.0	-1519.7		0.0437	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02138	110.1	77.6
60146_GRANCTY7	MISO_SINKS_SUOP	100.0	-1520.0		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02158	110.1	77.3
60161_STREGIS7	MISO_SINKS_SUOP	100.0	-1520.0		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02158	110.1	77.3
60347_MAYHWLK7	MISO_SINKS_SUOP	100.0	-1520.0		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02158	110.1	77.3
62938_OTSEGO_8	MISO_SINKS_SUOP	100.0	-1520.9		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02137	110.1	77.6
62966_ELKROTS8	MISO_SINKS_SUOP	100.0	-1520.9		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02137	110.1	77.6
60164_XRDS___7	MISO_SINKS_SUOP	100.0	-1521.1		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02157	110.1	77.2
60165_MEI_INT7	MISO_SINKS_SUOP	100.0	-1521.5		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02157	110.1	77.2
62002_WALDEN_7	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62029_WALDEN_9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62760_HOLMESC9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62764_HLMSCTP9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62765_WBRLAKE9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62766_FRMNSTP9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62767_FRAMNAS9	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
62814_WESTWD_7	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02157	110.1	77.2
7434_NE_MORRI	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
7440_CYRUSJT	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
7441_CYRUS	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
7442_FARWELL	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
7443_KENSING	MISO_SINKS_SUOP	100.0	-1522.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02194	110.1	76.7
60163_WST_CLD7	MISO_SINKS_SUOP	100.0	-1522.3		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02157	110.1	77.2
62850_WSTCLD_T	MISO_SINKS_SUOP	100.0	-1522.4		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02156	110.1	77.2
60348_BENCTP7	MISO_SINKS_SUOP	100.0	-1523.2		0.0436	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02153	110.1	77.3
60732_WST_CLD8	MISO_SINKS_SUOP	100.0	-1526.9		0.0435	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02154	110.1	77.2
62841_WESTWD_8	MISO_SINKS_SUOP	100.0	-1526.9		0.0435	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02154	110.1	77.2
62842_LESAUK_8	MISO_SINKS_SUOP	100.0	-1526.9		0.0435	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02154	110.1	77.2
62843_LSAUKTP8	MISO_SINKS_SUOP	100.0	-1527.3		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02154	110.1	77.2
60759_STJOSPH8	MISO_SINKS_SUOP	100.0	-1527.9		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02153	110.1	77.2
62957_OTSGOTP8	MISO_SINKS_SUOP	100.0	-1528.0		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02126	110.1	77.6
61189_WATAB__8	MISO_SINKS_SUOP	100.0	-1528.2		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02153	110.1	77.2
62410_PALMRLK7	MISO_SINKS_SUOP	100.0	-1528.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.5
38753_MANTRPTP	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38754_515_520T	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38781_LLCAPBNK	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38783_OSAGE_MP	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38784_PARKRPTP	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38785_PARKRPDS	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38786_RDO_MP	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
38792_MP_LNGLK	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62379_EAGELK9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62411_LONG_LK7	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62413_PINEPT_9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62414_OSAGE__9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62416_PRK_RPD9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62417_MANTRAP9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
62421_LONG_LK9	MISO_SINKS_SUOP	100.0	-1529.2		-0.0336	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01289	-62.2	-42.5
61808_SAND46_9	MISO_SINKS_SUOP	100.0	-1529.8		0.1317	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.13172	8.3	-193.3
60758_JOHNS_U8	MISO_SINKS_SUOP	100.0	-1529.9		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02152	110.1	77.1
62827_CROW_LK8	MISO_SINKS_SUOP	100.0	-1529.9		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02170	110.1	76.9
62831_BRCKWTP8	MISO_SINKS_SUOP	100.0	-1530.2		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02152	110.1	77.1
62832_BROCKWY8	MISO_SINKS_SUOP	100.0	-1530.2		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02152	110.1	77.1
62833_STSTPHN8	MISO_SINKS_SUOP	100.0	-1530.2		0.0434	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02152	110.1	77.1
60757_AVON___8	MISO_SINKS_SUOP	100.0	-1531.2		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02152	110.1	77.1
62136_REMMELE8	MISO_SINKS_SUOP	100.0	-1531.2		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02124	110.1	77.5
62142_REMMLTP8	MISO_SINKS_SUOP	100.0	-1531.2		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02124	110.1	77.5
60743_BELGRAD8	MISO_SINKS_SUOP	100.0	-1532.6		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02165	110.1	76.9
63239_BAGLEY_7	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
63240_MN_PIPE7	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
63241_CLEARBR7	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
63242_CLBKPIP7	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
63340_MN_PIPE9	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
63342_CLBK_LK9	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7934_BAGLEY_T	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7935_CLEARBK	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7936_CLRBROOK	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7937_CLRBRK_T	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7938_GONVICK	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
7946_BAGLEY	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
9360_CLEA_MPC	MISO_SINKS_SUOP	100.0	-1532.6		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01274	-62.2	-42.7
61578_MUDLKJCT	MISO_SINKS_SUOP	100.0	-1533.9		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01291	-62.2	-42.4
61579_MUDLKTR9	MISO_SINKS_SUOP	100.0	-1533.9		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01291	-62.2	-42.4
60756_ALBANY_8	MISO_SINKS_SUOP	100.0	-1534.0		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02150	110.1	77.1
62830_ALBANY_8	MISO_SINKS_SUOP	100.0	-1534.0		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02150	110.1	77.1
62851_ALBNYTP8	MISO_SINKS_SUOP	100.0	-1534.0		0.0433	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02150	110.1	77.1
38703_WARDTAP	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
38704_DOGLKTAP	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
38705_MOTLEY	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
38706_STPLSRRL	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
61644_DOGLAKE7	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
61844_DOGLAKE9	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
62014_SWIFT_FL	MISO_SINKS_SUOP	100.0	-1534.3		0.0432	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02169	110.1	76.8
62219_SHIMNTP9	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
62220_SHIMNLK9	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
62906_WARD___9	MISO_SINKS_SUOP	100.0	-1534.3		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
62415_RDO____7	MISO_SINKS_SUOP	100.0	-1534.4		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01284	-62.2	-42.5
62420_RDO_TAP7	MISO_SINKS_SUOP	100.0	-1534.4		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01284	-62.2	-42.5
61646_DOGLKTP7	MISO_SINKS_SUOP	100.0	-1534.8		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01290	-62.2	-42.4
63078_HUBBARDT	MISO_SINKS_SUOP	100.0	-1534.9		-0.0335	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01284	-62.2	-42.5
61651_MUDLAKE7	MISO_SINKS_SUOP	100.0	-1538.5		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01285	-62.2	-42.5
38782_HBBARD34	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38787_MENAHGA	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38788_MENHGATP	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38789_SPRTLKTP	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38790_SPIRITLK	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38791_MNPIPELN	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38805_SEBKARG1	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38806_SEBKARG2	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38807_SEBEKA	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
38808_ORTON_TP	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
62897_HUBBARD7	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
62898_HUBBARD9	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
62907_MENAHGA9	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
62908_ORTON__9	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62913_TWIN_LK9	MISO_SINKS_SUOP	100.0	-1539.0		-0.0334	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01280	-62.2	-42.5
60152_MNTCELO4	MISO_SINKS_SUOP	100.0	-1540.6		0.0431	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02112	110.1	77.5
60154_SAUK_RV7	MISO_SINKS_SUOP	100.0	-1540.8		0.0431	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02125	110.1	77.3
62858_ROCKVLL7	MISO_SINKS_SUOP	100.0	-1540.8		0.0431	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02125	110.1	77.3
62138_BRGGLKS8	MISO_SINKS_SUOP	100.0	-1541.4		0.0430	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02117	110.1	77.4
62277_DUELM__8	MISO_SINKS_SUOP	100.0	-1541.4		0.0430	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02117	110.1	77.4
62295_DUELMSW8	MISO_SINKS_SUOP	100.0	-1541.4		0.0430	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02117	110.1	77.4
62191_PINCTRT8	MISO_SINKS_SUOP	100.0	-1541.6		-0.0333	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01282	-62.2	-42.5
62653_WILSNLKT	MISO_SINKS_SUOP	100.0	-1541.8		-0.0333	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01281	-62.2	-42.5
62639_WILSNLK7	MISO_SINKS_SUOP	100.0	-1542.3		-0.0333	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01281	-62.2	-42.5
61610_BADOURA4	MISO_SINKS_SUOP	100.0	-1542.7		-0.0333	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01276	-62.2	-42.5
62528_TAMARAC7	MISO_SINKS_SUOP	100.0	-1549.4		0.0358	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01718	84.1	57.5
62553_TANSEM_9	MISO_SINKS_SUOP	100.0	-1549.4		0.0358	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01718	84.1	57.5
63310_TAMARAC9	MISO_SINKS_SUOP	100.0	-1549.4		0.0358	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01718	84.1	57.5
9501_BARNMUN	MISO_SINKS_SUOP	100.0	-1549.4		0.0358	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01718	84.1	57.5
62646_WILSONL8	MISO_SINKS_SUOP	100.0	-1550.9		-0.0331	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01272	-62.2	-42.5
62122_WESTEND8	MISO_SINKS_SUOP	100.0	-1553.8		0.0427	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02097	110.1	77.5
62929_ALBERTV8	MISO_SINKS_SUOP	100.0	-1554.7		0.0427	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02087	110.1	77.6
61617_MUDLAKE4	MISO_SINKS_SUOP	100.0	-1558.7		-0.0330	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01258	-62.2	-42.6
60157_STCLOUD7	MISO_SINKS_SUOP	100.0	-1561.5		0.0425	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02091	110.1	77.4
62012_BENSON_8	MISO_SINKS_SUOP	100.0	-1562.6		0.0425	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02126	110.1	76.8
62895_THMSTWN7	MISO_SINKS_SUOP	100.0	-1562.6		-0.0329	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01263	-62.2	-42.5
60174_ROSEAUS2	MISO_SINKS_SUOP	100.0	-1566.3		-0.0328	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01228	-62.2	-43.0
62838_FARMING8	MISO_SINKS_SUOP	100.0	-1566.6		0.0424	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02097	110.1	77.2
62291_GRASTON8	MISO_SINKS_SUOP	100.0	-1569.1		-0.0327	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01230	-62.2	-42.9
60374_FIBROMN7	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62001_BENSON_7	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62013_BENSON_9	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62030_DOME_BN9	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62033_MOYER__9	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62034_CSHL_TP9	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
62035_CASHEL_9	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
7438_SE_JCT	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
7459_DANVERS	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
7460_SEEDCO	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
7461_CLONTARF	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
7462_HANCOCK	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
9547_BENSMUN	MISO_SINKS_SUOP	100.0	-1572.4		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02111	110.1	76.9
91053_BENSON_T	MISO_SINKS_SUOP	100.0	-1573.1		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02110	110.1	76.9
62119_THOMPLK8	MISO_SINKS_SUOP	100.0	-1573.7		0.0422	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02061	110.1	77.6
61639_MNP_STP7	MISO_SINKS_SUOP	100.0	-1573.9		-0.0326	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01252	-62.2	-42.5
62839_BGFSHTP8	MISO_SINKS_SUOP	100.0	-1576.0		0.0421	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02082	110.1	77.2
62840_BIGFISH8	MISO_SINKS_SUOP	100.0	-1576.0		0.0421	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02082	110.1	77.2
62125_BECKER_8	MISO_SINKS_SUOP	100.0	-1576.6		0.0421	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02060	110.1	77.6
60159_STCTPW_7	MISO_SINKS_SUOP	100.0	-1578.7		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02065	110.1	77.5
63218_MOROTP_7	MISO_SINKS_SUOP	100.0	-1579.7		-0.0327	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02980	-1652.3	-1605.2
62816_STAUGST7	MISO_SINKS_SUOP	100.0	-1579.9		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02062	110.1	77.5
62824_ZION_TP8	MISO_SINKS_SUOP	100.0	-1580.8		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02084	110.1	77.1
62848_ZION___8	MISO_SINKS_SUOP	100.0	-1580.8		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02084	110.1	77.1
62815_I94PARK7	MISO_SINKS_SUOP	100.0	-1581.0		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02060	110.1	77.5
60158_STCLTP_7	MISO_SINKS_SUOP	100.0	-1581.4		0.0420	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02059	110.1	77.5
60142_BENTON_3	MISO_SINKS_SUOP	100.0	-1581.7		0.0419	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02053	110.1	77.6
62645_SPIRITL8	MISO_SINKS_SUOP	100.0	-1583.5		-0.0324	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01240	-62.2	-42.6
62647_SPRTLKS8	MISO_SINKS_SUOP	100.0	-1583.5		-0.0324	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01240	-62.2	-42.6
62182_PINECTR8	MISO_SINKS_SUOP	100.0	-1588.2		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
62651_VINLDTP8	MISO_SINKS_SUOP	100.0	-1588.2		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
60710_FARM_TP8	MISO_SINKS_SUOP	100.0	-1589.5		0.0417	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02061	110.1	77.3
61752_I_FALLS7	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61753_I_FALLS9	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61754_BOISE__7	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61755_BOISE__9	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
61756_MAINBUS9	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61757_IMTRA_2G	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61758_HYDRO__G	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61759_IMTRA_1G	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61761_IMTRA_39	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
61792_BOISEC_9	MISO_SINKS_SUOP	100.0	-1589.7		-0.0323	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01236	-62.2	-42.6
60711_RICHMND8	MISO_SINKS_SUOP	100.0	-1589.9		0.0417	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02061	110.1	77.3
62836_MUNSON_8	MISO_SINKS_SUOP	100.0	-1591.3		0.0417	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02060	110.1	77.3
62837_MUNSNTP8	MISO_SINKS_SUOP	100.0	-1591.3		0.0417	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02060	110.1	77.3
68719_WEAVER	MISO_SINKS_SUOP	100.0	-1591.3		0.0320	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02559	67.6	26.8
62834_ROSCOE_8	MISO_SINKS_SUOP	100.0	-1594.6		0.0416	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02057	110.1	77.3
62835_ROSCOTP8	MISO_SINKS_SUOP	100.0	-1594.6		0.0416	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02057	110.1	77.3
63052_INMAN__4	MISO_SINKS_SUOP	100.0	-1597.2		-0.0324	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03135	-1652.3	-1602.2
34251_MADELIA8	MISO_SINKS_SUOP	100.0	-1597.5		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	4475	-124.6	-69.0	-0.14550	-103.3	129.1
60709_STJMSMU8	MISO_SINKS_SUOP	100.0	-1597.5		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.26850	-103.3	325.6
60716_STJ_EAS8	MISO_SINKS_SUOP	100.0	-1597.5		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.24513	-103.3	288.3
60809_SJA_SWS8	MISO_SINKS_SUOP	100.0	-1597.5		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	4475	-124.6	-69.0	-0.27191	-103.3	331.1
62805_STJAMES8	MISO_SINKS_SUOP	100.0	-1597.5		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C:WATOWAN869.0-STJAMES869.0-1+SW114	735	-124.6	-69.0	-0.28648	-103.3	354.3
62802_MADELIA8	MISO_SINKS_SUOP	100.0	-1598.3		-0.0348	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	4475	-124.6	-69.0	-0.14546	-103.3	129.2
69137_CANTON_8	MISO_SINKS_SUOP	100.0	-1599.1		0.0319	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02742	67.6	23.7
69150_CANTN_TP	MISO_SINKS_SUOP	100.0	-1599.1		0.0319	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02742	67.6	23.7
60713_BECKER_8	MISO_SINKS_SUOP	100.0	-1600.0		0.0415	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02023	110.1	77.7
62137_LIBERTY8	MISO_SINKS_SUOP	100.0	-1600.0		0.0415	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02023	110.1	77.7
60760_PAYNES_8	MISO_SINKS_SUOP	100.0	-1601.3		0.0414	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02052	110.1	77.2
60707_BLUEHRN8	MISO_SINKS_SUOP	100.0	-1603.8		0.0414	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02037	110.1	77.4
62896_ALDRICH7	MISO_SINKS_SUOP	100.0	-1609.9		-0.0319	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01219	-62.2	-42.6
62318_HENNRIE8	MISO_SINKS_SUOP	100.0	-1610.1		-0.0319	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01195	-62.2	-43.0
60717_WAKEFLD8	MISO_SINKS_SUOP	100.0	-1612.1		0.0412	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02023	110.1	77.4
62948_BLACKLK8	MISO_SINKS_SUOP	100.0	-1612.8		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02004	110.1	77.7
62949_BLKLKTP8	MISO_SINKS_SUOP	100.0	-1612.8		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02004	110.1	77.7
62751_LK_MINA7	MISO_SINKS_SUOP	100.0	-1613.4		0.0344	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01703	84.1	56.7
62845_FAIRHVN8	MISO_SINKS_SUOP	100.0	-1613.5		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02020	110.1	77.5
62846_FRHV_TP8	MISO_SINKS_SUOP	100.0	-1613.5		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02020	110.1	77.5
60705_LUXBGTP8	MISO_SINKS_SUOP	100.0	-1615.2		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02017	110.1	77.5
62844_LUXMBRG8	MISO_SINKS_SUOP	100.0	-1615.2		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02017	110.1	77.5
62952_HASTY__8	MISO_SINKS_SUOP	100.0	-1615.9		0.0411	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02001	110.1	77.7
60779_ALTURA_8	MISO_SINKS_SUOP	100.0	-1617.0		0.0315	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02538	67.6	26.5
62620_WATKINS8	MISO_SINKS_SUOP	100.0	-1618.2		0.0410	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.02011	110.1	77.5
60703_WATKINS8	MISO_SINKS_SUOP	100.0	-1619.1		0.0410	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.02009	110.1	77.5
62531_INMAN__7	MISO_SINKS_SUOP	100.0	-1621.5		0.0342	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01602	84.1	58.2
60704_KIMBALL8	MISO_SINKS_SUOP	100.0	-1624.6		0.0408	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01998	110.1	77.6
62622_KINGSTN8	MISO_SINKS_SUOP	100.0	-1624.6		0.0408	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01998	110.1	77.6
38701_ALDRICH	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38702_STAPLES	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38801_HEWITT	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38802_501_533H	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38804_BLUGRASS	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38809_533_TIE	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38810_WADENA	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38811_CMPTN_TP	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
38812_501_533W	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
61642_VERNDLE7	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
61842_VERNDLE9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62899_HEWITT_9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62904_SEBEKA_9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62905_STAPLES9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62909_LEAFRVR9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62910_LFRVRTP9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
62914_COMPTON9	MISO_SINKS_SUOP	100.0	-1625.2		-0.0316	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01205	-62.2	-42.6
63075_BENTON1T	MISO_SINKS_SUOP	100.0	-1625.4		0.0408	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.8
66715_LEECHLK7	MISO_SINKS_SUOP	100.0	-1625.9		-0.0302	-	60133 SHEYNNE4 230 66754 MAPLE R4 230 1	C: 66750 FRNTIER4 230 66754 MAPLE R4 230 1	6683	-367.1	-318.0	-0.00946	-269.9	-254.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
66716_LAPORTE7	MISO_SINKS_SUOP	100.0	-1625.9		-0.0302	-	60133 SHEYNNE4 230 66754 MAPLE R4 230 1	C: 66750 FRNTIER4 230 66754 MAPLE R4 230 1	6683	-367.1	-318.0	-0.00946	-269.9	-254.5
62939_SILVERC8	MISO_SINKS_SUOP	100.0	-1627.3		0.0408	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.8
62894_WINGRTR9	MISO_SINKS_SUOP	100.0	-1628.8		-0.0315	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01202	-62.2	-42.6
60162_WAKEFLD7	MISO_SINKS_SUOP	100.0	-1629.0		0.0407	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01997	110.1	77.5
60706_WAKEFLD9	MISO_SINKS_SUOP	100.0	-1629.0		0.0407	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01997	110.1	77.5
60761_SOUTHVN8	MISO_SINKS_SUOP	100.0	-1629.3		0.0407	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01989	110.1	77.7
62893_WINGRIV7	MISO_SINKS_SUOP	100.0	-1631.6		-0.0315	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01199	-62.2	-42.7
62279_BRAHAM_8	MISO_SINKS_SUOP	100.0	-1631.7		-0.0315	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01173	-62.2	-43.1
62849_WAKEFLDT	MISO_SINKS_SUOP	100.0	-1631.9		0.0407	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01993	110.1	77.5
68716_T_STOC	MISO_SINKS_SUOP	100.0	-1632.6		0.0312	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02525	67.6	26.3
68717_STOCKTON	MISO_SINKS_SUOP	100.0	-1632.6		0.0312	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02525	67.6	26.3
60712_ANNDALE8	MISO_SINKS_SUOP	100.0	-1634.1		0.0406	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01979	110.1	77.7
62644_GLEN___8	MISO_SINKS_SUOP	100.0	-1634.2		-0.0314	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01193	-62.2	-42.7
62175_DEWING_7	MISO_SINKS_SUOP	100.0	-1634.7		-0.0314	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01196	-62.2	-42.7
62932_GOOSELK8	MISO_SINKS_SUOP	100.0	-1637.1		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.8
62944_GOOSETP8	MISO_SINKS_SUOP	100.0	-1637.1		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.8
60601_SHERCO	MISO_SINKS_SUOP	100.0	-1639.5		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01966	110.1	77.8
63024_MAPLE_1G	MISO_SINKS_SUOP	100.0	-1639.5		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01968	110.1	77.8
62093_LIBERTY7	MISO_SINKS_SUOP	100.0	-1639.7		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01966	110.1	77.8
62935_MAPLELK8	MISO_SINKS_SUOP	100.0	-1639.8		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01968	110.1	77.8
60765_MAPLELK8	MISO_SINKS_SUOP	100.0	-1640.1		0.0405	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01968	110.1	77.8
62650_VINELND8	MISO_SINKS_SUOP	100.0	-1640.9		-0.0313	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01188	-62.2	-42.7
62527_ELMO___7	MISO_SINKS_SUOP	100.0	-1641.0		0.0338	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01591	84.1	58.0
61670_MDWLNDS7	MISO_SINKS_SUOP	100.0	-1643.7		-0.0702	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.07021	-36.4	79.0
34321_LWSTNIP8	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
34322_RUSHFRD8	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
60166_SALIDA_7	MISO_SINKS_SUOP	100.0	-1643.9		0.0404	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01960	110.1	77.9
68718_RUSHFORD	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
68732_T_WIT	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
68733_WITOKA	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
68734_WILSON	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
68735_T_RUSH	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
68774_UTICA	MISO_SINKS_SUOP	100.0	-1643.9		0.0310	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02517	67.6	26.2
63058_WINGRIV4	MISO_SINKS_SUOP	100.0	-1645.5		-0.0312	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01186	-62.2	-42.7
62162_LIBERTYT	MISO_SINKS_SUOP	100.0	-1647.8		0.0403	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01954	110.1	77.9
62533_CORMRNT7	MISO_SINKS_SUOP	100.0	-1648.2		0.0337	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01612	84.1	57.6
8038_ST_VINC9	MISO_SINKS_SUOP	100.0	-1648.3		0.0410	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04130	268.8	200.7
8048_ST_VINC8	MISO_SINKS_SUOP	100.0	-1648.3		0.0410	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04130	268.8	200.7
68720_LEWISTON	MISO_SINKS_SUOP	100.0	-1648.6		0.0309	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02532	67.6	25.8
68773_LEWIS_TP	MISO_SINKS_SUOP	100.0	-1648.6		0.0309	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02532	67.6	25.8
62526_RUSH_LK7	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
62560_OTTO___9	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
62561_NYMILLS9	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
62562_RUSH_LK9	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
7168_NY_MILL	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
7172_OTTERT	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
7173_RUSHJCT	MISO_SINKS_SUOP	100.0	-1648.9		0.0336	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01585	84.1	58.0
61663_FLDWDTP7	MISO_SINKS_SUOP	100.0	-1655.5		-0.0697	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.06970	-36.4	79.0
60000_SHERC31G	MISO_SINKS_SUOP	100.0	-1655.8		0.0401	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01940	110.1	77.9
60001_SHERC32G	MISO_SINKS_SUOP	100.0	-1655.8		0.0401	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01940	110.1	77.9
60002_SHERC33G	MISO_SINKS_SUOP	100.0	-1655.8		0.0401	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01940	110.1	77.9
60160_SHERCO_3	MISO_SINKS_SUOP	100.0	-1655.8		0.0401	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01940	110.1	77.9
68704_LNSBRMUN	MISO_SINKS_SUOP	100.0	-1656.0		0.0308	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02557	67.6	25.2
68721_PETERSON	MISO_SINKS_SUOP	100.0	-1656.0		0.0308	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02557	67.6	25.2
60156_PYNSVIL7	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01972	110.1	77.4
60351_EDENVLY9	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01972	110.1	77.4
60352_WATKINS9	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.4
60391_PAYNES29	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.4
60702_PAYNES19	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.4
62629_PYNSVLL9	MISO_SINKS_SUOP	100.0	-1657.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01972	110.1	77.4
62006_KERKHO_7	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62026_KERKHO_9	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2
62036_KILDARE9	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2
7463_DEGRAFF	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2
7464_MURDOCK	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2
7465_KERKTP	MISO_SINKS_SUOP	100.0	-1658.7		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01982	110.1	77.2
60005_MNTCE31G	MISO_SINKS_SUOP	100.0	-1659.3		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01937	110.1	77.9
60151_MNTCELO3	MISO_SINKS_SUOP	100.0	-1659.3		0.0400	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01937	110.1	77.9
63053_HUBBARD4	MISO_SINKS_SUOP	100.0	-1661.3		-0.0311	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.03108	-1652.3	-1600.6
63111_CANBY__9	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
63211_CANBY__7	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7832_OLD_BUR	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7834_CANBY	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7835_BURRJCT	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7837_MINEAST	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7840_CANBYWRR	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7841_JCT	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7842_SAMJONES	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7843_PORTER	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7844_TAUTON	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7845_CANBYNE	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7846_CANBYR	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7847_HENDKT	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7848_IVANT	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7849_BENTON	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7850_IVNHOE	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7853_GREENV	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7854_GHENT	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
7855_MINNEOTA	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7856_HENDRIKS	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7866_BURR	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01985	110.1	77.1
7879_VERDI	MISO_SINKS_SUOP	100.0	-1662.2		0.0399	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01985	110.1	77.1
68713_ST_CHARL	MISO_SINKS_SUOP	100.0	-1662.4		0.0307	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02479	67.6	26.3
66758_WINGER_4	MISO_SINKS_SUOP	100.0	-1662.8		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
63138_WINGER_9	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
63238_WINGER_7	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
66786_WINGER_T	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
67018_WINGER_8	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7962_WINGTN	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7963_SO_MCIN	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7964_NO_MCIN	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7971_MCINTOSH	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7994_BEJOU	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7995_REMOVED	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
7996_WAUBON	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9314_ERSKIN_T	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9315_ERSKMPC	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9351_MAPLEBAY	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9353_RINDAL	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9354_WAUKON	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9355_FLOM	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9356_SANDHILL	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9357_FOSSTN_M	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9358_BEAULIEU	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
9359_OAKLAND	MISO_SINKS_SUOP	100.0	-1663.4		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
63187_WINGER_Y	MISO_SINKS_SUOP	100.0	-1663.5		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
63338_WINGER19	MISO_SINKS_SUOP	100.0	-1663.5		-0.0309	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01165	-62.2	-42.9
34325_ST_CHRT8	MISO_SINKS_SUOP	100.0	-1665.6		0.0306	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02473	67.6	26.4
60153_MNTCELO7	MISO_SINKS_SUOP	100.0	-1667.6		0.0398	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01926	110.1	77.9
62529_CMRTJCT7	MISO_SINKS_SUOP	100.0	-1670.0		0.0332	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01591	84.1	57.6
34320_STCRLMUN	MISO_SINKS_SUOP	100.0	-1670.3		0.0305	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02464	67.6	26.4
68726_HARMNY	MISO_SINKS_SUOP	100.0	-1670.3		0.0305	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02605	67.6	24.1

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
66554_MORRIS_4	MISO_SINKS_SUOP	100.0	-1671.7		0.0472	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.04696	268.8	190.3
62933_HIGHLND8	MISO_SINKS_SUOP	100.0	-1674.3		0.0396	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01923	110.1	77.9
63235_PERHAM_7	MISO_SINKS_SUOP	100.0	-1675.0		0.0331	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01569	84.1	57.9
69322_QUINCY	MISO_SINKS_SUOP	100.0	-1677.0		0.0304	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02450	67.6	26.5
60283_BUFFALO8	MISO_SINKS_SUOP	100.0	-1678.1		0.0395	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01914	110.1	77.9
69304_HAR_MUNI	MISO_SINKS_SUOP	100.0	-1679.3		0.0304	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02588	67.6	24.1
62759_AMOCO__9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
62761_AMOCOTP9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
62762_SNFRDTP9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
62763_SANFORD9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
62778_BRANDTP9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
62779_BRANDON9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
63221_BRANDN_7	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
67455_BRANDN_9	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7190_GARFIELD	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7191_BRANDJ	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7192_EVNSVILL	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7193_BRANDNJC	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7194_MILRVILL	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7195_URBANK	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7196_LAKADLEY	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7202_POMMEDE	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
7203_ERDAHL_J	MISO_SINKS_SUOP	100.0	-1682.4		-0.0307	-	60173 ROSEAUN2 500 67564 DORSEY 2 500 1	C: 67560 RIDGEWY4 230 67576 RICHER 4 230 1	10565	-1783.7	-1732.0	-0.02890	-1652.3	-1603.7
34316_DOVER__8	MISO_SINKS_SUOP	100.0	-1683.8		0.0303	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02437	67.6	26.5
68712_CHATFIEL	MISO_SINKS_SUOP	100.0	-1683.8		0.0303	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02437	67.6	26.5
60356_PAYNES_4	MISO_SINKS_SUOP	100.0	-1684.6		0.0394	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01938	110.1	77.4
62643_OPSTEAD8	MISO_SINKS_SUOP	100.0	-1687.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01146	-62.2	-42.9
62648_OPSTDTP8	MISO_SINKS_SUOP	100.0	-1687.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01146	-62.2	-42.9
62950_ROCKFRD8	MISO_SINKS_SUOP	100.0	-1688.5		0.0393	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	78.0
63150_FERTILE9	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
63237_MAHNOMN7	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01145	-62.2	-42.9
63250_FERTILE7	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
7997_JCT	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
8003_BELTJT	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
8008_FERTTN	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
8009_GARY	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
8010_TWINVY	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
9433_BELTMPC	MISO_SINKS_SUOP	100.0	-1690.8		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01144	-62.2	-42.9
62936_MARY_LK8	MISO_SINKS_SUOP	100.0	-1691.0		0.0392	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01896	110.1	78.0
61914_MORA	MISO_SINKS_SUOP	100.0	-1692.2		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01131	-62.2	-43.1
62303_MORA___8	MISO_SINKS_SUOP	100.0	-1692.2		-0.0304	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01131	-62.2	-43.1
69159_EYOTA_8	MISO_SINKS_SUOP	100.0	-1692.3		0.0301	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02421	67.6	26.6
63251_PLUMTAP7	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
63252_PLUMMER7	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7939_GULLY_T	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7940_TRAIL	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7941_GRAVEL	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7942_OKLEE_TP	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7943_OKLEE	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7944_GULLY	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7959_PLUM_TP	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7961_BROOKS_P	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7965_ERSK_JT	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7966_BROOKS	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7967_PLUM_SW	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7968_PLUMMER	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7969_RED_LKE	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7970_RED_LKW	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7990_GENT_JT	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7991_MENTOR	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
7992_GENTILLY	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
7993_ERSKINE	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
9313_OKLEEMPC	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
9361_GULLY_MP	MISO_SINKS_SUOP	100.0	-1695.4		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01140	-62.2	-42.9
63253_PLUMPIP7	MISO_SINKS_SUOP	100.0	-1696.8		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01139	-62.2	-42.9
63353_PLUMPIP9	MISO_SINKS_SUOP	100.0	-1696.8		-0.0303	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01139	-62.2	-42.9
34317_EYOTA__8	MISO_SINKS_SUOP	100.0	-1696.9		0.0300	-	60949 MONROCO8 69.0 68847 SPARTA 69.0 1	C: 39244 ARP 345 345 60304 EAU CL 3 345 1	7506	98.0	47.0	0.02412	67.6	26.6
62005_KERKHOT7	MISO_SINKS_SUOP	100.0	-1697.3		0.0391	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01929	110.1	77.3
62465_BRANDEN8	MISO_SINKS_SUOP	100.0	-1699.7		0.1186	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.11855	8.3	-193.3
62947_DICKIN_8	MISO_SINKS_SUOP	100.0	-1700.1		0.0390	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01884	110.1	78.0
62530_FRAZEE_7	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62558_EVERGRN9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62559_BURLNTN9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62563_DENT_TP9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62564_DENT___9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62565_FRAZEED9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62566_FRAZEE_9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62568_VRGSJCT9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62569_BTLR_TP9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62570_BUTLER_9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62571_PERHAM_9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62572_DORA___9	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
7177_LPINELAK	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
7178_FRAZEE	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
7212_VERGAS_T	MISO_SINKS_SUOP	100.0	-1702.9		0.0326	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01553	84.1	57.7
62955_OAKWOOD7	MISO_SINKS_SUOP	100.0	-1704.9		0.0389	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01876	110.1	78.1
62927_LKCONST7	MISO_SINKS_SUOP	100.0	-1707.1		0.0389	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01874	110.1	78.1
62426_WILLMR1T	MISO_SINKS_SUOP	100.0	-1707.2		0.0389	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01914	110.1	77.4
62425_WILLMAR7	MISO_SINKS_SUOP	100.0	-1708.2		0.0388	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01913	110.1	77.4
62539_PRKR_PR9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62547_PRKPRTP9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62548_PRPPRSW9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62752_MLTN_TP7	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62753_MILTONA7	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62773_MILTONA9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62776_LAGRAND9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62777_BELLERV9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62780_LGRNDTP9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
62782_LEAFVLL9	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
7197_PARKERS	MISO_SINKS_SUOP	100.0	-1710.5		0.0324	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01555	84.1	57.5
38803_BERTHA	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
38821_EAGLEBND	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
38822_CLARISSA	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
38823_BROWERVL	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
61643_EAGLVLY7	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
61843_EAGLVLY9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62900_EAGLE_B9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62901_HARTFRD9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62902_IONA___9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62911_HRTFDTP9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62912_IONA_TP9	MISO_SINKS_SUOP	100.0	-1711.1		-0.0300	-	61632 DAHLBRG7 115 61684 STIN-WI7 115 1	C:NSP - ATC STONE LK - STINSON	187	-149.4	-98.0	-0.01135	-62.2	-42.8
62427_WILLMAR8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62428_PENNOCK8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01899	110.1	77.5
62429_PNNCKTP8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01899	110.1	77.5
62430_SUNBURG8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62431_HAWICK_8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01899	110.1	77.5
62432_KANDYOH8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62434_PR_WDS_8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01899	110.1	77.5
62435_PRWDTAP8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62436_GREENLK8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01899	110.1	77.5
62441_SPICERT8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62442_SPICER_8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62990_WILMRMN8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62991_WILMRSW8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62992_WILMRSO8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62993_WILSWTP8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62994_WILMRTP8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62995_WILMR_E8	MISO_SINKS_SUOP	100.0	-1717.2		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01899	110.1	77.5
62934_HOWARDL8	MISO_SINKS_SUOP	100.0	-1718.7		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01867	110.1	78.0
60155_PULASKI7	MISO_SINKS_SUOP	100.0	-1720.7		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01857	110.1	78.1
60762_BUFALOM8	MISO_SINKS_SUOP	100.0	-1720.7		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01857	110.1	78.1
60763_PULASKI8	MISO_SINKS_SUOP	100.0	-1720.7		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01857	110.1	78.1
60764_LINN_ST8	MISO_SINKS_SUOP	100.0	-1720.7		0.0386	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01857	110.1	78.1
63050_WILLMAR4	MISO_SINKS_SUOP	100.0	-1722.5		0.0385	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01893	110.1	77.5
62443_WILLMR2T	MISO_SINKS_SUOP	100.0	-1722.6		0.0385	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01893	110.1	77.5
62433_SVEA___8	MISO_SINKS_SUOP	100.0	-1724.4		0.0385	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01888	110.1	77.5
62437_SVEATAP8	MISO_SINKS_SUOP	100.0	-1724.4		0.0385	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01888	110.1	77.5
62943_VICTOR_8	MISO_SINKS_SUOP	100.0	-1729.6		0.0384	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01853	110.1	78.0
67452_ALEXSS	MISO_SINKS_SUOP	100.0	-1730.2		0.0321	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01560	84.1	57.1
60736_HOWRDLK8	MISO_SINKS_SUOP	100.0	-1730.3		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01852	110.1	78.0
60872_VICTRTP8	MISO_SINKS_SUOP	100.0	-1730.3		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01852	110.1	78.0
62615_SWANLK_7	MISO_SINKS_SUOP	100.0	-1730.6		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01857	110.1	77.9
67453_ALEXSWM	MISO_SINKS_SUOP	100.0	-1731.2		0.0320	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01559	84.1	57.1
60738_WNSTDTP8	MISO_SINKS_SUOP	100.0	-1731.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01851	110.1	78.0
60932_WINSTED8	MISO_SINKS_SUOP	100.0	-1731.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01851	110.1	78.0
60933_MILRBND8	MISO_SINKS_SUOP	100.0	-1731.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01851	110.1	78.0
62595_SHERMAN8	MISO_SINKS_SUOP	100.0	-1731.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01851	110.1	78.0
62596_SHRMNTP8	MISO_SINKS_SUOP	100.0	-1731.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01851	110.1	78.0
60735_WAVERLY8	MISO_SINKS_SUOP	100.0	-1731.8		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01849	110.1	78.0
60734_MONTRSE8	MISO_SINKS_SUOP	100.0	-1732.7		0.0383	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01847	110.1	78.1
60891_DELANOT8	MISO_SINKS_SUOP	100.0	-1734.8		0.0382	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01843	110.1	78.1
60652_CROWRV_8	MISO_SINKS_SUOP	100.0	-1736.0		0.0382	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01840	110.1	78.1
60737_COKATO_8	MISO_SINKS_SUOP	100.0	-1740.7		0.0381	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01842	110.1	78.0
60773_COKATOT8	MISO_SINKS_SUOP	100.0	-1740.7		0.0381	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01842	110.1	78.0
67454_ALEXPLDM	MISO_SINKS_SUOP	100.0	-1743.8		0.0318	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01541	84.1	57.3
60357_MAYNARD7	MISO_SINKS_SUOP	100.0	-1745.4		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01868	110.1	77.5
62616_BIGSWAN7	MISO_SINKS_SUOP	100.0	-1746.0		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01837	110.1	78.0
62628_BIGSWANT	MISO_SINKS_SUOP	100.0	-1746.0		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01837	110.1	78.0
62926_DCKSNSS7	MISO_SINKS_SUOP	100.0	-1746.8		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01824	110.1	78.2
67471_ALEXTAP7	MISO_SINKS_SUOP	100.0	-1746.8		0.0318	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01537	84.1	57.3
61801_450_TAP9	MISO_SINKS_SUOP	100.0	-1747.0		0.1153	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.11534	8.3	-193.3
61804_HINK_E_9	MISO_SINKS_SUOP	100.0	-1747.1		0.1153	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.11534	8.3	-193.3
60739_DASSEL_8	MISO_SINKS_SUOP	100.0	-1748.1		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01835	110.1	78.0
62621_DASSEL_8	MISO_SINKS_SUOP	100.0	-1748.1		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01835	110.1	78.0
62925_DICKNSN7	MISO_SINKS_SUOP	100.0	-1748.1		0.0380	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01823	110.1	78.2
67462_DLINDUST	MISO_SINKS_SUOP	100.0	-1749.6		0.0317	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01515	84.1	57.6
67463_DLRUDDST	MISO_SINKS_SUOP	100.0	-1749.6		0.0317	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01515	84.1	57.6
63081_DICKNSNT	MISO_SINKS_SUOP	100.0	-1750.4		0.0379	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01819	110.1	78.2
60206_CROWRVR7	MISO_SINKS_SUOP	100.0	-1750.9		0.0379	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01821	110.1	78.2
62617_BIGSWAN8	MISO_SINKS_SUOP	100.0	-1751.1		0.0379	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01832	110.1	78.0
67461_ALEXSOUM	MISO_SINKS_SUOP	100.0	-1754.3		0.0316	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01531	84.1	57.3
67464_DLWEST	MISO_SINKS_SUOP	100.0	-1760.3		0.0315	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.6
63030_DICKNSN3	MISO_SINKS_SUOP	100.0	-1760.6		0.0377	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01805	110.1	78.3
62627_LKJNNSW8	MISO_SINKS_SUOP	100.0	-1767.5		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01811	110.1	78.0
62630_LK_JNN_8	MISO_SINKS_SUOP	100.0	-1767.5		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01811	110.1	78.0
62946_LKJENTP8	MISO_SINKS_SUOP	100.0	-1767.5		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01811	110.1	78.0
63207_DL_OTP_7	MISO_SINKS_SUOP	100.0	-1768.5		0.0314	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01500	84.1	57.6
66550_GRANITF4	MISO_SINKS_SUOP	100.0	-1769.4		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01839	110.1	77.5
62438_LITCHTP8	MISO_SINKS_SUOP	100.0	-1769.8		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01818	110.1	77.9
60377_MAYNARD8	MISO_SINKS_SUOP	100.0	-1769.9		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01837	110.1	77.5
60378_MAYNARL8	MISO_SINKS_SUOP	100.0	-1769.9		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01837	110.1	77.5
60379_CLARCTY8	MISO_SINKS_SUOP	100.0	-1769.9		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01837	110.1	77.5
60147_MINVALY4	MISO_SINKS_SUOP	100.0	-1770.4		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01838	110.1	77.5

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62770_LK_M_TP9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62771_HDSN_TP9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62772_CARLOS_9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62774_HUDSON_9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62775_LK_MARY9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62781_LEHMMDU9	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
63222_ALEXAND7	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
7135_ALEXAND	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
7206_CARLSJCT	MISO_SINKS_SUOP	100.0	-1770.7		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01516	84.1	57.3
62623_LTCHFLD8	MISO_SINKS_SUOP	100.0	-1771.4		0.0375	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01813	110.1	78.0
61912_LITCHFLD	MISO_SINKS_SUOP	100.0	-1772.2		0.0374	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01812	110.1	77.9
63202_AUDUBONY	MISO_SINKS_SUOP	100.0	-1772.2		0.0313	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01499	84.1	57.6
60690_MNARDTP8	MISO_SINKS_SUOP	100.0	-1772.3		0.0374	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01835	110.1	77.6
60740_LTCHMUT8	MISO_SINKS_SUOP	100.0	-1772.6		0.0374	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01811	110.1	78.0
66298_GRANITF8	MISO_SINKS_SUOP	100.0	-1776.4		0.0374	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01831	110.1	77.5
66551_GRANITF7	MISO_SINKS_SUOP	100.0	-1776.4		0.0374	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01831	110.1	77.5
66296_GRANITF29	MISO_SINKS_SUOP	100.0	-1777.3		0.0373	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01830	110.1	77.5
66297_GRANITF9	MISO_SINKS_SUOP	100.0	-1777.3		0.0373	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01830	110.1	77.5
60150_MNVLTAP4	MISO_SINKS_SUOP	100.0	-1777.4		0.0373	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01829	110.1	77.6
60149_MINVALT4	MISO_SINKS_SUOP	100.0	-1778.0		0.0373	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01828	110.1	77.6
60148_MINVALY7	MISO_SINKS_SUOP	100.0	-1783.7		0.0372	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01821	110.1	77.6
62439_HUTCHTP8	MISO_SINKS_SUOP	100.0	-1785.2		0.0372	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01797	110.1	78.0
60390_GROVECY8	MISO_SINKS_SUOP	100.0	-1789.7		0.0371	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01793	110.1	78.0
62307_DENHAM_8	MISO_SINKS_SUOP	100.0	-1790.1		0.1126	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.11256	8.3	-193.3
8874_AVERILL	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9263_CHRIST	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9362_HENDRUM	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9363_ADA_JCT	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9401_KRAGNES	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9402_AVERILL8	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9404_BUFF_RR	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9406_HAWLEY_J	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
9407_HAWLEY	MISO_SINKS_SUOP	100.0	-1792.1		0.0310	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01507	84.1	57.1
62601_HOOK_LK8	MISO_SINKS_SUOP	100.0	-1793.3		0.0370	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01784	110.1	78.1
62606_HOOKLKT8	MISO_SINKS_SUOP	100.0	-1793.3		0.0370	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01784	110.1	78.1
63236_AUDUBON7	MISO_SINKS_SUOP	100.0	-1797.4		0.0309	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01478	84.1	57.6
62624_ATWATER8	MISO_SINKS_SUOP	100.0	-1799.8		0.0369	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01782	110.1	78.0
60691_GRNFLCY8	MISO_SINKS_SUOP	100.0	-1800.4		0.0369	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01801	110.1	77.6
62987_HUTCHCP8	MISO_SINKS_SUOP	100.0	-1801.4		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01776	110.1	78.1
60683_MINNVAL8	MISO_SINKS_SUOP	100.0	-1801.9		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01799	110.1	77.6
60687_BUSH_PK8	MISO_SINKS_SUOP	100.0	-1801.9		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01799	110.1	77.6
60688_MNTVDEO8	MISO_SINKS_SUOP	100.0	-1801.9		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01799	110.1	77.6
60689_FIESTAC8	MISO_SINKS_SUOP	100.0	-1801.9		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01799	110.1	77.6
62984_HUTCHPT8	MISO_SINKS_SUOP	100.0	-1803.1		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01773	110.1	78.1
62985_HUTCHPK8	MISO_SINKS_SUOP	100.0	-1803.1		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01773	110.1	78.1
62986_HUTCHMN8	MISO_SINKS_SUOP	100.0	-1803.1		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01773	110.1	78.1
62988_HTCHHTI8	MISO_SINKS_SUOP	100.0	-1803.1		0.0368	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01773	110.1	78.1
66724_ALVARAD7	MISO_SINKS_SUOP	100.0	-1807.4		0.0417	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.04082	268.8	195.0
62625_ROSENDL8	MISO_SINKS_SUOP	100.0	-1814.5		0.0366	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01766	110.1	78.0
62467_SOLWAY_8	MISO_SINKS_SUOP	100.0	-1815.2		0.0389	-	61665 THOMSON7 115 61666 FONDULAC 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	160.5	90.0	0.03885	44.9	-25.6
60882_DELANO_8	MISO_SINKS_SUOP	100.0	-1816.9		0.0365	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01746	110.1	78.3
62982_HUTCHMN7	MISO_SINKS_SUOP	100.0	-1816.9		0.0365	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01756	110.1	78.2
62587_HELEN__8	MISO_SINKS_SUOP	100.0	-1819.0		0.0365	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01757	110.1	78.1
62603_HSSNJCT8	MISO_SINKS_SUOP	100.0	-1819.0		0.0365	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01757	110.1	78.1
62989_HUTCHMNT	MISO_SINKS_SUOP	100.0	-1820.4		0.0364	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01752	110.1	78.2
60693_SACRDHT8	MISO_SINKS_SUOP	100.0	-1821.7		0.0364	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01774	110.1	77.7
62983_HUTCH3M7	MISO_SINKS_SUOP	100.0	-1822.0		0.0364	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01750	110.1	78.2
62618_CEDARML8	MISO_SINKS_SUOP	100.0	-1824.2		0.0364	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01756	110.1	78.0
62619_CDRMLTP8	MISO_SINKS_SUOP	100.0	-1824.2		0.0364	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01756	110.1	78.0
60701_MADELVL8	MISO_SINKS_SUOP	100.0	-1825.4		-0.0305	-	34012 FOXLAKE8 69.0 34244 SHERBRN8 69.0 1	C: 60934 WATOWAN8 69.0 62805 STJAMES8 69.0 1	4475	-124.6	-69.0	-0.12843	-103.3	131.1
29227_ST_VINCT	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
63155_DONALDS9	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
63255_DONALDS7	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
63256_DONDPIP7	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
63356_DON_PIP9	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8032_DONALDSN	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8033_KENNEDY	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8034_EMER_TIE	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8035_HALLOCK	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8036_NORTHCOT	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8037_HUMBOLT	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8049_ARGYLE	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8050_STEPHEN	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8051_DON_JCT	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
8065_HALL_NW	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
9464_STEP_MPC	MISO_SINKS_SUOP	100.0	-1826.5		0.0412	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03691	268.8	201.4
60766_COSMSTP8	MISO_SINKS_SUOP	100.0	-1827.4		0.0363	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01752	110.1	78.0
62626_COSMOS_8	MISO_SINKS_SUOP	100.0	-1827.4		0.0363	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01752	110.1	78.0
62602_BELL___8	MISO_SINKS_SUOP	100.0	-1832.8		0.0362	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01742	110.1	78.1
60694_RENVILL8	MISO_SINKS_SUOP	100.0	-1842.1		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01748	110.1	77.9
60404_BISCAY7	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	78.3
60873_BSCYJCTG	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01724	110.1	78.3
60878_PLATO__8	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	78.3
60879_LSTRPRA8	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01724	110.1	78.3
60880_MCLEDCN8	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	78.3
60888_GLNCOTP8	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01724	110.1	78.3
62588_HIGHISL8	MISO_SINKS_SUOP	100.0	-1843.2		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01724	110.1	78.3
60898_GLNCOMU7	MISO_SINKS_SUOP	100.0	-1843.4		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	78.3
60680_EMMET_R8	MISO_SINKS_SUOP	100.0	-1843.9		0.0360	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01746	110.1	77.9
29409_HITTRDL8	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
29410_HITTRD_J	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
29411_AUDUBON	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
29476_WSTBRY_S	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
29477_RICHWOOD	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
66717_ULRICH_7	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
66773_ULRICH_9	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
66781_ULRICH_T	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
67039_ULRICH_8	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
7180_CALLAWAY	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
7181_OGEMA	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
7211_ULRICH	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
9413_MPCWHITE	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
9414_MPCWHITE2	MISO_SINKS_SUOP	100.0	-1844.7		0.0301	-	63211 CANBY 7 115 66551 GRANITF7 115 1	C: 63314 BIGSTON4 230 66503 BLAIR 4 230 1	6139	151.5	96.0	0.01443	84.1	57.5
62981_MCLEOD_7	MISO_SINKS_SUOP	100.0	-1846.0		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	78.2
60741_LKLILLN8	MISO_SINKS_SUOP	100.0	-1847.5		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01732	110.1	78.1
60679_CROOKS_8	MISO_SINKS_SUOP	100.0	-1848.5		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01740	110.1	77.9
60333_HONNERR7	MISO_SINKS_SUOP	100.0	-1850.2		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01742	110.1	77.8
61954_REDFLST7	MISO_SINKS_SUOP	100.0	-1850.2		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01742	110.1	77.8
61956_R_FALLS7	MISO_SINKS_SUOP	100.0	-1850.2		0.0359	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01742	110.1	77.8
66725_WARREN_7	MISO_SINKS_SUOP	100.0	-1855.8		0.0425	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03592	268.8	202.1
62638_AITKIN_7	MISO_SINKS_SUOP	100.0	-1857.0		0.1085	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.10851	8.3	-193.3
62604_BRWN_TP8	MISO_SINKS_SUOP	100.0	-1859.4		0.0357	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01715	110.1	78.2
60695_DANUBE_8	MISO_SINKS_SUOP	100.0	-1864.2		0.0356	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01721	110.1	78.0
60676_TROYT_R8	MISO_SINKS_SUOP	100.0	-1869.6		0.0355	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01715	110.1	78.0
60684_YELWMED8	MISO_SINKS_SUOP	100.0	-1870.7		0.0355	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01724	110.1	77.8
62589_MLVILLE8	MISO_SINKS_SUOP	100.0	-1871.3		0.0355	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01707	110.1	78.1
62590_MLVILTP8	MISO_SINKS_SUOP	100.0	-1871.3		0.0355	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01707	110.1	78.1
60742_PANTHER8	MISO_SINKS_SUOP	100.0	-1871.6		0.0355	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01707	110.1	78.1
60681_TROY__R8	MISO_SINKS_SUOP	100.0	-1871.9		0.0354	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01712	110.1	78.0
60870_OLIVIAM8	MISO_SINKS_SUOP	100.0	-1872.1		0.0354	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01711	110.1	78.0
60875_BVR_CRK8	MISO_SINKS_SUOP	100.0	-1872.7		0.0354	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01711	110.1	78.0
60869_OLIVIAC8	MISO_SINKS_SUOP	100.0	-1873.4		0.0354	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01710	110.1	78.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60682_KNGMN_R8	MISO_SINKS_SUOP	100.0	-1874.6		0.0354	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01708	110.1	78.0
62586_WINTHRP8	MISO_SINKS_SUOP	100.0	-1878.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01696	110.1	78.2
60733_HENRY_R8	MISO_SINKS_SUOP	100.0	-1880.1		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01703	110.1	78.0
60678_BROWNT_8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01700	110.1	78.1
60696_HECTOR_8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
60697_BUFLOLK8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01700	110.1	78.1
60698_STEWART8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
60699_BROWNTP8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
60718_BIRDISL8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
62591_YELLWST8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01700	110.1	78.1
62592_HECTOR_8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
62593_BROOKFD8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01700	110.1	78.1
62594_BRKFDTP8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01700	110.1	78.1
62600_PRSTNLK8	MISO_SINKS_SUOP	100.0	-1880.8		0.0353	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01700	110.1	78.1
62675_ASSMPTN8	MISO_SINKS_SUOP	100.0	-1882.5		0.0352	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01677	110.1	78.5
60677_HENRYTR8	MISO_SINKS_SUOP	100.0	-1890.2		0.0351	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01692	110.1	78.1
66508_S3_____7	MISO_SINKS_SUOP	100.0	-1895.6		0.0350	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01701	110.1	77.8
66552_MARS_ER7	MISO_SINKS_SUOP	100.0	-1895.6		0.0350	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01701	110.1	77.8
60770_BIRCH_R8	MISO_SINKS_SUOP	100.0	-1899.6		0.0349	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01683	110.1	78.1
60728_FRANKLN8	MISO_SINKS_SUOP	100.0	-1904.6		0.0348	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01678	110.1	78.1
60727_FARFXNU8	MISO_SINKS_SUOP	100.0	-1908.3		0.0348	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01672	110.1	78.1
60769_CAIRO_R8	MISO_SINKS_SUOP	100.0	-1908.9		0.0348	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01671	110.1	78.2
62535_EVERDEL9	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
62536_ROBRTSW9	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
62537_ROBERTS9	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7596_TOWNTP	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7598_CARGILJC	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7600_BRECKER	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7602_BRECKR	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7603_CARGLJ	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7604_DORANJ	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7639_DORAN	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
7640_CAMBELL	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
8788_DORANREA	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
9550_BREKPT9	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
9551_BRECKJ	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
9552_SO_BRECK	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
9554_TWITOSB	MISO_SINKS_SUOP	100.0	-1910.3		0.0431	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03919	268.8	193.9
60731_GRENISL8	MISO_SINKS_SUOP	100.0	-1911.6		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01655	110.1	78.4
60726_GIBBON_8	MISO_SINKS_SUOP	100.0	-1912.0		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01667	110.1	78.2
60771_RDWDFLTG	MISO_SINKS_SUOP	100.0	-1912.2		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01674	110.1	78.0
61958_REDWD_FL	MISO_SINKS_SUOP	100.0	-1912.2		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01674	110.1	78.0
62735_REDWOOD8	MISO_SINKS_SUOP	100.0	-1912.8		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01674	110.1	78.0
60371_ERIE_RD7	MISO_SINKS_SUOP	100.0	-1913.0		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01683	110.1	77.9
62075_CORNISH8	MISO_SINKS_SUOP	100.0	-1914.3		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01663	110.1	78.2
67472_MMU_N7ST	MISO_SINKS_SUOP	100.0	-1914.8		0.0347	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01681	110.1	77.9
60145_FRANKLN7	MISO_SINKS_SUOP	100.0	-1915.2		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01669	110.1	78.1
60725_WINTHRP8	MISO_SINKS_SUOP	100.0	-1915.5		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01661	110.1	78.2
62078_HRTLND_8	MISO_SINKS_SUOP	100.0	-1917.0		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01659	110.1	78.3
60170_MARSHAL7	MISO_SINKS_SUOP	100.0	-1917.1		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01678	110.1	77.9
62737_SHRDNTP8	MISO_SINKS_SUOP	100.0	-1917.4		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01672	110.1	78.0
60372_SARATOG7	MISO_SINKS_SUOP	100.0	-1917.5		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01679	110.1	77.9
60373_SOUTH_E7	MISO_SINKS_SUOP	100.0	-1919.3		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01677	110.1	77.9
62736_SHERIDN8	MISO_SINKS_SUOP	100.0	-1919.7		0.0346	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01670	110.1	78.0
62073_EDEN_TP8	MISO_SINKS_SUOP	100.0	-1920.7		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01662	110.1	78.1
62083_EDEN___8	MISO_SINKS_SUOP	100.0	-1920.7		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01662	110.1	78.1
60171_LYON_CO7	MISO_SINKS_SUOP	100.0	-1921.0		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01673	110.1	77.9
62739_MLRY_TP8	MISO_SINKS_SUOP	100.0	-1921.2		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01673	110.1	77.9
60723_MORGAN_8	MISO_SINKS_SUOP	100.0	-1922.4		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01661	110.1	78.1
67473_MMU_SW_7	MISO_SINKS_SUOP	100.0	-1923.4		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01673	110.1	77.9
62738_MILROY_8	MISO_SINKS_SUOP	100.0	-1923.6		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01668	110.1	78.0

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
60685_GRNVALY8	MISO_SINKS_SUOP	100.0	-1925.4		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01668	110.1	77.9
7852_GREENV2	MISO_SINKS_SUOP	100.0	-1925.4		0.0345	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01668	110.1	77.9
60729_GAYLORD8	MISO_SINKS_SUOP	100.0	-1926.2		0.0344	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01648	110.1	78.3
60903_LYON_CO8	MISO_SINKS_SUOP	100.0	-1927.4		0.0344	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01667	110.1	77.9
60692_CYSTL_T8	MISO_SINKS_SUOP	100.0	-1928.2		0.0344	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01646	110.1	78.3
60503_FRNKLN_3	MISO_SINKS_SUOP	100.0	-1931.0		0.0344	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01652	110.1	78.2
60719_LAFAYET8	MISO_SINKS_SUOP	100.0	-1937.3		0.0342	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01642	110.1	78.3
60730_ARLNGTN8	MISO_SINKS_SUOP	100.0	-1938.7		0.0342	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01633	110.1	78.4
62079_LAFAYTT8	MISO_SINKS_SUOP	100.0	-1940.2		0.0342	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01640	110.1	78.3
60722_SLPY_MU8	MISO_SINKS_SUOP	100.0	-1943.2		0.0341	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01640	110.1	78.2
62071_SLPYJCT8	MISO_SINKS_SUOP	100.0	-1943.2		0.0341	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01640	110.1	78.2
62072_SLPYEYE8	MISO_SINKS_SUOP	100.0	-1946.8		0.0341	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01637	110.1	78.2
66294_IVANHOE7	MISO_SINKS_SUOP	100.0	-1952.5		0.0340	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01662	110.1	77.6
66295_IVANHOE8	MISO_SINKS_SUOP	100.0	-1952.5		0.0340	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01662	110.1	77.6
61979_NEWPRAGN	MISO_SINKS_SUOP	100.0	-1953.7		0.0340	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01605	110.1	78.7
62080_HOME_TP8	MISO_SINKS_SUOP	100.0	-1954.4		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01630	110.1	78.2
62082_HOME___8	MISO_SINKS_SUOP	100.0	-1954.4		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01630	110.1	78.2
62674_JSNLDTP8	MISO_SINKS_SUOP	100.0	-1954.7		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01619	110.1	78.4
62692_JESNLND8	MISO_SINKS_SUOP	100.0	-1954.7		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01619	110.1	78.4
62740_WALNUTG8	MISO_SINKS_SUOP	100.0	-1955.1		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01644	110.1	77.9
62741_WLNTGTP8	MISO_SINKS_SUOP	100.0	-1955.1		0.0339	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01644	110.1	77.9
60855_TRACYSW8	MISO_SINKS_SUOP	100.0	-1961.5		0.0338	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01639	110.1	77.9
60721_ESSIG__8	MISO_SINKS_SUOP	100.0	-1962.0		0.0338	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01622	110.1	78.2
62076_SCHLLNG8	MISO_SINKS_SUOP	100.0	-1965.1		0.0338	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01619	110.1	78.3
62077_SCHLTP_8	MISO_SINKS_SUOP	100.0	-1965.1		0.0338	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01619	110.1	78.3
60119_LKYNKTN7	MISO_SINKS_SUOP	100.0	-1966.6		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01636	110.1	77.9
60853_LK_YANK8	MISO_SINKS_SUOP	100.0	-1966.6		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01636	110.1	77.9
60284_NEWULMC8	MISO_SINKS_SUOP	100.0	-1967.2		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01617	110.1	78.3
60720_NEWULMS8	MISO_SINKS_SUOP	100.0	-1967.2		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01617	110.1	78.3
60938_FTRIDGL8	MISO_SINKS_SUOP	100.0	-1967.2		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01617	110.1	78.3
60939_NEWULMP8	MISO_SINKS_SUOP	100.0	-1967.2		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01617	110.1	78.3
60941_NEWULMN8	MISO_SINKS_SUOP	100.0	-1967.2		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01617	110.1	78.3
60940_NEWULMT8	MISO_SINKS_SUOP	100.0	-1968.3		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01616	110.1	78.3
62081_NEW_ULM8	MISO_SINKS_SUOP	100.0	-1969.8		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01615	110.1	78.3
62067_SRL_JCT8	MISO_SINKS_SUOP	100.0	-1970.0		0.0337	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01615	110.1	78.3
66722_OSLO___7	MISO_SINKS_SUOP	100.0	-1970.0		0.0343	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04384	268.8	182.4
60724_HENDRSN8	MISO_SINKS_SUOP	100.0	-1972.6		0.0336	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01603	110.1	78.4
62711_LKSARAH8	MISO_SINKS_SUOP	100.0	-1975.0		0.0336	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01628	110.1	77.9
62713_LKSRHTP8	MISO_SINKS_SUOP	100.0	-1975.0		0.0336	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01628	110.1	77.9
60937_SEARLS_J	MISO_SINKS_SUOP	100.0	-1980.6		0.0335	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01606	110.1	78.3
60112_FTRIDLY7	MISO_SINKS_SUOP	100.0	-1984.4		0.0334	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01602	110.1	78.3
60381_YANKEE_7	MISO_SINKS_SUOP	100.0	-1987.8		0.0334	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01625	110.1	77.8
60394_YANKEE_9	MISO_SINKS_SUOP	100.0	-1987.8		0.0334	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01625	110.1	77.8
62714_CURRIE_8	MISO_SINKS_SUOP	100.0	-1994.5		0.0333	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01613	110.1	77.9
60279_BUFFRID7	MISO_SINKS_SUOP	100.0	-2006.1		0.0331	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01608	110.1	77.8
60708_BUFFRIDG	MISO_SINKS_SUOP	100.0	-2006.1		0.0331	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01608	110.1	77.8
61654_AITKNMN7	MISO_SINKS_SUOP	100.0	-2007.2		0.1004	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.10039	8.3	-193.3
60866_LESUEUR8	MISO_SINKS_SUOP	100.0	-2008.9		0.0330	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01572	110.1	78.5
60867_LSUEURE8	MISO_SINKS_SUOP	100.0	-2008.9		0.0330	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01572	110.1	78.5
60868_LESR_TP8	MISO_SINKS_SUOP	100.0	-2008.9		0.0330	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01572	110.1	78.5
62472_4CORNRS8	MISO_SINKS_SUOP	100.0	-2015.1		0.0350	-	61665 THOMSON7 115 61666 FONDULAC 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	160.5	90.0	0.03499	44.9	-25.6
60857_SLAYTON8	MISO_SINKS_SUOP	100.0	-2017.6		0.0329	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01595	110.1	77.9
62349_RUSHRVR8	MISO_SINKS_SUOP	100.0	-2023.5		0.0328	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01560	110.1	78.5
60782_VESELI_8	MISO_SINKS_SUOP	100.0	-2025.0		0.0328	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01540	110.1	78.9
60785_NPG_TAP8	MISO_SINKS_SUOP	100.0	-2025.0		0.0328	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01540	110.1	78.9
60936_NPR_TAP8	MISO_SINKS_SUOP	100.0	-2025.0		0.0328	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01540	110.1	78.9
61978_NEW_PRAG	MISO_SINKS_SUOP	100.0	-2025.0		0.0328	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01540	110.1	78.9
60858_HADLEY_8	MISO_SINKS_SUOP	100.0	-2029.2		0.0327	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01586	110.1	77.9
62715_LKWILSN8	MISO_SINKS_SUOP	100.0	-2035.3		0.0326	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01581	110.1	77.9
34301_NEWPRAG8	MISO_SINKS_SUOP	100.0	-2037.4		0.0326	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01529	110.1	78.9
60835_CHNDLRT8	MISO_SINKS_SUOP	100.0	-2037.6		0.0326	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01580	110.1	77.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
63156_KARLSTD9	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
66708_KARLSTA7	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
66785_KARLSTAT	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
66838_KARLSTA8	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8041_LANCST_T	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8042_BRONSON	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8043_HALMA	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8044_LANCAST	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8046_KARLSTAD	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8047_STRNDQST	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8053_FOLD_T8	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8054_HOLT_JCT	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8055_GREENBSH	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8056_BADGER_T	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8057_BADGER	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8566_HOLT_TP	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
8570_FOLD_T	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9231_LANC_MPC	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9239_MPCGRNBS	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9240_GRNBSMPC	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9343_STRANQ	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9445_STRATH_T	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
9446_STRATCO	MISO_SINKS_SUOP	100.0	-2043.3		0.0386	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03260	268.8	202.2
60111_SWAN_LK7	MISO_SINKS_SUOP	100.0	-2044.6		0.0325	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01549	110.1	78.4
62712_ELLSBOR7	MISO_SINKS_SUOP	100.0	-2045.0		0.0324	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01572	110.1	77.9
60395_ERIDGE_8	MISO_SINKS_SUOP	100.0	-2045.6		0.0324	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01574	110.1	77.9
62340_NSWEDEN8	MISO_SINKS_SUOP	100.0	-2046.4		0.0324	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01541	110.1	78.5
62341_NWSWDTP8	MISO_SINKS_SUOP	100.0	-2046.4		0.0324	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01541	110.1	78.5
62710_CHANDLR8	MISO_SINKS_SUOP	100.0	-2056.7		0.0323	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01566	110.1	77.9
62350_TRAVERS8	MISO_SINKS_SUOP	100.0	-2062.7		0.0322	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01528	110.1	78.5
63284_OSLO_TN7	MISO_SINKS_SUOP	100.0	-2065.3		0.0327	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04317	268.8	179.6
60826_TRAVRSE8	MISO_SINKS_SUOP	100.0	-2069.6		0.0321	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01523	110.1	78.5
60364_FIELD_N3	MISO_SINKS_SUOP	100.0	-2078.6		0.0319	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01520	110.1	78.5
60852_ROCKRIV8	MISO_SINKS_SUOP	100.0	-2083.9		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01546	110.1	77.8
61974_ST_PETER	MISO_SINKS_SUOP	100.0	-2083.9		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01511	110.1	78.6
34300_MONTGMY8	MISO_SINKS_SUOP	100.0	-2086.1		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01488	110.1	79.0
34310_MONTGG19	MISO_SINKS_SUOP	100.0	-2086.1		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01488	110.1	79.0
62323_PNLPNTP8	MISO_SINKS_SUOP	100.0	-2088.0		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01509	110.1	78.6
60827_LKEMILY8	MISO_SINKS_SUOP	100.0	-2089.8		0.0318	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01506	110.1	78.6
9230_HALLOCK8	MISO_SINKS_SUOP	100.0	-2090.9		0.0323	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04178	268.8	181.5
9237_ARGYLE8	MISO_SINKS_SUOP	100.0	-2090.9		0.0323	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04178	268.8	181.5
9251_RADIUM	MISO_SINKS_SUOP	100.0	-2090.9		0.0323	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.04178	268.8	181.5
66007_HOLLAND	MISO_SINKS_SUOP	100.0	-2096.0		0.0317	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01544	110.1	77.7
60859_ROCKTAP8	MISO_SINKS_SUOP	100.0	-2096.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01537	110.1	77.8
61190_WOODSTK8	MISO_SINKS_SUOP	100.0	-2096.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01537	110.1	77.8
61191_S_RIDGE8	MISO_SINKS_SUOP	100.0	-2096.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01537	110.1	77.8
60123_PIPESTN7	MISO_SINKS_SUOP	100.0	-2098.6		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01534	110.1	77.9
34302_LECENTR8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01497	110.1	78.6
34303_LECNTRT8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01497	110.1	78.6
62673_STTHMTP8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01497	110.1	78.6
62681_CLVLAND8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01497	110.1	78.6
62682_MNTGMRY8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01497	110.1	78.6
62691_STTHOMS8	MISO_SINKS_SUOP	100.0	-2099.9		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01497	110.1	78.6
60062_MEC_ST	MISO_SINKS_SUOP	100.0	-2101.0		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01504	110.1	78.5
60108_WILMART3	MISO_SINKS_SUOP	100.0	-2101.0		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01504	110.1	78.5
60603_MEC_345	MISO_SINKS_SUOP	100.0	-2101.0		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01504	110.1	78.5
62342_PENELOP8	MISO_SINKS_SUOP	100.0	-2101.7		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01499	110.1	78.6
60392_WRIDGE_8	MISO_SINKS_SUOP	100.0	-2102.4		0.0316	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01533	110.1	77.8
66008_HOLLAND	MISO_SINKS_SUOP	100.0	-2106.9		0.0315	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01533	110.1	77.8
60065_WEST_PIP	MISO_SINKS_SUOP	100.0	-2108.3		0.0315	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01528	110.1	77.9
60860_PIPESTN8	MISO_SINKS_SUOP	100.0	-2108.3		0.0315	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01528	110.1	77.9

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62343_PENELTP8	MISO_SINKS_SUOP	100.0	-2108.4		0.0315	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01494	110.1	78.6
66006_H_TAP	MISO_SINKS_SUOP	100.0	-2113.4		0.0314	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01527	110.1	77.8
62336_JHNSNTP8	MISO_SINKS_SUOP	100.0	-2114.7		0.0314	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01489	110.1	78.6
63249_CRKSTON7	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7960_PORTAL_P	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7972_CROOKST	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7974_SIMPLOT	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7975_CRK_PL_2	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7977_CRKS_P_T	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7978_CRKS_BAR	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7979_CRKS_PRK	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7980_CRKSTN_J	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7981_CRK_UPTN	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7982_CRKS_SUG	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7983_ROSS__41	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7984_FISH_TP	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7985_FANNY	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7986_CLIMAX9	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7988_CLIMAXSB	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
7989_FISHER	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8001_HAROLD	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8002_DEROSIER	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8058_WARREN	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8059_RODAN	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8060_ANGUS	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
8066_ANGRON7	MISO_SINKS_SUOP	100.0	-2115.2		0.0373	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.03119	268.8	202.8
60362_CHANRMB7	MISO_SINKS_SUOP	100.0	-2117.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01517	110.1	78.0
60715_CHANRMB9	MISO_SINKS_SUOP	100.0	-2117.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01517	110.1	78.0
63082_WILMRTHT	MISO_SINKS_SUOP	100.0	-2117.7		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01490	110.1	78.5
60003_PR_IS31G	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01452	110.1	79.3
60004_PR_IS32G	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01452	110.1	79.3
60105_PR_ISLD3	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01452	110.1	79.3
60667_PI1_RCP9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01452	110.1	79.3
60668_PI1__LD9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01452	110.1	79.3
60669_PI1_4KV9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01452	110.1	79.3
60670_PI2_RCP9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01452	110.1	79.3
60671_PI2__LD9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01452	110.1	79.3
60672_PI2_4KV9	MISO_SINKS_SUOP	100.0	-2119.3		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01452	110.1	79.3
62337_JAMESTW8	MISO_SINKS_SUOP	100.0	-2120.0		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01481	110.1	78.7
62351_JMSTWTP8	MISO_SINKS_SUOP	100.0	-2120.0		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01481	110.1	78.7
66005_PIPETAP	MISO_SINKS_SUOP	100.0	-2120.0		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01521	110.1	77.8
66726_ANDERNW7	MISO_SINKS_SUOP	100.0	-2120.9		0.0389	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02397	268.8	218.0
60647_KEYCT12G	MISO_SINKS_SUOP	100.0	-2122.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01484	110.1	78.6
60648_KEYCT34G	MISO_SINKS_SUOP	100.0	-2122.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01484	110.1	78.6
60650_WILMART8	MISO_SINKS_SUOP	100.0	-2122.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01484	110.1	78.6
61155_JOHNSON8	MISO_SINKS_SUOP	100.0	-2122.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01484	110.1	78.6
62324_JOHNSON8	MISO_SINKS_SUOP	100.0	-2122.4		0.0313	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01484	110.1	78.6
60063_MEC_CT1	MISO_SINKS_SUOP	100.0	-2123.6		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01485	110.1	78.5
60110_WILMART7	MISO_SINKS_SUOP	100.0	-2123.6		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01485	110.1	78.5
60360_MEC_115	MISO_SINKS_SUOP	100.0	-2123.6		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01485	110.1	78.5
60380_SUMMIT	MISO_SINKS_SUOP	100.0	-2123.8		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01484	110.1	78.5
60831_EASTWD28	MISO_SINKS_SUOP	100.0	-2125.0		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01479	110.1	78.6
62339_POHL___8	MISO_SINKS_SUOP	100.0	-2125.0		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01479	110.1	78.6
62347_EAGLELK8	MISO_SINKS_SUOP	100.0	-2126.2		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01477	110.1	78.7
60808_EAGLELK8	MISO_SINKS_SUOP	100.0	-2127.4		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01475	110.1	78.7
61250_JAMESTP8	MISO_SINKS_SUOP	100.0	-2127.4		0.0312	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01475	110.1	78.7
60113_DOME___7	MISO_SINKS_SUOP	100.0	-2132.0		0.0311	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01477	110.1	78.6
63116_ORTONVL9	MISO_SINKS_SUOP	100.0	-2134.1		0.0316	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02300	268.8	219.7
63216_ORTONVL7	MISO_SINKS_SUOP	100.0	-2134.1		0.0316	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02300	268.8	219.7
9495_BURDICK	MISO_SINKS_SUOP	100.0	-2134.1		0.0316	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02300	268.8	219.7
9562_ORT_MUN	MISO_SINKS_SUOP	100.0	-2134.1		0.0316	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02300	268.8	219.7

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
9570_BURDJT	MISO_SINKS_SUOP	100.0	-2134.1		0.0316	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02300	268.8	219.7
62338_HUNGRYH8	MISO_SINKS_SUOP	100.0	-2141.5		0.0310	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01469	110.1	78.6
60830_EASTWD18	MISO_SINKS_SUOP	100.0	-2144.4		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01467	110.1	78.6
60781_MINNLK_8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
60810_POHLRDT8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01465	110.1	78.6
60811_MAPLTON8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
60812_BALLARD8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
60813_SIBLYPK8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01465	110.1	78.6
62344_DECORIA8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
62345_STCLAIR8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01465	110.1	78.6
62346_STCLRTP8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
62878_HWY30TP8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01465	110.1	78.6
62879_DANVLL_8	MISO_SINKS_SUOP	100.0	-2147.1		0.0309	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01465	110.1	78.6
66723_GREENWD7	MISO_SINKS_SUOP	100.0	-2151.9		0.0383	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02346	268.8	218.3
63287_ORTQUAR7	MISO_SINKS_SUOP	100.0	-2154.3		0.0313	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02279	268.8	219.7
36239_POHL___8	MISO_SINKS_SUOP	100.0	-2158.1		0.0307	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01457	110.1	78.6
60070_FEP_13_0	MISO_SINKS_SUOP	100.0	-2159.6		0.0307	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01428	110.1	79.2
60384_FEPTP_7	MISO_SINKS_SUOP	100.0	-2159.6		0.0307	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01428	110.1	79.2
63113_MARIETT9	MISO_SINKS_SUOP	100.0	-2164.4		0.0364	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02143	268.8	222.4
63213_MARIETT7	MISO_SINKS_SUOP	100.0	-2164.4		0.0364	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02143	268.8	222.4
66004_TROSKY	MISO_SINKS_SUOP	100.0	-2164.4		0.0307	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01490	110.1	77.8
62678_ELYSIAN8	MISO_SINKS_SUOP	100.0	-2166.1		0.0306	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01437	110.1	78.9
62679_ELYSNTP8	MISO_SINKS_SUOP	100.0	-2166.1		0.0306	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01437	110.1	78.9
60787_NOFIELD8	MISO_SINKS_SUOP	100.0	-2167.3		0.0306	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01409	110.1	79.5
60925_HUNGRY_H	MISO_SINKS_SUOP	100.0	-2171.9		0.0306	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01447	110.1	78.6
62003_JOHNJCT7	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
62004_GRACEV_7	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
62017_GRACEV_9	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
62018_CLINTON9	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7474_ALBERTA	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7475_CHOKIOTP	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7476_CLINTON	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7477_GRCEVILL	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7481_JOHNSN	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
7482_CHOKIO	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
8781_DUMONT	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
8782_DUMONER	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
8784_GRACET	MISO_SINKS_SUOP	100.0	-2174.7		0.0310	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02199	268.8	221.0
60786_DUNDAS_8	MISO_SINKS_SUOP	100.0	-2179.1		0.0304	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01402	110.1	79.5
60805_WATRVIL8	MISO_SINKS_SUOP	100.0	-2182.3		0.0304	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01421	110.1	79.1
63288_ODESSA_7	MISO_SINKS_SUOP	100.0	-2184.3		0.0309	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02248	268.8	219.7
62876_FRLK_TP8	MISO_SINKS_SUOP	100.0	-2192.3		0.0303	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01405	110.1	79.3
62877_FRNCHLK8	MISO_SINKS_SUOP	100.0	-2192.3		0.0303	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01405	110.1	79.3
62865_AIRTECH7	MISO_SINKS_SUOP	100.0	-2193.3		0.0303	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01403	110.1	79.3
60369_FENTON_7	MISO_SINKS_SUOP	100.0	-2195.1		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01459	110.1	78.0
60393_FENTON_9	MISO_SINKS_SUOP	100.0	-2195.1		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01459	110.1	78.0
60331_LKFLDXL3	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63011_LGS__31G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63012_LGS__32G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63013_LGS__33G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63014_LGS__34G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63015_LGS__35G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63016_LGS__36G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
63090_TWF___9G	MISO_SINKS_SUOP	100.0	-2195.6		0.0302	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01444	110.1	78.4
62023_ALBERTA9	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
62028_DONNLLY9	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
62037_ALBTJCT9	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
66318_MORRIS_9	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
66555_MORRIS_7	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
7435_STEEL	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
7439_NW_JCT	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
7447_5_MILE	MISO_SINKS_SUOP	100.0	-2200.8		0.0307	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02136	268.8	221.8
60788_VALLYTP8	MISO_SINKS_SUOP	100.0	-2206.3		0.0301	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01385	110.1	79.5
62870_VLLYGRV8	MISO_SINKS_SUOP	100.0	-2206.3		0.0301	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01385	110.1	79.5
66003_HARDWICK	MISO_SINKS_SUOP	100.0	-2207.8		0.0301	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01461	110.1	77.8
60793_MORISTN8	MISO_SINKS_SUOP	100.0	-2208.1		0.0300	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01397	110.1	79.2
60789_CIRCLTP8	MISO_SINKS_SUOP	100.0	-2209.3		0.0300	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 39449 ARROWHD 345 1	9415	266.3	200.0	0.01383	110.1	79.5
62871_CIRCLEL8	MISO_SINKS_SUOP	100.0	-2209.3		0.0300	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01383	110.1	79.5
62872_FARIBLT8	MISO_SINKS_SUOP	100.0	-2209.3		0.0300	-	61683 STIN-MN7 115 61684 STIN-WI7 115 1	C: 39448 AWHD PST 230 61615 ARROWHD4 230 1	7507	266.3	200.0	0.01383	110.1	79.5
62000_MARSHLK7	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62019_AKRON__9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62020_ARTCKTP9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62021_FRFLDSW9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62022_FAIRFLD9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62024_ARTICHK9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62038_MARSHLK9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
62042_AKRONTP9	MISO_SINKS_SUOP	100.0	-2229.9		0.0303	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02203	268.8	219.7
63289_CORRELL7	MISO_SINKS_SUOP	100.0	-2243.8		0.0301	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:56STK	234	321.5	254.0	0.02190	268.8	219.7
29311_TERBONE8	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
29312_HOUT___8	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
29467_NORTHLND	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
66713_TRFALLS7	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
66767_TRFALLS9	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
66782_TRFALLST	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
66910_TRFALLS8	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9248_GRYGLA	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9249_HIGH_LD	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9253_HOLT_8	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9254_DAK_JCT	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9311_HAZEL8	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9416_GATZKE	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
9468_MUD_LK	MISO_SINKS_SUOP	100.0	-2250.1		0.0366	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.02193	268.8	219.5
66718_HALMA__7	MISO_SINKS_SUOP	100.0	-2257.0		0.0334	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:53STK	232	329.3	254.0	0.03440	268.8	191.2
62025_SHBL_TP9	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
62040_SHBL_LK9	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
63217_APPLETN7	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
7452_APPLE	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
7456_MILANJT	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
7457_MILANJT2	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
7458_HOLLOWAY	MISO_SINKS_SUOP	100.0	-2266.3		0.0348	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02149	268.8	220.1
63206_LOUSBRG7	MISO_SINKS_SUOP	100.0	-2326.9		0.0339	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02099	268.8	220.0
7478_BARRY	MISO_SINKS_SUOP	100.0	-2338.6		0.0352	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03152	268.8	195.1
7479_BRDSLYTP	MISO_SINKS_SUOP	100.0	-2338.6		0.0352	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03152	268.8	195.1
7480_BEARDSLY	MISO_SINKS_SUOP	100.0	-2338.6		0.0352	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03152	268.8	195.1
8787_BEARDREA	MISO_SINKS_SUOP	100.0	-2338.6		0.0352	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C:610 1	48	336.4	254.0	0.03152	268.8	195.1
62306_HARRY_M8	MISO_SINKS_SUOP	100.0	-2352.0		0.0857	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.08567	8.3	-193.3
63173_DAWS_TP7	MISO_SINKS_SUOP	100.0	-2430.8		0.0324	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02019	268.8	219.7
63174_DAWSON_7	MISO_SINKS_SUOP	100.0	-2430.8		0.0324	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02019	268.8	219.7
63254_VIKING_7	MISO_SINKS_SUOP	100.0	-2489.6		0.0317	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02637	268.8	203.1
63354_VIK_PIP9	MISO_SINKS_SUOP	100.0	-2489.6		0.0317	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.02637	268.8	203.1
63212_BURR__7	MISO_SINKS_SUOP	100.0	-2510.1		0.0314	-	60133 SHEYNNE4 230 63336 AUDUBON4 230 1	C: 63329 WAHPETN4 230 63331 FERGSFL4 230 1	6143	332.9	254.0	0.01940	268.8	220.1
61556_AWHD2JCT	MISO_SINKS_SUOP	100.0	-3329.1		-0.0347	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.03466	-36.4	79.0
61557_AWHD2TR9	MISO_SINKS_SUOP	100.0	-3329.1		-0.0347	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.03466	-36.4	79.0
61554_AWHD1JCT	MISO_SINKS_SUOP	100.0	-3334.9		-0.0346	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.03460	-36.4	79.0
61555_AWHD1TR9	MISO_SINKS_SUOP	100.0	-3334.9		-0.0346	-	61667 POTLTCH7 115 61668 CLOQUET7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	-205.4	-90.0	-0.03460	-36.4	79.0
62310_SAND_MP8	MISO_SINKS_SUOP	100.0	-3479.5		0.0579	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.05791	8.3	-193.3
62308_SAND_TP8	MISO_SINKS_SUOP	100.0	-3558.0		0.0566	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.05663	8.3	-193.3
62466_GRANDLK8	MISO_SINKS_SUOP	100.0	-3776.8		0.0534	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.05335	8.3	-193.3
62314_BEAR_CK8	MISO_SINKS_SUOP	100.0	-4205.3		0.0479	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04792	8.3	-193.3
62305_SANDSTN8	MISO_SINKS_SUOP	100.0	-4207.8		0.0479	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04789	8.3	-193.3
62309_SAND_SW8	MISO_SINKS_SUOP	100.0	-4207.8		0.0479	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04789	8.3	-193.3
62312_HINCKMP8	MISO_SINKS_SUOP	100.0	-4299.4		0.0469	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04687	8.3	-193.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix B - DC Analysis

From	To	Transfer Level	FCITC	Flag	TDF	LODF	Limiting Constraint	Contingency	Ncon	PreShift	Rating	PTDF	PreShft Base	PostShft Base
62313_GRNDSTN8	MISO_SINKS_SUOP	100.0	-4299.4		0.0469	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04687	8.3	-193.3
62311_HINCKTP8	MISO_SINKS_SUOP	100.0	-4574.8		0.0441	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04405	8.3	-193.3
62304_HNCKLEY8	MISO_SINKS_SUOP	100.0	-4800.4		0.0420	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.04198	8.3	-193.3
61796_RIVERJCT	MISO_SINKS_SUOP	100.0	-5218.0		0.0386	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03862	8.3	-193.3
61797_RIVERTR9	MISO_SINKS_SUOP	100.0	-5218.0		0.0386	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03862	8.3	-193.3
62212_RIVTON_T	MISO_SINKS_SUOP	100.0	-5644.1		0.0357	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03570	8.3	-193.3
38601_RVTNRUAL	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38602_IRNTNTSW	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38603_IRNTNTAP	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38604_IRONTON	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38605_CRSBYTAP	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38606_505_06SW	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38607_506_DIST	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38608_MAROCO44	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38609_CROSBY	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38610_TROMMALD	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38611_MARCOTAP	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38612_CYUNATAP	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38613_506_TAP	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38614_DEERWOOD	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38615_CUYUNA	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38616_CRSBYMFG	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38617_RVRTN_DT	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38618_TJMACRG1	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38619_MACMLNTR	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38620_MACMILAN	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38621_WAFERIZR	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38622_TJMACRG2	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38623_532_06TS	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
38624_HWY12	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
61653_RIVERTN7	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
61853_RIVERTN9	MISO_SINKS_SUOP	100.0	-5694.8		0.0354	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03538	8.3	-193.3
62176_MERRFLD7	MISO_SINKS_SUOP	100.0	-6001.5		0.0336	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03358	8.3	-193.3
62206_BAXTER_7	MISO_SINKS_SUOP	100.0	-6586.2		0.0306	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03060	8.3	-193.3
62180_RIVTON_8	MISO_SINKS_SUOP	100.0	-6596.2		0.0306	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03055	8.3	-193.3
38671_531_534T	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
38672_PILLAGER	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
38673_503_531T	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
38674_PINE_BCH	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
38675_MPL_BAX	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
38676_GULL_LK	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
61645_BAXTER_7	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
61845_BAXTER_9	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3
62205_MOTLEY_9	MISO_SINKS_SUOP	100.0	-6669.9		0.0302	-	61668 CLOQUET7 115 61673 ARROWHD7 115 1	C: 60002 SHERC33G 26.0 60160 SHERCO 3 345 1	3396	321.5	120.0	0.03021	8.3	-193.3

Note: Yellow highlighting indicates a three-winding transformer (one limiter).

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
9437	Aardahl	69	NW	Beltrami	50	37.2	-189.4	34.3
9332	Aardahl Tap	69	NW	Beltrami	50	35.2	-189.4	31.1
9363	Ada - MPC	69	NW	Norman	0	37.9	-738.1	1.5
7910	Airport	41.6	NW	Beltrami	50	35.0	-189.4	26.6
7909	Airport Junction	41.6	NW	Beltrami	50	35.0	-189.4	28.8
66724	Alvarado	115	NW	Marshall	100	38.3	-533.5	77.5
66726	Anderson	115	NW	Pennington	0	39.7	-461.9	81.8
8066	Angron	41.6	NW	Polk	180	38.8	-455.9	20.2
8060	Angus	41.6	NW	Polk	180	38.9	-455.9	20.3
8049	Argyle	41.6	NW	Marshall	100	38.7	-609.4	20.1
9237	Argyle	69	NW	Marshall	100	38.9	-565.5	34.8
29411	Audubon	69	NW	Becker	0	39.9	-723.4	-217.0
63136	Audubon	41.6	NW	Becker	0	40.2	-755.5	-249.9
63202	Audubon	230	NW	Becker	0	39.9	-721.5	-192.6
63236	Audubon	115	NW	Becker	0	39.9	-729.8	-204.5
63336	Audubon	230	NW	Becker	0	39.9	-805.6	322.7
29476	Audubon Tap	69	NW	Becker	0	38.6	-723.4	-217.0
7214	Audubon Twn	41.6	NW	Becker	0	40.2	-755.5	-249.9
7147	Aurdal	41.6	NW	Otter Tail	330	39.5	-50.6	-81.2
8874	Averill	69	NW	Clay	356	38.4	-738.1	1.5
9402	Averill	69	NW	Clay	356	38.5	-738.1	1.5
8057	Badger	69	NW	Roseau	0	39.1	-555.0	12.0
8056	Badger Tap	69	NW	Roseau	0	39.3	-555.0	12.0
7946	Bagley	41.6	NW	Clearwater	0	37.9	-239.3	10.0
9365	Bagley	69	NW	Clearwater	0	37.8	-186.6	13.2
63239	Bagley	115	NW	Clearwater	0	38.9	-239.3	19.6
7934	Bagley Tap	41.6	NW	Clearwater	0	37.9	-239.3	10.0
9501	Barnesville	41.6	NW	Clay	356	39.2	-105.6	-182.7
7478	Barry	41.6	NW	Traverse	20	38.5	-201.1	-248.0
7171	Battle Lake	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3
9384	Battle Lake	69	NW	Beltrami	50	36.5	-189.4	34.0
62542	Battle Lake	41.6	NW	Otter Tail	330	37.7	-50.6	-81.2
7149	Battle Lake Tap	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
9358	Beaulieu	69	NW	Mahnomen	0	37.7	-351.9	37.1
7994	Bejou	41.6	NW	Mahnomen	0	38.6	-351.9	15.1
8003	Belt Junction	41.6	NW	Polk	180	38.4	-381.1	11.6
9433	Belt MPC	41.6	NW	Polk	180	38.4	-381.1	11.6
9369	Bemidji	69	NW	Beltrami	50	35.8	-186.6	13.2
63246	Bemidji	115	NW	Beltrami	50	35.6	-189.4	74.8
67015	Bemidji	69	NW	Beltrami	50	35.6	-189.4	50.6
7928	Bemidji 25th Street	69	NW	Beltrami	50	36.1	-189.4	40.9
9436	Bemidji Hospital	69	NW	Beltrami	50	36.5	-189.4	35.6
8535	Bemidji Hydro	2.4	NW	Beltrami	50	34.3	-189.4	0.3
7924	Bemidji Industrial Park	69	NW	Beltrami	50	36.4	-189.4	39.5
7925	Bemidji Industrial Park Tap	69	NW	Beltrami	50	36.4	-189.4	39.5
7929	Bemidji State Univ.	69	NW	Beltrami	50	36.1	-189.4	40.9
66789	Bemidji Tertitary	115	NW	Beltrami	50	36.0	-189.4	74.8
63146	Bemidji Transformer	41.6	NW	Beltrami	50	35.2	-189.4	51.6
63346	Bemidji Transformer	12.5	NW	Beltrami	50	35.7	-189.4	20.5
63196	Bemidji Transformer Midpoint	115	NW	Beltrami	50	35.7	-189.4	24.0
9265	Blackduck	69	NW	Beltrami	50	37.0	-186.6	13.2
7600	Breckenridge	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
9550	Breckenridge Plant	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
9552	Breckenridge South	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
7596	Breckenridge Tap	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
9554	Breckenridge TWITO	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
7602	Brenkenridge	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
9551	Brenkenridge Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
7961	Brooks	41.6	NW	Red Lake	0	39.1	-404.2	19.8
7966	Brooks	41.6	NW	Red Lake	0	39.0	-404.2	19.8
9404	Buffalo River	69	NW	Clay	356	40.5	-738.1	1.5
62559	Burlington	41.6	NW	Becker	0	36.4	-240.7	-226.0
9424	Busy Corner	69	NW	Beltrami	50	37.3	-186.6	13.2
62570	Butler	41.6	NW	Otter Tail	330	37.3	-240.7	-226.0
62569	Butler Tap	41.6	NW	Otter Tail	330	37.2	-240.7	-226.0
7180	Callaway	41.6	NW	Becker	0	39.9	-723.4	-217.0
7640	Campbell	41.6	NW	Wilkin	361	37.9	-154.0	-172.6

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7598	Cargil Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
7603	Cargill Junction	41.6	NW	Wilkin	361	37.9	-154.0	-172.6
62549	Carlise	41.6	NW	Otter Tail	330	39.6	-50.6	-81.2
7141	Carlise/Elizabeth Junction	41.6	NW	Otter Tail	330	39.3	-50.6	-81.2
62550	Carlisle	41.6	NW	Otter Tail	330	39.6	-50.6	-81.2
9263	Christianson	69	NW	Becker	0	40.9	-738.1	1.5
7935	Clearbrook	41.6	NW	Clearwater	0	39.4	-239.3	10.0
7936	Clearbrook	41.6	NW	Clearwater	0	39.4	-239.3	11.1
63241	Clearbrook	115	NW	Clearwater	0	39.4	-239.3	19.6
9360	Clearbrook - MPC	41.6	NW	Clearwater	0	39.3	-239.3	11.5
63342	Clearbrook Lake	4.2	NW	Clearwater	0	39.4	-239.3	19.6
63242	Clearbrook pipeline	115	NW	Clearwater	0	39.4	-239.3	19.6
7937	Clearbrook tap	41.6	NW	Clearwater	0	39.3	-239.3	11.5
7986	Climax	41.6	NW	Polk	180	38.5	-455.9	15.3
7988	Climax SB	24	NW	Polk	180	38.7	-455.9	2.0
7170	Clitherall	41.6	NW	Otter Tail	330	39.5	-161.4	-199.3
7927	Colgate Tap	69	NW	Beltrami	50	36.1	-189.4	40.9
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7
62533	Cormorant	115	NW	Becker	0	39.5	-818.5	-135.1
62529	Cormorant Junction	115	NW	Becker	0	40.1	-808.4	-146.1
7960	Crookston	41.6	NW	Polk	180	38.5	-455.9	19.5
7974	Crookston	41.6	NW	Polk	180	38.6	-455.9	26.8
63249	Crookston	115	NW	Polk	180	38.5	-455.9	127.0
7978	Crookston BAR	41.6	NW	Polk	180	38.5	-455.9	21.4
7980	Crookston Junction	41.6	NW	Polk	180	38.4	-455.9	34.9
7979	Crookston Park	41.6	NW	Polk	180	38.5	-455.9	23.6
7977	Crookston Park Tap	41.6	NW	Polk	180	38.5	-455.9	18.7
7975	Crookston PL	41.6	NW	Polk	180	38.3	-455.9	21.4
7982	Crookston Sugar	41.6	NW	Polk	180	38.5	-455.9	37.2
7972	Crookston Tap	41.6	NW	Polk	180	38.7	-455.9	61.0
7981	Crookston UPTN	41.6	NW	Polk	180	38.4	-455.9	23.3
9254	Dakota Junction	69	NW	Pennington	0	39.7	-454.6	35.0
7164	Dalton	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2
7155	Dayton Hollow	41.6	NW	Otter Tail	330	38.4	-50.6	-81.2

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7154	Dayton Hollow Rural	41.6	NW	Otter Tail	330	38.2	-50.6	-81.2
8002	De Rosier	41.6	NW	Norman	0	38.5	-455.9	15.2
7167	Deer Creek	41.6	NW	Otter Tail	330	37.8	-161.4	-199.3
62564	Dent	41.6	NW	Otter Tail	330	38.1	-240.7	-226.0
62563	Dent Tap	41.6	NW	Otter Tail	330	37.5	-240.7	-226.0
67462	Detroit Lakes Industrial	115	NW	Becker	0	36.5	-784.6	-214.5
63207	Detroit Lakes NW Rural	115	NW	Becker	0	38.2	-761.6	-210.4
67463	Detroit Lakes NW Rural	115	NW	Becker	0	38.2	-784.6	-214.5
67464	Detroit Lakes West	115	NW	Becker	0	37.9	-771.4	-212.1
7139	Division Rural	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2
8032	Donaldson	41.6	NW	Kittson	100	38.7	-609.4	10.3
8033	Donaldson	41.6	NW	Kittson	100	38.7	-609.4	10.2
63255	Donaldson	115	NW	Kittson	100	38.6	-609.4	172.4
8051	Donaldson Junction	41.6	NW	Kittson	100	38.7	-609.4	20.4
63155	Donaldson Lakehead Pipeline	41.6	NW	Kittson	100	38.6	-609.4	20.4
63256	Donaldson Pipeline	115	NW	Kittson	100	38.6	-609.4	172.4
63356	Donaldson Pipeline	4.2	NW	Kittson	100	38.6	-609.4	29.3
62572	Dora	41.6	NW	Otter Tail	330	38.3	-240.7	-226.0
7639	Doran	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
8788	Doran	41.6	NW	Wilkin	361	38.0	-154.0	-172.6
7604	Doran Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6
9367	Dudley	69	NW	Clearwater	0	39.0	-186.6	13.2
61152	East Grand Forks	69	NW	Polk	180	38.0	-564.3	50.7
63233	Edgetown Tap	115	NW	Otter Tail	330	38.9	-51.6	-83.0
62575	Elizabeth	41.6	NW	Otter Tail	330	39.7	-50.6	-81.2
62527	Elmo Switching Station	115	NW	Otter Tail	330	37.8	67.4	-55.8
7143	Erhard	41.6	NW	Otter Tail	330	39.7	-50.6	-81.2
62546	Erhard	41.6	NW	Otter Tail	330	40.2	-83.7	-140.5
9412	Erie - MPC	41.6	NW	Becker	0	35.4	-755.5	-249.9
7182	Erie Junction	41.6	NW	Becker	0	38.5	-755.5	-249.9
7993	Erskine	41.6	NW	Polk	180	39.3	-404.2	19.8
9315	Erskine - MPC	41.6	NW	Polk	180	39.1	-351.9	16.3
7965	Erskine Junction	41.6	NW	Polk	180	39.3	-404.2	19.8
9314	Erskine Tap	41.6	NW	Polk	180	39.1	-351.9	15.9

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
9302	Euclid	69	NW	Polk	180	39.0	-565.3	47.9
62535	Everdell	41.6	NW	Wilkin	361	37.9	-154.0	-172.6
62558	Evergreen	41.6	NW	Becker	0	37.1	-240.7	-226.0
66706	Falconer	115	NW	Polk	180	38.2	-559.7	190.2
7985	Fanny	41.6	NW	Polk	180	38.6	-455.9	20.4
62532	Fergus	115	NW	Otter Tail	330	38.7	-51.6	-83.0
63231	Fergus Falls	115	NW	Otter Tail	330	38.1	-54.4	-90.9
63331	Fergus Falls	230	NW	Otter Tail	330	38.5	-94.7	-117.3
63332	Fergus Falls	13.2	NW	Otter Tail	330	38.1	-49.9	-79.6
63194	Fergus Falls 230kV	230	NW	Otter Tail	330	39.0	-49.9	-79.6
63232	Fergus Falls Edgetown	115	NW	Otter Tail	330	38.9	-51.6	-83.0
63150	Fertile	41.6	NW	Polk	180	38.7	-381.1	10.0
63250	Fertile	115	NW	Polk	180	39.4	-381.1	48.6
8008	Fertile Township	41.6	NW	Polk	180	39.6	-381.1	13.1
7989	Fisher	41.6	NW	Polk	180	38.5	-455.9	19.5
7984	Fisher Tap	41.6	NW	Polk	180	38.4	-455.9	21.1
9355	Flom	69	NW	Norman	0	40.0	-351.9	32.3
9357	Fosston	69	NW	Polk	180	38.9	-351.9	37.1
7157	Foxhome	41.6	NW	Wilkin	361	37.9	-50.6	-81.2
7156	Foxhome Tap	41.6	NW	Wilkin	361	37.9	-50.6	-81.2
7178	Frazee	41.6	NW	Otter Tail	330	36.3	-240.7	-226.0
62530	Frazee	115	NW	Becker	0	36.4	-240.7	-226.0
62565	Frazee	41.6	NW	Otter Tail	330	36.6	-240.7	-226.0
62566	Frazee	41.6	NW	Becker	0	35.3	-240.7	-226.0
7140	Friberg Rural	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2
29486	Frohn	69	NW	Beltrami	50	33.6	-189.4	30.5
8009	Gary	41.6	NW	Norman	0	38.6	-381.1	13.5
9416	Gatzke	69	NW	Marshall	100	38.5	-454.6	37.7
7992	Gentilly	41.6	NW	Polk	180	38.5	-404.2	15.5
7990	Gentilly Junction	41.6	NW	Polk	180	38.5	-404.2	15.4
7938	Gonvick	41.6	NW	Clearwater	0	39.1	-239.3	11.5
8055	Greenbush	69	NW	Roseau	0	39.8	-555.0	15.9
9240	Greenbush	69	NW	Roseau	0	39.7	-555.0	14.6
9239	Greenbush - MPC	69	NW	Roseau	0	39.5	-555.0	14.6

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
66723	Greenwood	115	NW	Pennington	0	39.2	-460.1	97.8
9248	Grygla	69	NW	Marshall	100	38.5	-454.6	37.7
7944	Gully	41.6	NW	Polk	180	38.1	-404.2	7.0
9361	Gully - MP	41.6	NW	Clearwater	0	38.7	-404.2	13.5
7939	Gully Tap	41.6	NW	Polk	180	39.7	-404.2	13.7
8034	Hallock	41.6	NW	Kittson	100	38.7	-609.4	9.7
8035	Hallock	41.6	NW	Kittson	100	38.6	-609.4	9.7
9230	Hallock	69	NW	Kittson	100	38.7	-565.5	31.0
8043	Halma	41.6	NW	Kittson	100	39.3	-555.0	16.2
66718	Halma	115	NW	Kittson	100	39.2	-576.5	133.6
9337	Halstad Municipal	69	NW	Norman	0	38.4	-637.5	-24.2
8001	Harold	41.6	NW	Norman	0	38.6	-455.9	15.3
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3
9407	Hawley	69	NW	Clay	356	40.8	-738.1	1.5
9406	Hawley Junction	69	NW	Clay	356	40.2	-738.1	1.5
9311	Hazel	69	NW	Pennington	0	39.2	-454.6	33.7
9362	Hendrum	69	NW	Norman	0	38.5	-738.1	1.5
62544	Henning	41.6	NW	Otter Tail	330	38.6	-161.4	-199.3
63051	Henning	230	NW	Otter Tail	330	38.8	-161.4	-199.3
63309	Henning	41.6	NW	Otter Tail	330	38.1	-555.0	-199.3
9531	Henning Municipal	41.6	NW	Otter Tail	330	38.1	-161.4	-199.3
9585	Henning Municipal	41.6	NW	Otter Tail	330	38.1	-161.4	-199.3
9249	Highland	69	NW	Pennington	0	39.1	-454.6	37.7
9249	Highland	69	NW	Pennington	0	38.6	33.4	34.2
7998	Hitterdal	41.6	NW	Clay	356	40.6	-755.5	-249.9
29409	Hitterdal	69	NW	Becker	0	39.5	-723.4	-217.0
29410	Hitterdal Junction	69	NW	Becker	0	39.5	-723.4	-217.0
9253	Holt	69	NW	Marshall	100	40.2	-454.6	32.5
8054	Holt Junction	69	NW	Marshall	100	40.1	-555.0	23.5
8566	Holt Tap	12.5	NW	Marshall	100	39.7	-2043.3	2.5
63123	Hoot Lake	41.6	NW	Otter Tail	330	38.5	-50.6	-81.2
63223	Hoot Lake	115	NW	Otter Tail	330	38.5	-50.6	-81.2
63323	Hoot Lake Generator 2	13.8	NW	Otter Tail	330	38.6	-50.6	-81.2
63324	Hoot Lake Generator 3	13.8	NW	Otter Tail	330	38.5	-50.6	-81.2

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
29312	HOUT 8 _1	69	NW	Red Lake	0	38.7	-454.6	33.1
8037	Humboldt	41.6	NW	Kittson	100	38.2	-609.4	8.5
9298	Huntsville	69	NW	Polk	180	38.4	-565.3	51.1
7916	Hydro Tap	69	NW	Beltrami	50	31.3	-189.4	30.4
62531	Inman	115	NW	Otter Tail	330	37.8	60.0	-66.3
63052	Inman	230	NW	Otter Tail	330	37.9	-178.0	-219.7
63244	Itasca	115	NW	Clearwater	0	35.6	-214.5	16.3
63344	Itasca	4.2	NW	Clearwater	0	35.6	-214.5	16.3
7997	Junction	41.6	NW	Polk	180	39.7	-381.1	11.6
8046	Karlstad	69	NW	Kittson	100	39.0	-555.0	25.9
63156	Karlstad	41.6	NW	Kittson	100	38.6	-555.0	16.2
66708	Karlstad	115	NW	Kittson	100	39.5	-555.0	142.2
66785	Karlstad	115	NW	Kittson	100	38.9	-555.0	47.8
66838	Karlstad	69	NW	Kittson	100	39.5	-555.0	31.6
8065	Kennedy	41.6	NW	Kittson	100	38.6	-609.4	9.7
9401	Kragness	69	NW	Clay	356	38.2	-738.1	1.5
7209	Kriste	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2
62541	Kriste Junction	41.6	NW	Otter Tail	330	38.4	-50.6	-81.2
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0
8042	Lake Bronson	41.6	NW	Kittson	100	39.3	-555.0	16.1
62557	Lake Eunice	41.6	NW	Becker	0	38.8	-755.5	-249.9
62567	Lake Eunice Tap	41.6	NW	Becker	0	39.2	-755.5	-249.9
7184	Lake Park	41.6	NW	Becker	0	40.1	-755.5	-249.9
7907	Lake Pipeline	41.6	NW	Beltrami	50	35.0	-186.6	13.2
7908	Lake Pipeline Tap	41.6	NW	Beltrami	50	35.0	-186.6	13.2
8044	Lancaster	41.6	NW	Kittson	100	39.1	-555.0	15.6
8041	Lancaster Tap	41.6	NW	Kittson	100	38.8	-555.0	15.6
9231	Landcaster - MPC	41.6	NW	Kittson	100	39.0	-555.0	15.6
7177	Lone Pine Lake	41.6	NW	Otter Tail	330	36.9	-240.7	-226.0
9264	Long Lake	69	NW	Beltrami	50	33.7	-186.6	13.2
7995	Mahnomen	41.6	NW	Mahnomen	0	37.9	-351.9	15.1
63237	Mahnomen	115	NW	Mahnomen	0	37.8	-434.7	-138.2
62540	Maine	41.6	NW	Otter Tail	330	38.9	-50.6	-81.2
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
9351	Maple Bay	69	NW	Polk	180	39.4	-351.9	37.1
7971	McIntosh	41.6	NW	Polk	180	39.2	-351.9	15.9
7964	McIntosh North	41.6	NW	Polk	180	39.4	-351.9	15.9
7963	McIntosh South	41.6	NW	Polk	180	39.4	-351.9	15.9
7991	Mentor	41.6	NW	Polk	180	39.5	-404.2	19.8
63240	Minnesota Pipeline	115	NW	Clearwater	0	38.6	-239.3	19.6
63340	Minnesota Pipeline	4.2	NW	Clearwater	0	39.6	-239.3	19.6
66553	Moorhead	230	NW	Clay	356	37.6	-754.5	-17.9
66587	Moorhead	115	NW	Clay	356	37.7	-786.3	-15.6
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3
66757	Moranville	230	NW	Roseau	0	37.7	28.4	36.3
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3
66793	Moranville Tertitary	230	NW	Roseau	0	37.7	28.4	36.3
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3
66795	Moranville Tertitary	230	NW	Roseau	0	38.2	28.4	36.3
66768	Moranville Transformer	13.8	NW	Roseau	0	38.2	11.0	11.0
66769	Moranville Transformer	13.8	NW	Roseau	0	37.7	10.0	10.0
66770	Moranville Transformer	13.8	NW	Roseau	0	37.9	3.0	3.0
66771	Moranville Transformer	13.8	NW	Roseau	0	38.1	10.0	10.0
9414	MPC White	41.6	NW	Becker	0	39.1	-723.4	-217.0
67467	MPS Brook	115	NW	Clay	356	36.7	-765.4	-13.5
67459	MPS Central	115	NW	Clay	356	37.8	-769.0	-13.9
67460	MPS Northeast	115	NW	Clay	356	37.8	-772.4	-14.2
67466	MPS Southeast	115	NW	Clay	356	37.7	-766.9	-13.7
9468	Mud Lake	69	NW	Marshall	100	40.1	-454.6	32.5
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5
8053	New Folden	69	NW	Marshall	100	39.4	-555.0	23.5
8570	New Folden Tertiary	12.5	NW	Marshall	100	39.3	-555.0	1.5
7168	New York Mills	41.6	NW	Otter Tail	330	37.4	24.3	-61.7
62561	New York Mills	41.6	NW	Otter Tail	330	37.3	21.6	-61.7
8036	Northcote	41.6	NW	Kittson	100	38.3	-609.4	8.6
9431	Northern	69	NW	Beltrami	50	34.7	-186.6	13.2
29467	Northland	69	NW	Pennington	0	39.5	-454.6	37.7

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7912	Northwood	41.6	NW	Beltrami	50	36.1	-186.6	13.2
7947	Northwood	41.6	NW	Clearwater	0	38.1	-214.5	14.2
63282	Northwood	115	NW	Clearwater	0	37.3	-214.5	16.3
7911	Northwood Tap	41.6	NW	Beltrami	50	36.0	-186.6	13.2
7915	Nymore	69	NW	Beltrami	50	31.3	-189.4	37.3
7920	Nymore Junction	69	NW	Beltrami	50	31.3	-189.4	30.5
9359	Oakland	69	NW	Mahnomen	0	36.4	-351.9	37.1
7181	Ogema	41.6	NW	Becker	0	39.0	-723.4	-217.0
7943	Oklee	41.6	NW	Red Lake	0	38.7	-404.2	15.0
7968	Oklee - MPC	41.6	NW	Red Lake	0	38.8	-404.2	19.2
9313	Oklee MPC	41.6	NW	Red Lake	0	38.7	-404.2	16.0
7942	Oklee Tap	41.6	NW	Red Lake	0	38.8	-404.2	15.0
62545	Orwell	41.6	NW	Otter Tail	330	38.1	-50.6	-81.2
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3
63166	Osage	41.6	NW	Otter Tail	330	37.9	-116.3	-143.9
66722	Oslo	115	NW	Marshall	100	38.1	-548.7	142.2
63284	Oslo Township	115	NW	Marshall	100	38.0	-545.2	78.4
7166	Otter Junction	41.6	NW	Otter Tail	330	37.9	-161.4	-199.3
7210	Otter Outlet	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2
7172	Otter Tail Lake	41.6	NW	Otter Tail	330	37.7	19.6	-61.7
62560	Otto	41.6	NW	Otter Tail	330	37.1	29.0	-61.7
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1
62551	Pelican Lake	41.6	NW	Otter Tail	330	40.7	-83.7	-140.5
7176	Pelican Rapid Turkey Plant	41.6	NW	Otter Tail	330	40.6	-83.7	-140.5
7208	Pelican Rapids	41.6	NW	Otter Tail	330	40.3	-83.7	-140.5
7186	Pelican Rapids Junction	41.6	NW	Otter Tail	330	39.5	-83.7	-140.5
7187	Pelican Rapids North	41.6	NW	Otter Tail	330	39.7	-83.7	-140.5
63234	Pelican Rapids S75	115	NW	Otter Tail	330	40.3	-83.7	-140.5
7188	Pelican Rapids West	41.6	NW	Otter Tail	330	39.5	-83.7	-140.5
7185	Pelican Tap	41.6	NW	Otter Tail	330	38.7	-83.7	-140.5
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62571	Perham	41.6	NW	Otter Tail	330	36.6	-240.7	-226.0
63235	Perham	115	NW	Otter Tail	330	37.8	-175.5	-216.7
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8
7969	Plummer	41.6	NW	Polk	180	38.3	-404.2	18.9
63252	Plummer	115	NW	Red Lake	0	38.8	-404.2	52.2
63253	Plummer Pipeline	115	NW	Red Lake	0	38.8	-406.8	52.6
63353	Plummer Pipeline	4.2	NW	Red Lake	0	38.8	-406.8	26.8
7967	Plummer Switch	41.6	NW	Red Lake	0	38.7	-404.2	40.0
7959	Plummer Tap	41.6	NW	Red Lake	0	38.8	-404.2	19.2
63251	Plummer Tap	115	NW	Red Lake	0	38.8	-404.2	52.2
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3
9262	Puposky	138	NW	Beltrami	50	35.6	-189.4	35.6
9383	Quiring	69	NW	Beltrami	50	35.7	-189.4	34.0
9251	Radium	69	NW	Marshall	100	39.3	-565.5	32.4
7970	Red Lake	41.6	NW	Polk	180	38.2	-404.2	17.0
9481	Red Lake	69	NW	Beltrami	50	39.5	-189.4	34.0
9261	Redby	69	NW	Beltrami	50	39.7	-189.4	34.0
66729	Rice Lake	115	NW	Clearwater	0	34.6	-214.5	16.3
66727	Rice Lake Tap	115	NW	Clearwater	0	35.8	-214.5	16.3
29477	Richwood	69	NW	Becker	0	39.9	-723.4	-217.0
9353	Rindal	69	NW	Polk	180	39.3	-351.9	35.2
62537	Roberts	41.6	NW	Wilkin	361	38.4	-154.0	-172.6
62536	Roberts Switching Station	41.6	NW	Wilkin	361	38.2	-154.0	-172.6
8059	Rodan	41.6	NW	Marshall	100	38.8	-455.9	20.1
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3
60173	Roseau	500	NW	Roseau	0	36.7	238.6	459.7
60174	Roseau	500	NW	Roseau	0	36.1	257.9	766.4
60175	Roseau	230	NW	Roseau	0	36.8	29.7	38.0
7983	Ross	41.6	NW	Polk	180	38.4	-455.9	21.3
7142	Rothsay	41.6	NW	Otter Tail	330	40.0	-50.6	-81.2
7144	Rothsay	41.6	NW	Otter Tail	330	40.4	-50.6	-81.2
62554	Rothsay	41.6	NW	Wilkin	361	39.5	-50.6	-81.2
62526	Rush Lake	115	NW	Otter Tail	330	37.6	55.9	-61.7

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All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62562	Rush Lake	41.6	NW	Otter Tail	330	37.7	29.0	-61.7
7173	Rush-Otter Tail Lake	41.6	NW	Otter Tail	330	37.9	29.0	-61.7
7163	S Cascade	41.6	NW	Otter Tail	330	38.3	-50.6	-81.2
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3
9356	Sandhill	69	NW	Polk	180	39.2	-351.9	37.1
9366	Shevlin	69	NW	Clearwater	0	37.7	-186.6	13.2
63243	Shevlin Junction	115	NW	Clearwater	0	37.4	-214.5	16.3
7933	Shevlin Mill	41.6	NW	Clearwater	0	38.1	-214.5	14.0
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7
63366	Silver Lake	230	NW	Otter Tail	330	38.1	-116.3	-143.9
7932	Solway	41.6	NW	Beltrami	50	34.1	-214.5	14.2
63285	Solway	115	NW	Beltrami	50	34.0	-206.2	15.4
8038	St. Vincent	41.6	NW	Kittson	100	37.9	-716.8	7.5
8048	St. Vincent	69	NW	Kittson	100	37.8	-716.8	28.6
29227	St. Vincent	41.6	NW	Kittson	100	38.1	-609.4	8.3
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3
62552	Stalker Lake	41.6	NW	Otter Tail	330	39.2	-161.4	-199.3
62543	Stalker Lake Tap	41.6	NW	Otter Tail	330	39.0	-161.4	-199.3
8050	Stephen	41.6	NW	Marshall	100	38.7	-609.4	20.0
9464	Stephen - MPC	41.6	NW	Marshall	100	38.9	-609.4	20.0
8047	Strandquist	69	NW	Marshall	100	40.1	-555.0	24.3
9343	Strandquist	69	NW	Marshall	100	40.0	-555.0	24.3
9445	Strathcona	69	NW	Roseau	0	40.1	-555.0	17.0
9446	Strathcona	69	NW	Roseau	0	40.4	-555.0	17.0
8000	Syre	41.6	NW	Norman	0	39.5	-755.5	-249.9
9300	Tabor	69	NW	Polk	180	38.6	-565.3	49.7
62528	Tamarac	115	NW	Otter Tail	330	40.3	-105.6	-182.7
63310	Tamarac	41.6	NW	Otter Tail	330	39.1	-105.6	-182.7
62553	Tansem	41.6	NW	Clay	356	41.1	-105.6	-182.7
7145	Tap Gorge	41.6	NW	Otter Tail	330	39.3	-50.6	-81.2
62538	Ten Mile Lake	41.6	NW	Otter Tail	330	38.7	-50.6	-81.2
29311	Terrebonne	69	NW	Red Lake	0	39.4	-454.6	33.1
66713	Thief River Falls	115	NW	Pennington	0	39.3	-454.6	170.3

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
66910	Thief River Falls	69	NW	Pennington	0	39.3	-454.6	37.7
66767	Thief River Falls Municipal	13.2	NW	Pennington	0	39.5	-454.6	11.0
66782	Thief River Falls Tap	115	NW	Pennington	0	39.3	-454.6	81.0
7940	Trail	41.6	NW	Polk	180	40.2	-404.2	13.8
7941	Trail	41.6	NW	Polk	180	39.0	-404.2	14.0
8010	Twin Valley	41.6	NW	Norman	0	38.6	-381.1	13.6
7999	Ulen	41.6	NW	Clay	356	39.9	-755.5	-249.9
7211	Ulrich	41.6	NW	Becker	0	39.0	-723.4	-217.0
66717	Ulrich	115	NW	Becker	0	38.6	-723.4	-217.0
66773	Ulrich	41.6	NW	Becker	0	39.0	-723.4	-217.0
67039	Ulrich	69	NW	Becker	0	38.9	-723.4	-217.0
66781	Ulrich Tap	115	NW	Becker	0	39.1	-723.4	-217.0
7148	Underwood	41.6	NW	Otter Tail	330	38.5	-50.6	-81.2
62556	Underwood	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2
62555	Underwood Tap	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2
62568	Vergas Junction	41.6	NW	Otter Tail	330	37.9	-240.7	-226.0
7212	Vergas Tap	41.6	NW	Otter Tail	330	37.9	-240.7	-226.0
63254	Viking	115	NW	Marshall	100	40.1	-491.6	155.8
63354	Viking Pipeline	4.2	NW	Marshall	100	40.2	-491.6	34.7
7169	Vining	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3
8058	Warren	41.6	NW	Marshall	100	38.8	-455.9	20.1
66725	Warren	115	NW	Marshall	100	38.3	-510.5	77.4
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3
66202	Water Plant	69	NW	Polk	180	38.0	-563.7	115.8
7996	Waubun	41.6	NW	Mahnomen	0	38.5	-351.9	16.0
9354	Waukon	69	NW	Norman	0	38.4	-351.9	33.6
9413	White Earth	41.6	NW	Becker	0	39.1	-723.4	-217.0
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8
7931	Wilton	41.6	NW	Beltrami	50	33.6	-186.6	13.2
63245	Wilton	115	NW	Beltrami	50	33.5	-186.6	13.2
63345	Wilton	230	NW	Beltrami	50	34.7	-169.6	20.9
66968	Wilton	69	NW	Beltrami	50	34.6	-186.6	13.2

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Substation Name)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
63280	Wilton Pipeline	115	NW	Beltrami	50	33.4	-199.4	14.6
63281	Wilton Tap	115	NW	Beltrami	50	33.4	-199.4	14.6
66776	Wilton Tertitary	115	NW	Beltrami	50	34.0	-186.6	13.2
66798	Wilton Tertitary	230	NW	Beltrami	50	34.7	-189.3	12.5
63145	Wilton Transformer	41.6	NW	Beltrami	50	34.5	-186.6	13.2
63343	Wilton Transformer	13.8	NW	Beltrami	50	35.2	-189.3	12.5
66797	Wilton Transformer	13.8	NW	Beltrami	50	33.7	-189.3	12.5
63186	Wilton Transformer Midpoint	230	NW	Beltrami	50	33.2	-189.3	12.5
63138	Winger	41.6	NW	Polk	180	39.1	-351.9	16.0
63238	Winger	115	NW	Polk	180	39.3	-351.9	43.3
66758	Winger	230	NW	Polk	180	39.3	-327.8	45.4
67018	Winger	69	NW	Polk	180	39.7	-351.9	37.1
66786	Winger Tap	115	NW	Polk	180	39.3	-351.9	37.1
63338	Winger Tertitary	13.2	NW	Polk	180	39.0	-358.5	42.8
63187	Winger Transformer Midpoint	230	NW	Polk	180	39.3	-358.5	42.8
7962	Wington	41.6	NW	Mahnomen	0	38.7	-351.9	14.8

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62533	Cormorant	115	NW	Becker	0	39.5	-818.5	-135.1	-818.5	SUOP
62529	Cormorant Junction	115	NW	Becker	0	40.1	-808.4	-146.1	-808.4	SUOP
63336	Audubon	230	NW	Becker	0	39.9	-805.6	322.7	-805.6	SUOP
66587	Moorhead	115	NW	Clay	356	37.7	-786.3	-15.6	-786.3	SUOP
67462	Detroit Lakes Industrial	115	NW	Becker	0	36.5	-784.6	-214.5	-784.6	SUOP
67463	Detroit Lakes NW Rural	115	NW	Becker	0	38.2	-784.6	-214.5	-784.6	SUOP
67460	MPS Northeast	115	NW	Clay	356	37.8	-772.4	-14.2	-772.4	SUOP
67464	Detroit Lakes West	115	NW	Becker	0	37.9	-771.4	-212.1	-771.4	SUOP
67459	MPS Central	115	NW	Clay	356	37.8	-769.0	-13.9	-769	SUOP
67466	MPS Southeast	115	NW	Clay	356	37.7	-766.9	-13.7	-766.9	SUOP
67467	MPS Brook	115	NW	Clay	356	36.7	-765.4	-13.5	-765.4	SUOP
63207	Detroit Lakes NW Rural	115	NW	Becker	0	38.2	-761.6	-210.4	-761.6	SUOP
7182	Erie Junction	41.6	NW	Becker	0	38.5	-755.5	-249.9	-755.5	SUOP
7184	Lake Park	41.6	NW	Becker	0	40.1	-755.5	-249.9	-755.5	SUOP
7214	Audubon Twn	41.6	NW	Becker	0	40.2	-755.5	-249.9	-755.5	SUOP
7998	Hitterdal	41.6	NW	Clay	356	40.6	-755.5	-249.9	-755.5	SUOP
7999	Ulen	41.6	NW	Clay	356	39.9	-755.5	-249.9	-755.5	SUOP
8000	Syre	41.6	NW	Norman	0	39.5	-755.5	-249.9	-755.5	SUOP
9412	Erie - MPC	41.6	NW	Becker	0	35.4	-755.5	-249.9	-755.5	SUOP
62557	Lake Eunice	41.6	NW	Becker	0	38.8	-755.5	-249.9	-755.5	SUOP
62567	Lake Eunice Tap	41.6	NW	Becker	0	39.2	-755.5	-249.9	-755.5	SUOP
63136	Audubon	41.6	NW	Becker	0	40.2	-755.5	-249.9	-755.5	SUOP
66553	Moorhead	230	NW	Clay	356	37.6	-754.5	-17.9	-754.5	SUOP
8874	Averill	69	NW	Clay	356	38.4	-738.1	1.5	-738.1	SUOP
9263	Christianson	69	NW	Becker	0	40.9	-738.1	1.5	-738.1	SUOP
9362	Hendrum	69	NW	Norman	0	38.5	-738.1	1.5	-738.1	SUOP
9363	Ada - MPC	69	NW	Norman	0	37.9	-738.1	1.5	-738.1	SUOP
9401	Kragness	69	NW	Clay	356	38.2	-738.1	1.5	-738.1	SUOP
9402	Averill	69	NW	Clay	356	38.5	-738.1	1.5	-738.1	SUOP
9404	Buffalo River	69	NW	Clay	356	40.5	-738.1	1.5	-738.1	SUOP
9406	Hawley Junction	69	NW	Clay	356	40.2	-738.1	1.5	-738.1	SUOP
9407	Hawley	69	NW	Clay	356	40.8	-738.1	1.5	-738.1	SUOP
63236	Audubon	115	NW	Becker	0	39.9	-729.8	-204.5	-729.8	SUOP
7180	Callaway	41.6	NW	Becker	0	39.9	-723.4	-217.0	-723.4	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7181	Ogema	41.6	NW	Becker	0	39.0	-723.4	-217.0	-723.4	SUOP
7211	Ulrich	41.6	NW	Becker	0	39.0	-723.4	-217.0	-723.4	SUOP
9413	White Earth	41.6	NW	Becker	0	39.1	-723.4	-217.0	-723.4	SUOP
9414	MPC White	41.6	NW	Becker	0	39.1	-723.4	-217.0	-723.4	SUOP
29409	Hitterdal	69	NW	Becker	0	39.5	-723.4	-217.0	-723.4	SUOP
29410	Hitterdal Junction	69	NW	Becker	0	39.5	-723.4	-217.0	-723.4	SUOP
29411	Audubon	69	NW	Becker	0	39.9	-723.4	-217.0	-723.4	SUOP
29476	Audubon Tap	69	NW	Becker	0	38.6	-723.4	-217.0	-723.4	SUOP
29477	Richwood	69	NW	Becker	0	39.9	-723.4	-217.0	-723.4	SUOP
66717	Ulrich	115	NW	Becker	0	38.6	-723.4	-217.0	-723.4	SUOP
66773	Ulrich	41.6	NW	Becker	0	39.0	-723.4	-217.0	-723.4	SUOP
66781	Ulrich Tap	115	NW	Becker	0	39.1	-723.4	-217.0	-723.4	SUOP
67039	Ulrich	69	NW	Becker	0	38.9	-723.4	-217.0	-723.4	SUOP
63202	Audubon	230	NW	Becker	0	39.9	-721.5	-192.6	-721.5	SUOP
8038	St. Vincent	41.6	NW	Kittson	100	37.9	-716.8	7.5	-716.8	SUOP
8048	St. Vincent	69	NW	Kittson	100	37.8	-716.8	28.6	-716.8	SUOP
9337	Halstad Municipal	69	NW	Norman	0	38.4	-637.5	-24.2	-637.5	SUOP
8032	Donaldson	41.6	NW	Kittson	100	38.7	-609.4	10.3	-609.4	SUOP
8033	Donaldson	41.6	NW	Kittson	100	38.7	-609.4	10.2	-609.4	SUOP
8034	Hallock	41.6	NW	Kittson	100	38.7	-609.4	9.7	-609.4	SUOP
8035	Hallock	41.6	NW	Kittson	100	38.6	-609.4	9.7	-609.4	SUOP
8036	Northcote	41.6	NW	Kittson	100	38.3	-609.4	8.6	-609.4	SUOP
8037	Humboldt	41.6	NW	Kittson	100	38.2	-609.4	8.5	-609.4	SUOP
8049	Argyle	41.6	NW	Marshall	100	38.7	-609.4	20.1	-609.4	SUOP
8050	Stephen	41.6	NW	Marshall	100	38.7	-609.4	20.0	-609.4	SUOP
8051	Donaldson Junction	41.6	NW	Kittson	100	38.7	-609.4	20.4	-609.4	SUOP
8065	Kennedy	41.6	NW	Kittson	100	38.6	-609.4	9.7	-609.4	SUOP
9464	Stephen - MPC	41.6	NW	Marshall	100	38.9	-609.4	20.0	-609.4	SUOP
29227	St. Vincent	41.6	NW	Kittson	100	38.1	-609.4	8.3	-609.4	SUOP
63155	Donaldson Lakehead Pipeline	41.6	NW	Kittson	100	38.6	-609.4	20.4	-609.4	SUOP
63255	Donaldson	115	NW	Kittson	100	38.6	-609.4	172.4	-609.4	SUOP
63256	Donaldson Pipeline	115	NW	Kittson	100	38.6	-609.4	172.4	-609.4	SUOP
63356	Donaldson Pipeline	4.2	NW	Kittson	100	38.6	-609.4	29.3	-609.4	SUOP
66718	Halma	115	NW	Kittson	100	39.2	-576.5	133.6	-576.5	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9230	Hallock	69	NW	Kittson	100	38.7	-565.5	31.0	-565.5	SUOP
9237	Argyle	69	NW	Marshall	100	38.9	-565.5	34.8	-565.5	SUOP
9251	Radium	69	NW	Marshall	100	39.3	-565.5	32.4	-565.5	SUOP
9298	Huntsville	69	NW	Polk	180	38.4	-565.3	51.1	-565.3	SUOP
9300	Tabor	69	NW	Polk	180	38.6	-565.3	49.7	-565.3	SUOP
9302	Euclid	69	NW	Polk	180	39.0	-565.3	47.9	-565.3	SUOP
61152	East Grand Forks	69	NW	Polk	180	38.0	-564.3	50.7	-564.3	SUOP
66202	Water Plant	69	NW	Polk	180	38.0	-563.7	115.8	-563.7	SUOP
66706	Falconer	115	NW	Polk	180	38.2	-559.7	190.2	-559.7	SUOP
8041	Lancaster Tap	41.6	NW	Kittson	100	38.8	-555.0	15.6	-555	SUOP
8042	Lake Bronson	41.6	NW	Kittson	100	39.3	-555.0	16.1	-555	SUOP
8043	Halma	41.6	NW	Kittson	100	39.3	-555.0	16.2	-555	SUOP
8044	Lancaster	41.6	NW	Kittson	100	39.1	-555.0	15.6	-555	SUOP
8046	Karlstad	69	NW	Kittson	100	39.0	-555.0	25.9	-555	SUOP
8047	Strandquist	69	NW	Marshall	100	40.1	-555.0	24.3	-555	SUOP
8053	New Folden	69	NW	Marshall	100	39.4	-555.0	23.5	-555	SUOP
8054	Holt Junction	69	NW	Marshall	100	40.1	-555.0	23.5	-555	SUOP
8055	Greenbush	69	NW	Roseau	0	39.8	-555.0	15.9	-555	SUOP
8056	Badger Tap	69	NW	Roseau	0	39.3	-555.0	12.0	-555	SUOP
8057	Badger	69	NW	Roseau	0	39.1	-555.0	12.0	-555	SUOP
8570	New Folden Tertiary	12.5	NW	Marshall	100	39.3	-555.0	1.5	-555	SUOP
9231	Landcaster - MPC	41.6	NW	Kittson	100	39.0	-555.0	15.6	-555	SUOP
9239	Greenbush - MPC	69	NW	Roseau	0	39.5	-555.0	14.6	-555	SUOP
9240	Greenbush	69	NW	Roseau	0	39.7	-555.0	14.6	-555	SUOP
9343	Strandquist	69	NW	Marshall	100	40.0	-555.0	24.3	-555	SUOP
9445	Strathcona	69	NW	Roseau	0	40.1	-555.0	17.0	-555	SUOP
9446	Strathcona	69	NW	Roseau	0	40.4	-555.0	17.0	-555	SUOP
63156	Karlstad	41.6	NW	Kittson	100	38.6	-555.0	16.2	-555	SUOP
63309	Henning	41.6	NW	Otter Tail	330	38.1	-555.0	-199.3	-555	SUOP
66708	Karlstad	115	NW	Kittson	100	39.5	-555.0	142.2	-555	SUOP
66785	Karlstad	115	NW	Kittson	100	38.9	-555.0	47.8	-555	SUOP
66838	Karlstad	69	NW	Kittson	100	39.5	-555.0	31.6	-555	SUOP
66722	Oslo	115	NW	Marshall	100	38.1	-548.7	142.2	-548.7	SUOP
63284	Oslo Township	115	NW	Marshall	100	38.0	-545.2	78.4	-545.2	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
66724	Alvarado	115	NW	Marshall	100	38.3	-533.5	77.5	-533.5	SUOP
66725	Warren	115	NW	Marshall	100	38.3	-510.5	77.4	-510.5	SUOP
63254	Viking	115	NW	Marshall	100	40.1	-491.6	155.8	-491.6	SUOP
63354	Viking Pipeline	4.2	NW	Marshall	100	40.2	-491.6	34.7	-491.6	SUOP
66726	Anderson	115	NW	Pennington	0	39.7	-461.9	81.8	-461.9	SUOP
66723	Greenwood	115	NW	Pennington	0	39.2	-460.1	97.8	-460.1	SUOP
7960	Crookston	41.6	NW	Polk	180	38.5	-455.9	19.5	-455.9	SUOP
7972	Crookston Tap	41.6	NW	Polk	180	38.7	-455.9	61.0	-455.9	SUOP
7974	Crookston	41.6	NW	Polk	180	38.6	-455.9	26.8	-455.9	SUOP
7975	Crookston PL	41.6	NW	Polk	180	38.3	-455.9	21.4	-455.9	SUOP
7977	Crookston Park Tap	41.6	NW	Polk	180	38.5	-455.9	18.7	-455.9	SUOP
7978	Crookston BAR	41.6	NW	Polk	180	38.5	-455.9	21.4	-455.9	SUOP
7979	Crookston Park	41.6	NW	Polk	180	38.5	-455.9	23.6	-455.9	SUOP
7980	Crookston Junction	41.6	NW	Polk	180	38.4	-455.9	34.9	-455.9	SUOP
7981	Crookston UPTN	41.6	NW	Polk	180	38.4	-455.9	23.3	-455.9	SUOP
7982	Crookston Sugar	41.6	NW	Polk	180	38.5	-455.9	37.2	-455.9	SUOP
7983	Ross	41.6	NW	Polk	180	38.4	-455.9	21.3	-455.9	SUOP
7984	Fisher Tap	41.6	NW	Polk	180	38.4	-455.9	21.1	-455.9	SUOP
7985	Fanny	41.6	NW	Polk	180	38.6	-455.9	20.4	-455.9	SUOP
7986	Climax	41.6	NW	Polk	180	38.5	-455.9	15.3	-455.9	SUOP
7988	Climax SB	24	NW	Polk	180	38.7	-455.9	2.0	-455.9	SUOP
7989	Fisher	41.6	NW	Polk	180	38.5	-455.9	19.5	-455.9	SUOP
8001	Harold	41.6	NW	Norman	0	38.6	-455.9	15.3	-455.9	SUOP
8002	De Rosier	41.6	NW	Norman	0	38.5	-455.9	15.2	-455.9	SUOP
8058	Warren	41.6	NW	Marshall	100	38.8	-455.9	20.1	-455.9	SUOP
8059	Rodan	41.6	NW	Marshall	100	38.8	-455.9	20.1	-455.9	SUOP
8060	Angus	41.6	NW	Polk	180	38.9	-455.9	20.3	-455.9	SUOP
8066	Angron	41.6	NW	Polk	180	38.8	-455.9	20.2	-455.9	SUOP
63249	Crookston	115	NW	Polk	180	38.5	-455.9	127.0	-455.9	SUOP
9248	Grygla	69	NW	Marshall	100	38.5	-454.6	37.7	-454.6	SUOP
9249	Highland	69	NW	Pennington	0	39.1	-454.6	37.7	-454.6	SUOP
9253	Holt	69	NW	Marshall	100	40.2	-454.6	32.5	-454.6	SUOP
9254	Dakota Junction	69	NW	Pennington	0	39.7	-454.6	35.0	-454.6	SUOP
9311	Hazel	69	NW	Pennington	0	39.2	-454.6	33.7	-454.6	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9416	Gatzke	69	NW	Marshall	100	38.5	-454.6	37.7	-454.6	SUOP
9468	Mud Lake	69	NW	Marshall	100	40.1	-454.6	32.5	-454.6	SUOP
29311	Terrebonne	69	NW	Red Lake	0	39.4	-454.6	33.1	-454.6	SUOP
29312	HOUT 8 _1	69	NW	Red Lake	0	38.7	-454.6	33.1	-454.6	SUOP
29467	Northland	69	NW	Pennington	0	39.5	-454.6	37.7	-454.6	SUOP
66713	Thief River Falls	115	NW	Pennington	0	39.3	-454.6	170.3	-454.6	SUOP
66767	Thief River Falls Municipal	13.2	NW	Pennington	0	39.5	-454.6	11.0	-454.6	SUOP
66782	Thief River Falls Tap	115	NW	Pennington	0	39.3	-454.6	81.0	-454.6	SUOP
66910	Thief River Falls	69	NW	Pennington	0	39.3	-454.6	37.7	-454.6	SUOP
63237	Mahnomen	115	NW	Mahnomen	0	37.8	-434.7	-138.2	-434.7	SUOP
63253	Plummer Pipeline	115	NW	Red Lake	0	38.8	-406.8	52.6	-406.8	SUOP
63353	Plummer Pipeline	4.2	NW	Red Lake	0	38.8	-406.8	26.8	-406.8	SUOP
7939	Gully Tap	41.6	NW	Polk	180	39.7	-404.2	13.7	-404.2	SUOP
7940	Trail	41.6	NW	Polk	180	40.2	-404.2	13.8	-404.2	SUOP
7941	Trail	41.6	NW	Polk	180	39.0	-404.2	14.0	-404.2	SUOP
7942	Oklee Tap	41.6	NW	Red Lake	0	38.8	-404.2	15.0	-404.2	SUOP
7943	Oklee	41.6	NW	Red Lake	0	38.7	-404.2	15.0	-404.2	SUOP
7944	Gully	41.6	NW	Polk	180	38.1	-404.2	7.0	-404.2	SUOP
7959	Plummer Tap	41.6	NW	Red Lake	0	38.8	-404.2	19.2	-404.2	SUOP
7961	Brooks	41.6	NW	Red Lake	0	39.1	-404.2	19.8	-404.2	SUOP
7965	Erskine Junction	41.6	NW	Polk	180	39.3	-404.2	19.8	-404.2	SUOP
7966	Brooks	41.6	NW	Red Lake	0	39.0	-404.2	19.8	-404.2	SUOP
7967	Plummer Switch	41.6	NW	Red Lake	0	38.7	-404.2	40.0	-404.2	SUOP
7968	Oklee - MPC	41.6	NW	Red Lake	0	38.8	-404.2	19.2	-404.2	SUOP
7969	Plummer	41.6	NW	Polk	180	38.3	-404.2	18.9	-404.2	SUOP
7970	Red Lake	41.6	NW	Polk	180	38.2	-404.2	17.0	-404.2	SUOP
7990	Gentilly Junction	41.6	NW	Polk	180	38.5	-404.2	15.4	-404.2	SUOP
7991	Mentor	41.6	NW	Polk	180	39.5	-404.2	19.8	-404.2	SUOP
7992	Gentilly	41.6	NW	Polk	180	38.5	-404.2	15.5	-404.2	SUOP
7993	Erskine	41.6	NW	Polk	180	39.3	-404.2	19.8	-404.2	SUOP
9313	Oklee MPC	41.6	NW	Red Lake	0	38.7	-404.2	16.0	-404.2	SUOP
9361	Gully - MP	41.6	NW	Clearwater	0	38.7	-404.2	13.5	-404.2	SUOP
63251	Plummer Tap	115	NW	Red Lake	0	38.8	-404.2	52.2	-404.2	SUOP
63252	Plummer	115	NW	Red Lake	0	38.8	-404.2	52.2	-404.2	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7997	Junction	41.6	NW	Polk	180	39.7	-381.1	11.6	-381.1	SUOP
8003	Belt Junction	41.6	NW	Polk	180	38.4	-381.1	11.6	-381.1	SUOP
8008	Fertile Township	41.6	NW	Polk	180	39.6	-381.1	13.1	-381.1	SUOP
8009	Gary	41.6	NW	Norman	0	38.6	-381.1	13.5	-381.1	SUOP
8010	Twin Valley	41.6	NW	Norman	0	38.6	-381.1	13.6	-381.1	SUOP
9433	Belt MPC	41.6	NW	Polk	180	38.4	-381.1	11.6	-381.1	SUOP
63150	Fertile	41.6	NW	Polk	180	38.7	-381.1	10.0	-381.1	SUOP
63250	Fertile	115	NW	Polk	180	39.4	-381.1	48.6	-381.1	SUOP
63187	Winger Transformer Midpoint	230	NW	Polk	180	39.3	-358.5	42.8	-358.5	SUOP
63338	Winger Tertitary	13.2	NW	Polk	180	39.0	-358.5	42.8	-358.5	SUOP
7962	Wington	41.6	NW	Mahnomen	0	38.7	-351.9	14.8	-351.9	SUOP
7963	McIntosh South	41.6	NW	Polk	180	39.4	-351.9	15.9	-351.9	SUOP
7964	McIntosh North	41.6	NW	Polk	180	39.4	-351.9	15.9	-351.9	SUOP
7971	McIntosh	41.6	NW	Polk	180	39.2	-351.9	15.9	-351.9	SUOP
7994	Bejou	41.6	NW	Mahnomen	0	38.6	-351.9	15.1	-351.9	SUOP
7995	Mahnomen	41.6	NW	Mahnomen	0	37.9	-351.9	15.1	-351.9	SUOP
7996	Waubun	41.6	NW	Mahnomen	0	38.5	-351.9	16.0	-351.9	SUOP
9314	Erskine Tap	41.6	NW	Polk	180	39.1	-351.9	15.9	-351.9	SUOP
9315	Erskine - MPC	41.6	NW	Polk	180	39.1	-351.9	16.3	-351.9	SUOP
9351	Maple Bay	69	NW	Polk	180	39.4	-351.9	37.1	-351.9	SUOP
9353	Rindal	69	NW	Polk	180	39.3	-351.9	35.2	-351.9	SUOP
9354	Waukon	69	NW	Norman	0	38.4	-351.9	33.6	-351.9	SUOP
9355	Flom	69	NW	Norman	0	40.0	-351.9	32.3	-351.9	SUOP
9356	Sandhill	69	NW	Polk	180	39.2	-351.9	37.1	-351.9	SUOP
9357	Fosston	69	NW	Polk	180	38.9	-351.9	37.1	-351.9	SUOP
9358	Beaulieu	69	NW	Mahnomen	0	37.7	-351.9	37.1	-351.9	SUOP
9359	Oakland	69	NW	Mahnomen	0	36.4	-351.9	37.1	-351.9	SUOP
63138	Winger	41.6	NW	Polk	180	39.1	-351.9	16.0	-351.9	SUOP
63238	Winger	115	NW	Polk	180	39.3	-351.9	43.3	-351.9	SUOP
66786	Winger Tap	115	NW	Polk	180	39.3	-351.9	37.1	-351.9	SUOP
67018	Winger	69	NW	Polk	180	39.7	-351.9	37.1	-351.9	SUOP
66758	Winger	230	NW	Polk	180	39.3	-327.8	45.4	-327.8	SUOP
7478	Barry	41.6	NW	Traverse	20	38.5	-201.1	-248.0	-248	SUPK
7177	Lone Pine Lake	41.6	NW	Otter Tail	330	36.9	-240.7	-226.0	-240.7	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7178	Frazee	41.6	NW	Otter Tail	330	36.3	-240.7	-226.0	-240.7	SUOP
7212	Vergas Tap	41.6	NW	Otter Tail	330	37.9	-240.7	-226.0	-240.7	SUOP
62530	Frazee	115	NW	Becker	0	36.4	-240.7	-226.0	-240.7	SUOP
62558	Evergreen	41.6	NW	Becker	0	37.1	-240.7	-226.0	-240.7	SUOP
62559	Burlington	41.6	NW	Becker	0	36.4	-240.7	-226.0	-240.7	SUOP
62563	Dent Tap	41.6	NW	Otter Tail	330	37.5	-240.7	-226.0	-240.7	SUOP
62564	Dent	41.6	NW	Otter Tail	330	38.1	-240.7	-226.0	-240.7	SUOP
62565	Frazee	41.6	NW	Otter Tail	330	36.6	-240.7	-226.0	-240.7	SUOP
62566	Frazee	41.6	NW	Becker	0	35.3	-240.7	-226.0	-240.7	SUOP
62568	Vergas Junction	41.6	NW	Otter Tail	330	37.9	-240.7	-226.0	-240.7	SUOP
62569	Butler Tap	41.6	NW	Otter Tail	330	37.2	-240.7	-226.0	-240.7	SUOP
62570	Butler	41.6	NW	Otter Tail	330	37.3	-240.7	-226.0	-240.7	SUOP
62571	Perham	41.6	NW	Otter Tail	330	36.6	-240.7	-226.0	-240.7	SUOP
62572	Dora	41.6	NW	Otter Tail	330	38.3	-240.7	-226.0	-240.7	SUOP
7934	Bagley Tap	41.6	NW	Clearwater	0	37.9	-239.3	10.0	-239.3	SUOP
7935	Clearbrook	41.6	NW	Clearwater	0	39.4	-239.3	10.0	-239.3	SUOP
7936	Clearbrook	41.6	NW	Clearwater	0	39.4	-239.3	11.1	-239.3	SUOP
7937	Clearbrook tap	41.6	NW	Clearwater	0	39.3	-239.3	11.5	-239.3	SUOP
7938	Gonvick	41.6	NW	Clearwater	0	39.1	-239.3	11.5	-239.3	SUOP
7946	Bagley	41.6	NW	Clearwater	0	37.9	-239.3	10.0	-239.3	SUOP
9360	Clearbrook - MPC	41.6	NW	Clearwater	0	39.3	-239.3	11.5	-239.3	SUOP
63239	Bagley	115	NW	Clearwater	0	38.9	-239.3	19.6	-239.3	SUOP
63240	Minnesota Pipeline	115	NW	Clearwater	0	38.6	-239.3	19.6	-239.3	SUOP
63241	Clearbrook	115	NW	Clearwater	0	39.4	-239.3	19.6	-239.3	SUOP
63242	Clearbrook pipeline	115	NW	Clearwater	0	39.4	-239.3	19.6	-239.3	SUOP
63340	Minnesota Pipeline	4.2	NW	Clearwater	0	39.6	-239.3	19.6	-239.3	SUOP
63342	Clearbrook Lake	4.2	NW	Clearwater	0	39.4	-239.3	19.6	-239.3	SUOP
63052	Inman	230	NW	Otter Tail	330	37.9	-178.0	-219.7	-219.7	SUPK
63235	Perham	115	NW	Otter Tail	330	37.8	-175.5	-216.7	-216.7	SUPK
7932	Solway	41.6	NW	Beltrami	50	34.1	-214.5	14.2	-214.5	SUOP
7933	Shevlin Mill	41.6	NW	Clearwater	0	38.1	-214.5	14.0	-214.5	SUOP
7947	Northwood	41.6	NW	Clearwater	0	38.1	-214.5	14.2	-214.5	SUOP
63243	Shevlin Junction	115	NW	Clearwater	0	37.4	-214.5	16.3	-214.5	SUOP
63244	Itasca	115	NW	Clearwater	0	35.6	-214.5	16.3	-214.5	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63282	Northwood	115	NW	Clearwater	0	37.3	-214.5	16.3	-214.5	SUOP
63344	Itasca	4.2	NW	Clearwater	0	35.6	-214.5	16.3	-214.5	SUOP
66727	Rice Lake Tap	115	NW	Clearwater	0	35.8	-214.5	16.3	-214.5	SUOP
66729	Rice Lake	115	NW	Clearwater	0	34.6	-214.5	16.3	-214.5	SUOP
63285	Solway	115	NW	Beltrami	50	34.0	-206.2	15.4	-206.2	SUOP
63280	Wilton Pipeline	115	NW	Beltrami	50	33.4	-199.4	14.6	-199.4	SUOP
63281	Wilton Tap	115	NW	Beltrami	50	33.4	-199.4	14.6	-199.4	SUOP
7149	Battle Lake Tap	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3	-199.3	SUPK
7166	Otter Junction	41.6	NW	Otter Tail	330	37.9	-161.4	-199.3	-199.3	SUPK
7167	Deer Creek	41.6	NW	Otter Tail	330	37.8	-161.4	-199.3	-199.3	SUPK
7169	Vining	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3	-199.3	SUPK
7170	Clitherall	41.6	NW	Otter Tail	330	39.5	-161.4	-199.3	-199.3	SUPK
7171	Battle Lake	41.6	NW	Otter Tail	330	38.7	-161.4	-199.3	-199.3	SUPK
9531	Henning Municipal	41.6	NW	Otter Tail	330	38.1	-161.4	-199.3	-199.3	SUPK
9585	Henning Municipal	41.6	NW	Otter Tail	330	38.1	-161.4	-199.3	-199.3	SUPK
62543	Stalker Lake Tap	41.6	NW	Otter Tail	330	39.0	-161.4	-199.3	-199.3	SUPK
62544	Henning	41.6	NW	Otter Tail	330	38.6	-161.4	-199.3	-199.3	SUPK
62552	Stalker Lake	41.6	NW	Otter Tail	330	39.2	-161.4	-199.3	-199.3	SUPK
63051	Henning	230	NW	Otter Tail	330	38.8	-161.4	-199.3	-199.3	SUPK
7909	Airport Junction	41.6	NW	Beltrami	50	35.0	-189.4	28.8	-189.4	SUOP
7910	Airport	41.6	NW	Beltrami	50	35.0	-189.4	26.6	-189.4	SUOP
7915	Nymore	69	NW	Beltrami	50	31.3	-189.4	37.3	-189.4	SUOP
7916	Hydro Tap	69	NW	Beltrami	50	31.3	-189.4	30.4	-189.4	SUOP
7920	Nymore Junction	69	NW	Beltrami	50	31.3	-189.4	30.5	-189.4	SUOP
7924	Bemidji Industrial Park	69	NW	Beltrami	50	36.4	-189.4	39.5	-189.4	SUOP
7925	Bemidji Industrial Park Tap	69	NW	Beltrami	50	36.4	-189.4	39.5	-189.4	SUOP
7927	Colgate Tap	69	NW	Beltrami	50	36.1	-189.4	40.9	-189.4	SUOP
7928	Bemidji 25th Street	69	NW	Beltrami	50	36.1	-189.4	40.9	-189.4	SUOP
7929	Bemidji State Univ.	69	NW	Beltrami	50	36.1	-189.4	40.9	-189.4	SUOP
8535	Bemidji Hydro	2.4	NW	Beltrami	50	34.3	-189.4	0.3	-189.4	SUOP
9261	Redby	69	NW	Beltrami	50	39.7	-189.4	34.0	-189.4	SUOP
9262	Puposky	138	NW	Beltrami	50	35.6	-189.4	35.6	-189.4	SUOP
9332	Aardahl Tap	69	NW	Beltrami	50	35.2	-189.4	31.1	-189.4	SUOP
9383	Quiring	69	NW	Beltrami	50	35.7	-189.4	34.0	-189.4	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9384	Battle Lake	69	NW	Beltrami	50	36.5	-189.4	34.0	-189.4	SUOP
9436	Bemidji Hospital	69	NW	Beltrami	50	36.5	-189.4	35.6	-189.4	SUOP
9437	Aardahl	69	NW	Beltrami	50	37.2	-189.4	34.3	-189.4	SUOP
9481	Red Lake	69	NW	Beltrami	50	39.5	-189.4	34.0	-189.4	SUOP
29486	Frohn	69	NW	Beltrami	50	33.6	-189.4	30.5	-189.4	SUOP
63146	Bemidji Transformer	41.6	NW	Beltrami	50	35.2	-189.4	51.6	-189.4	SUOP
63196	Bemidji Transformer Midpoint	115	NW	Beltrami	50	35.7	-189.4	24.0	-189.4	SUOP
63246	Bemidji	115	NW	Beltrami	50	35.6	-189.4	74.8	-189.4	SUOP
63346	Bemidji Transformer	12.5	NW	Beltrami	50	35.7	-189.4	20.5	-189.4	SUOP
66789	Bemidji Tertitary	115	NW	Beltrami	50	36.0	-189.4	74.8	-189.4	SUOP
67015	Bemidji	69	NW	Beltrami	50	35.6	-189.4	50.6	-189.4	SUOP
63186	Wilton Transformer Midpoint	230	NW	Beltrami	50	33.2	-189.3	12.5	-189.3	SUOP
63343	Wilton Transformer	13.8	NW	Beltrami	50	35.2	-189.3	12.5	-189.3	SUOP
66797	Wilton Transformer	13.8	NW	Beltrami	50	33.7	-189.3	12.5	-189.3	SUOP
66798	Wilton Tertitary	230	NW	Beltrami	50	34.7	-189.3	12.5	-189.3	SUOP
7907	Lake Pipeline	41.6	NW	Beltrami	50	35.0	-186.6	13.2	-186.6	SUOP
7908	Lake Pipeline Tap	41.6	NW	Beltrami	50	35.0	-186.6	13.2	-186.6	SUOP
7911	Northwood Tap	41.6	NW	Beltrami	50	36.0	-186.6	13.2	-186.6	SUOP
7912	Northwood	41.6	NW	Beltrami	50	36.1	-186.6	13.2	-186.6	SUOP
7931	Wilton	41.6	NW	Beltrami	50	33.6	-186.6	13.2	-186.6	SUOP
9264	Long Lake	69	NW	Beltrami	50	33.7	-186.6	13.2	-186.6	SUOP
9265	Blackduck	69	NW	Beltrami	50	37.0	-186.6	13.2	-186.6	SUOP
9365	Bagley	69	NW	Clearwater	0	37.8	-186.6	13.2	-186.6	SUOP
9366	Shevlin	69	NW	Clearwater	0	37.7	-186.6	13.2	-186.6	SUOP
9367	Dudley	69	NW	Clearwater	0	39.0	-186.6	13.2	-186.6	SUOP
9369	Bemidji	69	NW	Beltrami	50	35.8	-186.6	13.2	-186.6	SUOP
9424	Busy Corner	69	NW	Beltrami	50	37.3	-186.6	13.2	-186.6	SUOP
9431	Northern	69	NW	Beltrami	50	34.7	-186.6	13.2	-186.6	SUOP
63145	Wilton Transformer	41.6	NW	Beltrami	50	34.5	-186.6	13.2	-186.6	SUOP
63245	Wilton	115	NW	Beltrami	50	33.5	-186.6	13.2	-186.6	SUOP
66776	Wilton Tertitary	115	NW	Beltrami	50	34.0	-186.6	13.2	-186.6	SUOP
66968	Wilton	69	NW	Beltrami	50	34.6	-186.6	13.2	-186.6	SUOP
9501	Barnesville	41.6	NW	Clay	356	39.2	-105.6	-182.7	-182.7	SUPK
62528	Tamarac	115	NW	Otter Tail	330	40.3	-105.6	-182.7	-182.7	SUPK

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62553	Tansem	41.6	NW	Clay	356	41.1	-105.6	-182.7	-182.7	SUPK
63310	Tamarac	41.6	NW	Otter Tail	330	39.1	-105.6	-182.7	-182.7	SUPK
7596	Breckenridge Tap	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7598	Cargil Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7600	Breckenridge	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7602	Brenkenridge	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7603	Cargill Junction	41.6	NW	Wilkin	361	37.9	-154.0	-172.6	-172.6	SUPK
7604	Doran Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7639	Doran	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
7640	Campbell	41.6	NW	Wilkin	361	37.9	-154.0	-172.6	-172.6	SUPK
8788	Doran	41.6	NW	Wilkin	361	38.0	-154.0	-172.6	-172.6	SUPK
9550	Breckenridge Plant	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
9551	Brenkenridge Junction	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
9552	Breckenridge South	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
9554	Breckenridge TWITO	41.6	NW	Wilkin	361	38.1	-154.0	-172.6	-172.6	SUPK
62535	Everdell	41.6	NW	Wilkin	361	37.9	-154.0	-172.6	-172.6	SUPK
62536	Roberts Switching Station	41.6	NW	Wilkin	361	38.2	-154.0	-172.6	-172.6	SUPK
62537	Roberts	41.6	NW	Wilkin	361	38.4	-154.0	-172.6	-172.6	SUPK
63345	Wilton	230	NW	Beltrami	50	34.7	-169.6	20.9	-169.6	SUOP
63166	Osage	41.6	NW	Otter Tail	330	37.9	-116.3	-143.9	-143.9	SUPK
63366	Silver Lake	230	NW	Otter Tail	330	38.1	-116.3	-143.9	-143.9	SUPK
7176	Pelican Rapid Turkey Plant	41.6	NW	Otter Tail	330	40.6	-83.7	-140.5	-140.5	SUPK
7185	Pelican Tap	41.6	NW	Otter Tail	330	38.7	-83.7	-140.5	-140.5	SUPK
7186	Pelican Rapids Junction	41.6	NW	Otter Tail	330	39.5	-83.7	-140.5	-140.5	SUPK
7187	Pelican Rapids North	41.6	NW	Otter Tail	330	39.7	-83.7	-140.5	-140.5	SUPK
7188	Pelican Rapids West	41.6	NW	Otter Tail	330	39.5	-83.7	-140.5	-140.5	SUPK
7208	Pelican Rapids	41.6	NW	Otter Tail	330	40.3	-83.7	-140.5	-140.5	SUPK
62546	Erhard	41.6	NW	Otter Tail	330	40.2	-83.7	-140.5	-140.5	SUPK
62551	Pelican Lake	41.6	NW	Otter Tail	330	40.7	-83.7	-140.5	-140.5	SUPK
63234	Pelican Rapids S75	115	NW	Otter Tail	330	40.3	-83.7	-140.5	-140.5	SUPK
63331	Fergus Falls	230	NW	Otter Tail	330	38.5	-94.7	-117.3	-117.3	SUPK
63231	Fergus Falls	115	NW	Otter Tail	330	38.1	-54.4	-90.9	-90.9	SUPK
62532	Fergus	115	NW	Otter Tail	330	38.7	-51.6	-83.0	-83	SUPK
63232	Fergus Falls Edgetown	115	NW	Otter Tail	330	38.9	-51.6	-83.0	-83	SUPK

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63233	Edgetown Tap	115	NW	Otter Tail	330	38.9	-51.6	-83.0	-83	SUPK
7139	Division Rural	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2	-81.2	SUPK
7140	Friberg Rural	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2	-81.2	SUPK
7141	Carlise/Elizabeth Junction	41.6	NW	Otter Tail	330	39.3	-50.6	-81.2	-81.2	SUPK
7142	Rothsay	41.6	NW	Otter Tail	330	40.0	-50.6	-81.2	-81.2	SUPK
7143	Erhard	41.6	NW	Otter Tail	330	39.7	-50.6	-81.2	-81.2	SUPK
7144	Rothsay	41.6	NW	Otter Tail	330	40.4	-50.6	-81.2	-81.2	SUPK
7145	Tap Gorge	41.6	NW	Otter Tail	330	39.3	-50.6	-81.2	-81.2	SUPK
7147	Aurdal	41.6	NW	Otter Tail	330	39.5	-50.6	-81.2	-81.2	SUPK
7148	Underwood	41.6	NW	Otter Tail	330	38.5	-50.6	-81.2	-81.2	SUPK
7154	Dayton Hollow Rural	41.6	NW	Otter Tail	330	38.2	-50.6	-81.2	-81.2	SUPK
7155	Dayton Hollow	41.6	NW	Otter Tail	330	38.4	-50.6	-81.2	-81.2	SUPK
7156	Foxhome Tap	41.6	NW	Wilkin	361	37.9	-50.6	-81.2	-81.2	SUPK
7157	Foxhome	41.6	NW	Wilkin	361	37.9	-50.6	-81.2	-81.2	SUPK
7163	S Cascade	41.6	NW	Otter Tail	330	38.3	-50.6	-81.2	-81.2	SUPK
7164	Dalton	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2	-81.2	SUPK
7209	Kriste	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2	-81.2	SUPK
7210	Otter Outlet	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2	-81.2	SUPK
62538	Ten Mile Lake	41.6	NW	Otter Tail	330	38.7	-50.6	-81.2	-81.2	SUPK
62540	Maine	41.6	NW	Otter Tail	330	38.9	-50.6	-81.2	-81.2	SUPK
62541	Kriste Junction	41.6	NW	Otter Tail	330	38.4	-50.6	-81.2	-81.2	SUPK
62542	Battle Lake	41.6	NW	Otter Tail	330	37.7	-50.6	-81.2	-81.2	SUPK
62545	Orwell	41.6	NW	Otter Tail	330	38.1	-50.6	-81.2	-81.2	SUPK
62549	Carlise	41.6	NW	Otter Tail	330	39.6	-50.6	-81.2	-81.2	SUPK
62550	Carlisle	41.6	NW	Otter Tail	330	39.6	-50.6	-81.2	-81.2	SUPK
62554	Rothsay	41.6	NW	Wilkin	361	39.5	-50.6	-81.2	-81.2	SUPK
62555	Underwood Tap	41.6	NW	Otter Tail	330	39.2	-50.6	-81.2	-81.2	SUPK
62556	Underwood	41.6	NW	Otter Tail	330	39.1	-50.6	-81.2	-81.2	SUPK
62575	Elizabeth	41.6	NW	Otter Tail	330	39.7	-50.6	-81.2	-81.2	SUPK
63123	Hoot Lake	41.6	NW	Otter Tail	330	38.5	-50.6	-81.2	-81.2	SUPK
63223	Hoot Lake	115	NW	Otter Tail	330	38.5	-50.6	-81.2	-81.2	SUPK
63323	Hoot Lake Generator 2	13.8	NW	Otter Tail	330	38.6	-50.6	-81.2	-81.2	SUPK
63324	Hoot Lake Generator 3	13.8	NW	Otter Tail	330	38.5	-50.6	-81.2	-81.2	SUPK
63194	Fergus Falls 230kV	230	NW	Otter Tail	330	39.0	-49.9	-79.6	-79.6	SUPK

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63332	Fergus Falls	13.2	NW	Otter Tail	330	38.1	-49.9	-79.6	-79.6	SUPK
62531	Inman	115	NW	Otter Tail	330	37.8	60.0	-66.3	-66.3	SUPK
7168	New York Mills	41.6	NW	Otter Tail	330	37.4	24.3	-61.7	-61.7	SUPK
7172	Otter Tail Lake	41.6	NW	Otter Tail	330	37.7	19.6	-61.7	-61.7	SUPK
7173	Rush-Otter Tail Lake	41.6	NW	Otter Tail	330	37.9	29.0	-61.7	-61.7	SUPK
62526	Rush Lake	115	NW	Otter Tail	330	37.6	55.9	-61.7	-61.7	SUPK
62560	Otto	41.6	NW	Otter Tail	330	37.1	29.0	-61.7	-61.7	SUPK
62561	New York Mills	41.6	NW	Otter Tail	330	37.3	21.6	-61.7	-61.7	SUPK
62562	Rush Lake	41.6	NW	Otter Tail	330	37.7	29.0	-61.7	-61.7	SUPK
62527	Elmo Switching Station	115	NW	Otter Tail	330	37.8	67.4	-55.8	-55.8	SUPK
8566	Holt Tap	12.5	NW	Marshall	100	39.7	-2043.3	2.5	2.5	SUPK
66770	Moranville Transformer	13.8	NW	Roseau	0	37.9	3.0	3.0	3	EQUAL
66769	Moranville Transformer	13.8	NW	Roseau	0	37.7	10.0	10.0	10	EQUAL
66771	Moranville Transformer	13.8	NW	Roseau	0	38.1	10.0	10.0	10	EQUAL
66768	Moranville Transformer	13.8	NW	Roseau	0	38.2	11.0	11.0	11	EQUAL
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8	15.5	SUOP
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8	15.5	SUOP
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8	15.5	SUOP
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8	15.5	SUOP
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5	18.3	SUOP
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0	21	EQUAL
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1	21.1	SUPK
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1	21.1	SUPK
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1	21.1	SUPK
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1	21.1	SUPK
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2	21.2	EQUAL
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7	24.1	SUOP
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3	25.7	SUOP
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7	26	SUOP
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3	28.4	SUOP
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3	28.4	SUOP
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3	28.4	SUOP

Appendix C - Screening Steps

All NW Planning Zone Buses (sorted by Minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3	28.4	SUOP
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3	28.4	SUOP
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66757	Moranville	230	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3	28.4	SUOP
66793	Moranville Tertitary	230	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66795	Moranville Tertitary	230	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3	28.4	SUOP
60175	Roseau	230	NW	Roseau	0	36.8	29.7	38.0	29.7	SUOP
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7	30.9	SUOP
9249	Highland	69	NW	Pennington	0	38.6	33.4	34.2	33.4	SUOP
60173	Roseau	500	NW	Roseau	0	36.7	238.6	459.7	238.6	SUOP
60174	Roseau	500	NW	Roseau	0	36.1	257.9	766.4	257.9	SUOP

Appendix C - Screening Steps

NW Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
66770	Moranville Transformer	13.8	NW	Roseau	0	37.9	3.0	3.0	3	EQUAL
66769	Moranville Transformer	13.8	NW	Roseau	0	37.7	10.0	10.0	10	EQUAL
66771	Moranville Transformer	13.8	NW	Roseau	0	38.1	10.0	10.0	10	EQUAL
66768	Moranville Transformer	13.8	NW	Roseau	0	38.2	11.0	11.0	11	EQUAL
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8	15.5	SUOP
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8	15.5	SUOP
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8	15.5	SUOP
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8	15.5	SUOP
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5	18.3	SUOP
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0	21	EQUAL
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1	21.1	SUPK
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1	21.1	SUPK
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1	21.1	SUPK
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1	21.1	SUPK
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2	21.2	EQUAL
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7	24.1	SUOP
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3	25.7	SUOP
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7	26	SUOP
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3	28.4	SUOP
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3	28.4	SUOP
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3	28.4	SUOP
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3	28.4	SUOP
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3	28.4	SUOP
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3	28.4	SUOP
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3	28.4	SUOP
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66757	Moranville	230	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66793	Moranville Tertitary	230	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66795	Moranville Tertitary	230	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP

Appendix C - Screening Steps

NW Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60175	Roseau	230	NW	Roseau	0	36.8	29.7	38.0	29.7	SUOP
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7	30.9	SUOP
60173	Roseau	500	NW	Roseau	0	36.7	238.6	459.7	238.6	SUOP
60174	Roseau	500	NW	Roseau	0	36.1	257.9	766.4	257.9	SUOP

Appendix C - Screening Steps

NW Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8	15.5	SUOP
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8	15.5	SUOP
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8	15.5	SUOP
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8	15.5	SUOP
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5	18.3	SUOP
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0	21	EQUAL
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1	21.1	SUPK
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1	21.1	SUPK
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1	21.1	SUPK
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1	21.1	SUPK
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2	21.2	EQUAL
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7	24.1	SUOP
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3	25.7	SUOP
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7	26	SUOP
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3	28.4	SUOP
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3	28.4	SUOP
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3	28.4	SUOP
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3	28.4	SUOP
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3	28.4	SUOP
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3	28.4	SUOP
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3	28.4	SUOP
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7	30.9	SUOP

Appendix C - Screening Steps

NW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8	15.5	SUOP
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8	15.5	SUOP
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8	15.5	SUOP
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8	15.5	SUOP
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5	18.3	SUOP
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0	21	EQUAL
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1	21.1	SUPK
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1	21.1	SUPK
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1	21.1	SUPK
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1	21.1	SUPK
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2	21.2	EQUAL
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7	24.1	SUOP
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3	25.7	SUOP
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7	26	SUOP
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3	28.4	SUOP
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3	28.4	SUOP
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3	28.4	SUOP
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3	28.4	SUOP
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3	28.4	SUOP
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3	28.4	SUOP
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3	28.4	SUOP
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7	30.9	SUOP

Appendix C - Screening Steps

NW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5-digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9260	Baudette	69	NW	Lake of the Woods	0	37.2	15.5	19.8	15.5	SUOP
9256	Williams Tap	69	NW	Lake of the Woods	0	37.1	15.5	19.8	15.5	SUOP
9257	Williams	69	NW	Lake of the Woods	0	37.0	15.5	19.8	15.5	SUOP
9258	Pitt	69	NW	Lake of the Woods	0	36.7	15.5	19.8	15.5	SUOP
7205	Nashua Tintah	41.6	NW	Wilkin	361	38.0	18.3	18.5	18.3	SUOP
7196	Lake Adley	41.6	NW	Otter Tail	330	39.4	21.0	21.0	21	EQUAL
7197	Parkers Prairie SS	41.6	NW	Otter Tail	330	39.2	27.1	21.1	21.1	SUPK
62547	Parkers Prairie Tap	41.6	NW	Otter Tail	330	39.0	24.0	21.1	21.1	SUPK
62539	Parkers Prairie	41.6	NW	Otter Tail	330	39.0	27.2	21.1	21.1	SUPK
62548	Parkers Prairie SW	41.6	NW	Otter Tail	330	38.6	27.6	21.1	21.1	SUPK
7195	Urbank	41.6	NW	Otter Tail	330	39.4	21.2	21.2	21.2	EQUAL
62914	Compton	34.5	NW	Otter Tail	330	37.1	24.1	24.7	24.1	SUOP
62414	Osage	34.5	NW	Becker	0	35.4	25.7	27.3	25.7	SUOP
62413	Pine Point	34.5	NW	Becker	0	35.9	26.0	26.7	26	SUOP
66999	Moranville	69	NW	Roseau	0	39.5	28.4	36.3	28.4	SUOP
9241	Stafford	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9244	Malung	69	NW	Roseau	0	38.9	28.4	36.3	28.4	SUOP
9243	Polaris	69	NW	Roseau	0	38.8	28.4	36.3	28.4	SUOP
9242	Roseau	69	NW	Roseau	0	38.5	28.4	36.3	28.4	SUOP
9245	Pencer	69	NW	Roseau	0	38.4	28.4	36.3	28.4	SUOP
9483	Salol Tap	69	NW	Roseau	0	38.2	28.4	36.3	28.4	SUOP
9484	Salol	69	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66719	Moranville	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66794	Moranville Tertitary	115	NW	Roseau	0	37.7	28.4	36.3	28.4	SUOP
66790	Moranville Tertitary	115	NW	Roseau	0	37.5	28.4	36.3	28.4	SUOP
9247	Haselrud - MPC	69	NW	Roseau	0	37.1	28.4	36.3	28.4	SUOP
9255	Warroad	69	NW	Roseau	0	37.0	28.4	36.3	28.4	SUOP
9266	Shooks	69	NW	Beltrami	50	37.1	30.9	33.7	30.9	SUOP

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0
38909	13K Capacitor	34.5	NE	Morrison	0	34.6	6.3	6.5
38911	14K Capacitor	34.5	NE	Morrison	0	34.6	6.7	7.1
61731	14L Tap	115	NE	St. Louis	75	32.3	201.7	197.8
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3
61686	15th Ave	115	NE	St. Louis	75	26.5	-30.4	202.0
61718	16L Tap	115	NE	St. Louis	75	23.7	-58.7	50.3
61781	20L TAP7	115	NE	Itasca	1,141	30.9	107.9	117.5
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7
61863	31-32TIE	46	NE	St. Louis	75	27.2	21.0	21.0
61880	32-31TIE	46	NE	St. Louis	75	26.7	23.5	25.3
61704	34L Tap	115	NE	St. Louis	75	29.7	204.5	39.1
38919	36K Capacitor	34.5	NE	Morrison	0	33.8	10.7	11.0
61725	44L Tap	115	NE	St. Louis	75	34.1	169.3	157.7
61801	450 Tap	46	NE	Pine	0	31.9	-760.0	-778.4
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1
38673	503-531T	34.5	NE	Cass	0	31.3	16.8	17.0
38606	505-06SW	34.5	NE	Crow Wing	0	30.0	13.1	15.1
38607	506 DIST	34.5	NE	Crow Wing	0	28.8	10.2	10.4
38613	506-TAP	34.5	NE	Crow Wing	0	30.0	13.1	15.1
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9
38902	508-502T	34.5	NE	Morrison	0	33.9	12.4	17.2
38848	508-511T	34.5	NE	Morrison	0	34.9	12.4	17.3
38882	508-521T	34.5	NE	Morrison	0	33.3	12.4	17.0
38850	508-525T	34.5	NE	Morrison	0	34.2	12.4	17.2
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6
38754	515-520T	34.5	NE	Hubbard	0	34.8	24.3	26.3
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7
38907	525 Voltage Regulator 1	34.5	NE	Morrison	0	33.0	5.9	5.9

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
38906	525 Voltage Regulator 2	34.5	NE	Morrison	0	33.0	10.0	10.0
38904	525-08T7	34.5	NE	Morrison	0	33.0	15.3	17.6
38874	525-08T8	34.5	NE	Morrison	0	32.9	22.3	25.8
38875	525-2988	34.5	NE	Morrison	0	34.8	22.3	25.8
38901	525-529T	34.5	NE	Morrison	0	33.4	9.2	10.5
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5
38869	526-529T	34.5	NE	Morrison	0	34.8	34.0	34.0
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0
38867	529 REG	34.5	NE	Morrison	0	34.2	10.0	10.0
38888	529 Voltage Regulator	34.5	NE	Morrison	0	34.2	10.0	10.0
38917	529-36E	34.5	NE	Morrison	0	33.1	13.4	14.7
38861	529-36ES	34.5	NE	Morrison	0	34.3	13.1	14.4
38916	529-36SW	34.5	NE	Morrison	0	33.5	13.4	14.7
38903	529-525T	34.5	NE	Morrison	0	34.0	18.0	18.0
38868	529-526T	34.5	NE	Morrison	0	34.6	34.1	34.1
38860	529-DIST	34.5	NE	Morrison	0	33.4	13.4	14.7
38858	529-T77	34.5	NE	Morrison	0	34.4	12.0	12.9
38671	531-534T	34.5	NE	Crow Wing	0	32.9	16.3	16.4
38623	532-06TS	34.5	NE	Crow Wing	0	32.0	19.6	19.5
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3
38891	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0
38895	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3
61730	78L Tap	115	NE	St. Louis	75	33.6	-83.7	-15.7
61614	98L TAP4	230	NE	St. Louis	75	27.4	-38.5	291.8
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0
61654	Aitkin	115	NE	Crow Wing	0	31.2	109.4	110.1
62638	Aitkin	115	NE	Aitkin	0	32.8	-58.3	110.9
38741	Akeley	34.5	NE	Hubbard	0	33.0	-481.0	17.0
38742	Akeley	34.5	NE	Hubbard	0	33.2	-481.0	18.5
61638	Akeley	115	NE	Hubbard	0	33.0	-481.0	125.4
61838	Akeley	34.5	NE	Hubbard	0	33.0	-481.0	29.9
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61810	Anderson Corner	46	NE	Pine	0	31.7	-535.9	-590.8
62474	Arbo	69	NE	Itasca	1,141	30.4	18.7	11.3
62484	Arbo Tap	69	NE	Itasca	1,141	30.4	18.7	11.3
39448	Arrowhead	230	NE	St. Louis	75	30.8	-38.5	332.1
39449	Arrowhead	345	NE	St. Louis	75	30.8	-38.5	332.1
61555	Arrowhead	13.8	NE	St. Louis	75	31.1	-32.1	20.0
61557	Arrowhead	13.8	NE	St. Louis	75	31.2	-32.1	20.0
61615	Arrowhead	230	NE	St. Louis	75	31.2	-38.5	332.1
61673	Arrowhead	115	NE	St. Louis	75	31.2	-33.4	287.8
61554	Arrowhead Junction	115	NE	St. Louis	75	30.9	-32.1	276.9
61556	Arrowhead Junction	115	NE	St. Louis	75	31.2	-32.1	276.8
61806	Askov	46	NE	Pine	0	31.6	-549.1	-605.2
62143	Athens Switch	69	NE	Isanti	0	33.9	-318.8	-406.6
38461	Aurora	46	NE	St. Louis	75	30.5	15.0	18.2
61705	Babbitt	115	NE	St. Louis	75	27.2	124.3	35.0
61860	Babbitt	46	NE	St. Louis	75	28.1	23.5	24.6
62504	Babbitt Townsite	46	NE	St. Louis	75	28.4	23.5	24.5
61865	Babbitt VL	46	NE	St. Louis	75	30.5	18.5	19.1
38750	Backus	34.5	NE	Cass	0	33.1	24.2	27.2
61610	Badoura	230	NE	Hubbard	0	33.5	251.5	435.5
61640	Badoura	115	NE	Hubbard	0	33.1	-814.9	277.3
61794	Badoura Junction	115	NE	Hubbard	0	33.8	-779.1	193.7
61795	Badoura Transformer	13.8	NE	Hubbard	0	33.1	-779.1	20.0
62479	Ball Club	69	NE	Itasca	1,141	31.8	47.5	48.7
61813	Barnum	46	NE	Carlton	0	29.4	-238.5	-288.9
61812	Barnum Tap	46	NE	Carlton	0	27.8	-242.2	-295.6
62178	Bass Lake	69	NE	Crow Wing	0	32.0	36.7	-38.9
61845	Baxter	34.5	NE	Crow Wing	0	31.8	28.4	27.8
38675	Baxter - MP	34.5	NE	Crow Wing	0	31.8	17.0	17.0
62206	Baxter Bank	115	NE	Crow Wing	0	32.6	118.9	127.1
61645	Baxter S47	115	NE	Crow Wing	0	32.9	105.4	109.2
62314	Bear Creek	69	NE	Pine	0	28.7	-439.1	-794.0
63055	Bear Creek	230	NE	Pine	0	28.7	-165.3	-156.0
62315	Bear Creek Tap	12.5	NE	Pine	0	30.0	-165.3	-156.0

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3
62483	Bena Tap	69	NE	Itasca	1,141	32.4	45.9	46.4
62446	Bergen Lake	115	NE	St. Louis	75	28.4	-39.8	80.8
62447	Bergen Tap	115	NE	St. Louis	75	29.2	-39.8	100.1
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8
38854	Bertran	34.5	NE	Morrison	0	37.8	35.2	36.3
9268	Big Falls	69	NE	Koochiching	0	31.9	30.9	33.7
62697	Big Fork	69	NE	Itasca	1,141	30.9	12.9	14.3
62520	Big Sand	69	NE	Aitkin	0	32.1	-41.7	14.3
62519	Big Sand Tap	69	NE	Aitkin	0	30.6	-41.7	14.3
62177	Birch Lake	115	NE	Hubbard	0	33.8	33.5	37.9
62208	Birch Lake	34.5	NE	Cass	0	32.8	24.2	27.2
62209	Birch Lake	69	NE	Cass	0	32.8	29.2	27.5
62214	Birch Lake Tap	13.2	NE	Cass	0	32.4	8.4	8.4
38417	Biwabik	46	NE	St. Louis	75	28.5	17.8	18.2
61566	Blackberry	115	NE	Itasca	1,141	31.2	252.2	336.6
61567	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0
61568	Blackberry	115	NE	Itasca	1,141	31.2	252.2	338.0
61569	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0
61625	Blackberry	230	NE	Itasca	1,141	31.2	252.1	757.0
61739	Blackberry	115	NE	Itasca	1,141	31.2	131.0	236.6
62476	Blackberry	69	NE	Itasca	1,141	31.7	32.0	19.8
62488	Blackberry	69	NE	Itasca	1,141	31.2	46.4	31.0
62513	Blackberry Tertitary	12.8	NE	Itasca	1,141	31.2	7.6	7.6
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7
61779	Blandin	115	NE	Itasca	1,141	31.7	250.8	126.6
38852	Blandin Paper	6	NE	Morrison	0	36.0	9.9	10.0
61778	Blandin Tap	115	NE	Itasca	1,141	30.9	206.1	118.8
62196	Blind Lake	69	NE	Cass	0	33.4	55.0	51.9
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1
61756	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4
61757	Boise	2.3	NE	Koochiching	0	30.7	11.5	13.1

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61758	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4
61759	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4
61761	Boise	6.6	NE	Koochiching	0	30.7	-6.4	-4.8
61754	Boise Cascade	118	NE	Koochiching	0	30.7	73.9	75.6
61755	Boise Cascade	6.6	NE	Koochiching	0	30.7	11.5	13.1
61792	Boise Cascade Paper	13.8	NE	Koochiching	0	30.7	100.6	102.2
61748	Boswell	115	NE	Itasca	1,141	31.0	203.1	109.7
61776	Boswell Generator 1	14.4	NE	Itasca	1,141	31.2	48.7	3.3
61777	Boswell Generator 2	14.4	NE	Itasca	1,141	32.3	46.5	3.3
61774	Boswell Generator 3	20.9	NE	Itasca	1,141	31.8	-80.2	31.4
61775	Boswell Generator 4	22.8	NE	Itasca	1,141	31.9	-80.2	31.4
62481	Boy River	69	NE	Cass	0	32.3	19.5	20.1
62279	Braham	69	NE	Isanti	0	33.7	-431.8	-409.4
61652	Brainerd	115	NE	Crow Wing	0	33.9	-11.4	64.5
61852	Brainerd	34.5	NE	Crow Wing	0	33.4	-11.4	56.3
61851	Brainerd - NWP	34.5	NE	Crow Wing	0	33.2	-11.4	30.0
38654	Brainerd Rural	34.5	NE	Crow Wing	0	30.1	-11.4	23.6
62465	Brandon Road	69	NE	St. Louis	75	30.8	-38.9	41.4
62187	Breezy Point	69	NE	Crow Wing	0	31.9	21.2	-32.4
62193	Breezy Point	69	NE	Crow Wing	0	31.6	30.6	-32.4
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5
61671	Burnett	115	NE	St. Louis	75	28.3	-37.8	100.2
63022	Cambridge	69	NE	Isanti	0	33.2	-377.3	-230.4
63009	Cambridge Gen	16	NE	Isanti	0	33.8	-377.3	-230.4
62270	Cambridge Industrial Park Bank 1	69	NE	Isanti	0	33.4	-363.4	-222.0
38871	Camp Ripley East Sub	34.5	NE	Morrison	0	34.8	12.4	17.2
61817	Carl Tap	24	NE	Carlton	0	29.8	-238.5	-288.9
62057	Cascade	69	NE	Cook	18	24.1	-48.5	-18.9
63347	Cass Lake	69	NE	Cass	0	34.3	-170.6	29.7
63248	Cass Lake N	115	NE	Cass	0	34.2	-170.6	44.9
63349	Cass lake Pipeline	4.2	NE	Cass	0	34.1	-170.6	30.8
63247	Cass Lake S	115	NE	Cass	0	35.3	-170.6	44.9
63197	Cass Lake Y	115	NE	Cass	0	32.3	-170.6	44.9

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62463	Cedar Valley	69	NE	St. Louis	75	29.2	-40.9	10.8
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2
61626	Clay Boswell	230	NE	Itasca	1,141	31.0	-80.2	31.4
62502	Clear Lake	46	NE	St. Louis	75	29.0	25.8	28.7
61668	Cloquet	115	NE	Carlton	0	31.4	-34.0	159.0
62172	Clover Valley	115	NE	St. Louis	75	24.4	-36.2	13.2
38921	CMEC	34.5	NE	Morrison	0	33.1	12.7	13.8
62449	Cohasset	115	NE	Itasca	1,141	30.5	74.4	77.6
61790	Cohasset Tap	115	NE	Itasca	1,141	31.2	74.4	77.6
61688	Colbyville	115	NE	St. Louis	75	26.9	-34.6	24.5
62055	Colville	69	NE	Cook	18	21.7	-48.5	-18.9
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0
62493	Cook	69	NE	St. Louis	75	28.0	59.4	58.0
62452	Cotton	115	NE	St. Louis	75	27.3	-46.1	25.7
61720	Cotton Tap	115	NE	St. Louis	75	27.8	-46.1	96.4
38899	Crestliner	34.5	NE	Morrison	0	33.7	10.7	11.0
61655	Cromwell	115	NE	Carlton	0	31.4	-41.5	62.3
62459	Cromwell	69	NE	Carlton	0	32.1	-41.7	60.4
62470	Cromwell	69	NE	Carlton	0	31.4	-42.5	86.4
62514	Cromwell Tertitary	13.2	NE	Carlton	0	30.8	-41.5	9.1
62510	Crooked Lake	115	NE	Itasca	1,141	30.2	117.5	119.0
62511	Crooked Lake Tap	115	NE	St. Louis	75	32.6	147.5	149.0
38609	Crosby	34.5	NE	Crow Wing	0	30.0	14.5	17.3
38616	Crosby MFG	34.5	NE	Crow Wing	0	29.1	18.0	19.1
38605	Crosby Tap	34.5	NE	Crow Wing	0	30.0	14.5	17.3
62183	Crosslake	69	NE	Crow Wing	0	30.3	26.3	-27.8
62198	Crosslake City	69	NE	Crow Wing	0	31.5	31.4	33.0
38615	Cuyuna	34.5	NE	Crow Wing	0	29.7	13.1	15.1
38612	Cuyuna Tap	34.5	NE	Crow Wing	0	29.6	13.1	15.1
62283	Dalbo	69	NE	Isanti	0	33.7	-313.8	-191.9
62284	Dalbo Tap	69	NE	Isanti	0	33.7	-313.8	-191.9
61780	Deer River	115	NE	Itasca	1,141	37.6	57.9	58.7
62450	Deer River	115	NE	Itasca	1,141	37.6	56.0	56.0

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62487	Deer River	69	NE	Itasca	1,141	32.5	78.3	88.8
62515	Deer River Tertitary	12.5	NE	Itasca	1,141	31.5	0.5	0.5
38614	Deerwood	34.5	NE	Crow Wing	0	30.4	13.1	15.1
61811	Denham	46	NE	Pine	0	29.4	-318.6	-295.6
62307	Denham	69	NE	Pine	0	31.1	-321.8	-285.6
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8
61644	Dog Lake	115	NE	Cass	0	33.7	102.7	123.8
61844	Dog Lake	34.5	NE	Todd	30	33.6	25.4	28.2
38704	Dog Lake Tap	34.5	NE	Todd	30	33.2	25.4	31.8
61646	Dog Lake Tap	115	NE	Cass	0	33.3	134.3	159.7
38752	Dorset	34.5	NE	Hubbard	0	34.7	-481.0	20.0
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8
62379	Eagle Lake	34.5	NE	Hubbard	0	33.6	24.3	26.3
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8
38892	East Side Sub Tap	34.5	NE	Morrison	0	34.2	13.1	14.4
38859	EAST88	34.5	NE	Morrison	0	34.3	13.1	14.4
61862	Ely Sub A	46	NE	St. Louis	75	26.4	19.2	20.1
61872	Ely Sub B	46	NE	St. Louis	75	25.7	25.3	27.9
61879	Ely Sub Tap	46	NE	St. Louis	75	27.3	25.3	27.9
62184	Emily	69	NE	Crow Wing	0	30.1	15.3	16.9
62477	Enbridge Blackberry	69	NE	Itasca	1,141	31.7	33.3	20.7
62464	Enbridge Gowan	69	NE	St. Louis	75	29.5	-40.1	41.4
38464	Erie	4.8	NE	St. Louis	75	28.8	50.0	18.7
38920	Ethanol	34.5	NE	Morrison	0	32.5	10.9	11.2
61721	Eveleth Taconite Co.	115	NE	St. Louis	75	29.4	165.4	44.8
61723	Eveleth Taconite Co. Gen	13.8	NE	St. Louis	75	29.4	162.8	44.8
62699	Evensen	69	NE	Itasca	1,141	32.2	10.8	11.3
38889	Fairgrounds	34.5	NE	Morrison	0	34.3	10.0	10.0
62194	Fifty Lakes	69	NE	Crow Wing	0	30.6	35.1	38.3
61694	Finland	115	NE	Lake	0	24.1	-44.7	-16.0
62171	Finland	115	NE	Lake	0	24.8	-44.7	-16.0
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1
61663	Floodwood	115	NE	St. Louis	75	29.9	-42.4	103.9
61669	Floodwood	115	NE	St. Louis	75	30.5	-41.9	62.3
62404	Fond Du Lac	46	NE	Carlton	0	27.9	-252.5	-307.5
62409	Fond Du Lac	69	NE	Carlton	0	26.0	-252.5	-307.5
61666	Fond du-Lac	115	NE	St. Louis	75	27.5	-31.8	87.2
60100	Forbes	500	NE	St. Louis	75	27.3	234.9	861.6
60101	Forbes	500	NE	St. Louis	75	27.7	234.9	861.6
61624	Forbes	230	NE	St. Louis	75	27.7	242.6	822.6
61722	Forbes	115	NE	St. Louis	75	27.7	-14.7	-99.8
61550	Forbes 1 Junction	230	NE	St. Louis	75	27.7	243.8	474.0
61551	Forbes 1 TR9	34.5	NE	St. Louis	75	26.8	50.0	50.0
61553	Forbes 2 TR9	34.5	NE	St. Louis	75	27.7	50.0	50.0
61552	Forbes Junction	230	NE	St. Louis	75	27.7	243.8	473.5
61564	Forbes Junction	115	NE	St. Louis	75	27.7	238.7	260.2
61565	Forbes TR9	13.8	NE	St. Louis	75	27.6	20.0	20.0
38653	Fort Ripley	34.5	NE	Crow Wing	0	32.5	-11.4	18.2
62445	Four Corners	115	NE	St. Louis	75	31.5	-33.6	35.0
62472	Four Corners	69	NE	St. Louis	75	29.9	-35.4	35.0
62516	Four Corners Tap	12.8	NE	St. Louis	75	31.2	-33.6	28.0
62501	Frazer	69	NE	St. Louis	75	28.2	61.4	52.5
61689	French River	115	NE	St. Louis	75	26.0	-35.8	14.9
61679	Gary	115	NE	St. Louis	75	24.0	-24.3	209.0
62644	Glen	69	NE	Aitkin	0	32.6	-555.6	-541.0
62478	Goodland	69	NE	Itasca	1,141	31.3	14.4	14.8
62462	Gowan	69	NE	St. Louis	75	29.9	-40.3	31.0
62471	Gowan	69	NE	St. Louis	75	28.6	-40.2	48.4
62466	Grand Lake	69	NE	St. Louis	75	30.9	-36.8	40.6
61918	Grand Marais	69	NE	Cook	18	18.6	-48.5	-18.9
62054	Grand Marais Tap	69	NE	Cook	18	24.7	-48.5	-18.9
61740	Grand Rapids	115	NE	Itasca	1,141	31.7	178.5	109.9
62291	Grasston	69	NE	Pine	0	33.1	-474.1	-409.4
62313	Grindstone River	69	NE	Pine	0	30.8	-480.6	-493.8
38676	Gull Lake	34.5	NE	Crow Wing	0	34.5	18.3	18.9

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62475	Gunn	69	NE	Itasca	1,141	31.5	27.2	16.7
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0
9372	Gutherie	69	NE	Hubbard	0	35.2	-170.6	29.7
9371	Gutherie Tap	69	NE	Cass	0	34.3	-170.6	29.7
61727	H. T. Pumps	115	NE	St. Louis	75	30.1	248.8	248.8
38746	Hackensack	34.5	NE	Cass	0	33.6	25.3	27.5
61855	Hackensack	34.5	NE	Cass	0	33.0	24.2	27.2
61674	Haines Road	115	NE	St. Louis	75	29.5	-33.8	162.4
62306	Harry Maser	69	NE	Pine	0	32.3	-541.3	-596.6
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0
38873	Hennepin Paper	34.5	NE	Morrison	0	33.2	15.3	17.5
62318	HENNRIE8 _1	69	NE	Kanabec	0	32.6	-479.6	-429.7
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8
61677	Hibbard	14	NE	St. Louis	75	19.7	-28.1	31.0
61724	Hibbing	115	NE	St. Louis	75	34.3	188.9	197.8
61728	Hibbing Taconite	115	NE	St. Louis	75	36.6	-428.6	-80.3
61729	Hibbing Taconite Generator	13.8	NE	St. Louis	75	36.6	-428.6	-80.3
61726	Hibbing Taconite Pump	13.8	NE	St. Louis	75	32.3	25.8	25.8
38893	High School	34.5	NE	Morrison	0	34.2	12.0	12.9
38890	Highway 10 77	34.5	NE	Morrison	0	33.1	10.0	10.0
38624	Highway 12	34.5	NE	Crow Wing	0	32.0	13.1	15.1
62448	Hill City	115	NE	Aitkin	0	31.1	60.4	43.6
61576	Hilltop	115	NE	St. Louis	75	27.5	-28.3	165.7
61616	Hilltop	230	NE	St. Louis	75	28.7	-36.9	205.0
61672	Hilltop	115	NE	St. Louis	75	27.5	-29.3	251.9
61577	Hilltop Transformer	13.8	NE	St. Louis	75	27.5	-28.3	20.0
62304	Hinckley	69	NE	Pine	0	31.7	-520.1	-586.9
62312	Hinckley - MP	69	NE	Pine	0	27.3	-480.6	-493.8
62311	Hinckley Tap	69	NE	Pine	0	31.7	-473.4	-621.9
61804	Hinkley East S78	46	NE	Pine	0	29.7	-759.9	-778.4
38463	Hoyt Lakes	46	NE	St. Louis	75	26.3	15.0	18.2

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61698	Hoyt Lakes	138	NE	St. Louis	75	33.3	-56.8	2.3
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3
63053	Hubbard	230	NE	Hubbard	0	35.9	220.8	323.7
63078	Hubbard tap	13.8	NE	Hubbard	0	35.9	38.0	38.0
62296	INDST Tap	69	NE	Isanti	0	34.2	-363.4	-222.0
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9
38824	Industrial Park - REG	34.5	NE	Todd	30	38.2	10.0	-1.4
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1
61715	Inland Generator	13.8	NE	St. Louis	75	30.8	109.8	110.0
38415	Inland Industrial	46	NE	St. Louis	75	30.1	17.0	17.0
61709	Inland Taconite Co.	115	NE	St. Louis	75	30.8	176.0	176.1
9273	International Falls	69	NE	Koochiching	0	32.1	30.9	33.0
61752	International Falls	118	NE	Koochiching	0	34.2	221.9	138.0
61753	International Falls	12.5	NE	Koochiching	0	34.2	68.8	72.6
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2
62453	Iron	115	NE	St. Louis	75	27.8	99.6	45.5
61734	Iron Tap	115	NE	St. Louis	75	28.2	133.6	45.5
38604	Ironton	34.5	NE	Crow Wing	0	29.6	13.4	13.7
38602	Ironton Switch	34.5	NE	Crow Wing	0	29.6	14.5	17.3
38603	Ironton Tap	34.5	NE	Crow Wing	0	29.6	14.5	17.3
62109	Isanti	69	NE	Isanti	0	34.0	-333.3	-263.5
62141	Isanti SS	69	NE	Isanti	0	34.4	-333.3	-263.5
62302	Isle	69	NE	Mille Lacs	0	36.7	-588.7	-452.1
62696	Jessie Lake	69	NE	Itasca	1,141	31.0	15.5	16.4
9274	Kabetogama	69	NE	St. Louis	75	31.5	30.9	33.0
61706	Keewatin	115	NE	St. Louis	75	32.4	100.4	101.0
62455	Keewatin	115	NE	St. Louis	75	32.3	99.4	100.0
61805	Kerrick	46	NE	Pine	0	29.0	-327.4	-307.6
62468	Kettle River SS	69	NE	Carlton	0	31.4	-222.0	-271.5
62637	Kimberly	115	NE	Aitkin	0	31.8	-53.0	109.2
62216	Knife Lake	69	NE	Mille Lacs	0	36.7	-557.2	-615.5

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62217	Knife Lake Tap	69	NE	Mille Lacs	0	36.7	-557.2	-615.5
62422	Kramer Lake	115	NE	Hubbard	0	34.4	-481.0	125.4
61681	Lake Superior Paper	115	NE	St. Louis	75	25.5	-28.2	242.5
61682	Lake Superior Paper	14.3	NE	St. Louis	75	25.5	-28.2	191.8
61791	Lakehead Pumping Station	115	NE	Itasca	1,141	31.7	69.9	70.8
62486	Lakehead Tap	69	NE	Itasca	1,141	32.0	33.3	20.7
62451	Lakeland	115	NE	St. Louis	75	26.4	63.7	20.1
66716	Laporte	115	NE	Hubbard	0	34.2	-259.6	66.8
38894	Larson	34.5	NE	Morrison	0	34.6	6.3	6.5
38460	Laskin	46	NE	St. Louis	75	27.8	15.0	18.2
61575	Laskin	13.8	NE	St. Louis	75	27.8	5.0	5.0
61701	Laskin	138	NE	St. Louis	75	27.4	-58.2	5.0
61574	Laskin Junction	115	NE	St. Louis	75	28.8	5.0	5.0
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0
38421	Laurentian Mine	46	NE	St. Louis	75	30.0	17.7	18.0
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0
66715	Leech Lake	115	NE	Cass	0	35.7	-259.6	66.8
61850	Little Falls	34.5	NE	Morrison	0	34.7	64.5	71.2
62204	Little Falls	34.5	NE	Morrison	0	34.6	21.0	19.5
38872	Little Falls HE	34.5	NE	Morrison	0	32.8	5.9	5.9
38908	Little Falls HE	34.5	NE	Morrison	0	34.6	5.9	5.9
38910	Little Falls Industrial Park	34.5	NE	Morrison	0	34.6	6.7	7.1
61650	Little Falls S68	115	NE	Morrison	0	34.6	161.6	194.6
38887	Little Falls South	34.5	NE	Morrison	0	34.2	20.6	21.7
38905	Little Falls West Side	34.5	NE	Morrison	0	33.3	12.4	13.4
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1
9271	Littlefork	69	NE	Koochiching	0	32.3	30.9	32.9
9425	Littlefork	69	NE	Koochiching	0	31.3	30.9	33.0
61751	Littlefork	118	NE	Koochiching	0	31.6	198.0	196.5
9270	Loman	69	NE	Koochiching	0	31.2	6.5	8.4
62411	Long Lake	115	NE	Hubbard	0	34.8	220.4	231.2

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62421	Long Lake	34.5	NE	Hubbard	0	34.1	78.7	89.5
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6
38781	Long Lake Cap Bank	34.5	NE	Hubbard	0	34.4	34.1	34.2
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7
62271	Long Siding	69	NE	Mille Lacs	0	34.7	-283.9	-257.4
62199	Longville	69	NE	Cass	0	32.4	30.4	32.9
62200	Longville	69	NE	Cass	0	32.4	30.4	32.9
66760	Lund	230	NE	Koochiching	0	31.4	22.6	28.8
66801	Lund	69	NE	Koochiching	0	31.6	15.5	19.8
62052	Lutsen	69	NE	Cook	18	24.4	-48.5	-18.9
61676	M. L. Hibbard	115	NE	St. Louis	75	19.7	-28.1	241.5
38619	Macmillan	34.5	NE	Crow Wing	0	30.9	20.4	19.5
38620	MacMillan	4.2	NE	Crow Wing	0	30.3	10.4	8.8
38618	Macmillan G1	34.5	NE	Crow Wing	0	30.9	17.1	17.0
38622	Macmillan G2	34.5	NE	Crow Wing	0	30.9	17.0	17.0
38621	Macmillan Waferizer	4.2	NE	Crow Wing	0	31.0	10.4	8.8
61656	Mahtowa	115	NE	Carlton	0	29.7	-238.5	-288.9
61807	Mahtowa	46	NE	Carlton	0	29.3	-242.2	-295.6
61809	Mahtowa	46	NE	Carlton	0	29.7	-238.5	-288.9
61814	Mahtowa	24	NE	Carlton	0	28.9	-238.5	-288.9
61815	Mahtowa	24	NE	Carlton	0	29.9	-238.5	-288.9
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3
62417	Mantrap	34.5	NE	Hubbard	0	33.1	24.3	26.3
62053	Maple Hill	69	NE	Cook	18	25.6	-48.5	-18.9
62056	Maple Hill Tap	69	NE	Cook	18	26.3	-48.5	-18.9
38608	Maroco	34.5	NE	Crow Wing	0	30.3	10.0	10.0
38611	Maroco Tap	34.5	NE	Crow Wing	0	30.3	13.1	15.1
62636	McGregor	115	NE	Aitkin	0	32.0	-48.9	111.5
38416	McKinley	46	NE	St. Louis	75	30.5	17.0	17.0
62492	Meadowbrook	69	NE	St. Louis	75	29.0	33.7	34.9

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61670	Meadowlands	115	NE	St. Louis	75	31.1	-42.4	100.7
38787	Menahga	34.5	NE	Wadena	0	33.5	17.1	17.2
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4
38788	Menahga SS	34.5	NE	Wadena	0	34.9	18.5	18.8
62176	Merrifield	115	NE	Crow Wing	0	31.3	112.4	114.4
61687	Midway	115	NE	St. Louis	75	29.7	-33.1	137.6
61910	Milaca	230	NE	Mille Lacs	0	34.5	-84.2	-82.7
62301	Milaca	69	NE	Mille Lacs	0	34.5	-503.1	-537.5
62273	Milaca Bank 1	69	NE	Mille Lacs	0	34.5	-502.8	-537.1
61909	Milaca Tap	13.2	NE	Mille Lacs	0	34.4	-84.2	-82.7
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1
38897	Minnesota Power	34.5	NE	Morrison	0	33.6	10.7	11.0
38896	Minnesota Power Tap	34.5	NE	Morrison	0	33.6	10.7	11.0
61623	Minntac	230	NE	St. Louis	75	32.8	247.9	722.3
61707	Minntac	115	NE	St. Louis	75	32.4	99.0	39.5
61710	Minntac	115	NE	St. Louis	75	33.1	248.3	420.1
61558	Minntac Junction 1	115	NE	St. Louis	75	31.8	247.6	326.3
61560	Minntac Junction 2	115	NE	St. Louis	75	31.8	247.6	326.9
61714	Minntac Load A	13.8	NE	St. Louis	75	34.6	172.1	173.0
61713	Minntac Load C	13.8	NE	St. Louis	75	33.7	242.4	243.2
61712	Minntac Tap A	115	NE	St. Louis	75	34.6	248.3	349.0
61711	Minntac Tap C	115	NE	St. Louis	75	34.6	248.3	385.0
61559	Minntac Transformer 1	13.8	NE	St. Louis	75	31.8	20.0	20.0
61561	Minntac Transformer 2	13.8	NE	St. Louis	75	31.8	20.0	20.0
9461	Mission	69	NE	Cass	0	34.3	-189.4	33.4
62192	Mission	69	NE	Crow Wing	0	30.3	26.3	-27.8
38856	MN Pipeline Darling	34.5	NE	Morrison	0	34.8	19.6	20.6
62970	Moose Lake C10	69	NE	Carlton	0	29.1	-222.0	-271.5
62971	Moose Lake MN	69	NE	Carlton	0	31.1	-222.0	-271.5
62473	Moose Lake Tap	69	NE	Carlton	0	30.7	-222.0	-271.5
61914	Mora	69	NE	Kanabec	0	32.7	-490.3	-501.1
62303	Mora	69	NE	Kanabec	0	32.7	-490.3	-501.1
38705	Motley	34.5	NE	Morrison	0	32.9	24.1	25.2

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All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62205	Motley	34.5	NE	Morrison	0	33.2	19.8	21.7
38883	MP Flensberg	34.5	NE	Morrison	0	33.0	12.4	17.3
61617	Mud Lake	230	NE	Crow Wing	0	32.2	236.1	246.8
61651	Mud Lake	115	NE	Crow Wing	0	33.4	-9.5	53.4
61578	Mud Lake Junction	115	NE	Crow Wing	0	32.7	175.7	81.4
61579	Mud Lake Transformer	13.8	NE	Crow Wing	0	34.0	20.0	20.0
66710	Nary	115	NE	Hubbard	0	36.1	-205.7	81.3
61737	Nashwauk	115	NE	Itasca	1,141	32.4	241.0	227.2
38500	Nashwauk Tap	34.5	NE	Itasca	1,141	33.6	16.0	16.4
61732	National G	13.8	NE	St. Louis	75	33.4	180.9	181.3
61762	National Steel Mill Generator	13.8	NE	Lake	0	22.4	-43.1	5.0
61764	National Steel Mill Generator	13.8	NE	Lake	0	22.6	-43.1	5.0
61765	National Steel Mill Generator	13.8	NE	Lake	0	20.9	-43.1	5.0
61767	National Steel Mill Generator	13.8	NE	Lake	0	22.3	-43.1	5.0
61783	National Steel Mill Syn Condenser	13.8	NE	Lake	0	20.4	-43.1	5.0
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4
38751	Nevis	34.5	NE	Hubbard	0	33.6	-481.0	19.4
62418	Nevis	34.5	NE	Hubbard	0	34.6	-481.0	22.0
38724	Nisswa	34.5	NE	Crow Wing	0	31.5	25.6	27.3
62202	Nokay	115	NE	Crow Wing	0	33.8	123.1	66.2
7918	North Cass County	69	NE	Cass	0	34.7	-170.6	22.5
62321	North Milaca	69	NE	Mille Lacs	0	32.2	-557.6	-621.3
62855	North Parker	34.5	NE	Morrison	0	34.3	17.8	19.8
63348	North Pipeline	4.2	NE	Cass	0	35.0	-170.6	26.0
38912	North Sub	34.5	NE	Morrison	0	33.9	8.9	10.2
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6
38655	NW Paper	34.5	NE	Crow Wing	0	33.1	-11.4	31.5
38656	NW Paper Tap	34.5	NE	Crow Wing	0	29.8	-11.4	30.1
62181	Oak Lawn	69	NE	Crow Wing	0	33.3	-81.4	-107.7
62190	Oak Lawn Tap	69	NE	Crow Wing	0	33.2	-81.4	-107.7
38898	Oakes	34.5	NE	Morrison	0	34.1	13.9	15.6
62280	Ogilvie	69	NE	Kanabec	0	33.1	-501.8	-529.0
8537	Old Mill	12.5	NE	Hubbard	0	36.4	-170.6	18.7

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62642	Onamia	69	NE	Mille Lacs	0	35.2	-620.7	-476.8
38744	Onigum	34.5	NE	Cass	0	34.1	25.8	27.5
62507	Onigum	34.5	NE	Cass	0	34.8	10.5	11.1
62643	Opstead	69	NE	Mille Lacs	0	36.8	-668.1	-513.3
62648	Opstead Tap	69	NE	Mille Lacs	0	36.6	-668.1	-513.3
62505	Orr	69	NE	St. Louis	75	27.7	59.4	58.0
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6
62908	Orton	34.5	NE	Wadena	0	34.7	18.0	18.2
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0
62185	Ox Lake	69	NE	Crow Wing	0	31.3	39.0	43.8
62649	Palisade	69	NE	Aitkin	0	32.7	-41.7	14.3
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9
62416	Park Rapids	34.5	NE	Hubbard	0	34.8	24.3	31.7
38784	Park Rapids Tap	34.5	NE	Hubbard	0	34.8	34.0	34.0
62454	Peary	115	NE	St. Louis	75	25.9	-58.8	50.9
38721	Pequoet Lake District	34.5	NE	Crow Wing	0	32.9	35.3	34.3
62211	Pequot Lake Tap	13.2	NE	Crow Wing	0	32.9	8.4	8.4
61648	Pequot Lakes	115	NE	Crow Wing	0	32.9	148.0	140.2
61848	Pequot Lakes	34.5	NE	Crow Wing	0	32.9	36.9	34.2
62195	Pequot Lakes	69	NE	Crow Wing	0	32.7	36.7	-38.9
62405	Peterson	24	NE	Carlton	0	29.5	-238.5	-288.9
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0
62496	Pike River	69	NE	St. Louis	75	29.6	35.0	36.6
38672	Pillager	34.5	NE	Cass	0	31.9	16.8	17.5
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1
38674	Pine Beach	34.5	NE	Cass	0	31.5	19.3	20.8
62182	Pine Center	69	NE	Crow Wing	0	33.3	-205.9	-238.3
62191	Pine Center Tap	69	NE	Crow Wing	0	33.4	-60.3	-80.4
62275	Pine City	69	NE	Pine	0	33.0	-330.9	-374.3
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1
38722	Pine River	34.5	NE	Cass	0	33.3	30.0	30.0

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
38723	Pine River	34.5	NE	Cass	0	34.0	31.9	32.8
61854	Pine River	34.5	NE	Cass	0	34.2	30.0	30.0
62201	Pine River	115	NE	Cass	0	32.9	169.0	177.1
38418	Pineville	46	NE	St. Louis	75	26.7	17.9	18.3
61716	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3
61717	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3
61719	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3
61786	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3
61787	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3
61788	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3
62207	Pleasant Lake	69	NE	Cass	0	32.4	26.1	27.0
61699	Polymet	138	NE	St. Louis	75	29.4	-56.0	-7.9
7950	Potlatch	69	NE	Hubbard	0	35.8	-170.6	33.5
61667	Potlatch	115	NE	Carlton	0	31.9	-33.8	93.1
62494	Potlatch	69	NE	St. Louis	75	28.5	37.7	40.5
62498	Potlatch	69	NE	St. Louis	75	28.9	37.7	40.5
7949	Potlatch Tap	69	NE	Hubbard	0	36.3	-170.6	31.1
62292	Princeton	69	NE	Mille Lacs	0	34.4	-266.6	-237.0
61921	Princeton North	69	NE	Mille Lacs	0	34.2	-273.2	-199.9
61924	Princeton South	69	NE	Mille Lacs	0	32.5	-340.0	-326.1
9272	Rat Root River	69	NE	Koochiching	0	30.5	30.9	33.0
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5
62489	Remer	69	NE	Cass	0	31.5	48.3	49.6
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9
61675	Ridge View	115	NE	St. Louis	75	29.2	-34.1	35.5
61612	Riverton	230	NE	Crow Wing	0	30.4	241.3	343.0
61653	Riverton	115	NE	Crow Wing	0	29.6	240.0	284.4
61796	Riverton	115	NE	Crow Wing	0	29.6	150.5	135.2
61797	Riverton	13.8	NE	Crow Wing	0	30.1	37.9	37.9
61853	Riverton	34.5	NE	Crow Wing	0	28.8	36.0	40.7
62180	Riverton	69	NE	Crow Wing	0	29.6	-63.1	-63.3

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62212	Riverton	12.8	NE	Crow Wing	0	29.6	9.1	9.1
38617	Riverton Downtown	34.5	NE	Crow Wing	0	29.6	17.1	17.3
38601	Riverton Rural	34.5	NE	Crow Wing	0	29.6	14.7	17.6
38915	Riverview Drive 44	34.5	NE	Morrison	0	33.6	13.9	15.2
38914	Riverview F	34.5	NE	Morrison	0	33.4	13.4	14.7
60361	Rock Creek	230	NE	Pine	0	31.8	197.8	-19.9
61192	Rock Creek	69	NE	Pine	0	31.4	57.5	-19.9
63023	Rock Lake	69	NE	Pine	0	33.4	-330.9	-374.3
62461	Round Lake	69	NE	Aitkin	0	30.9	-41.7	11.9
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3
62652	Rum River	69	NE	Mille Lacs	0	34.5	-625.5	-480.5
66753	Running	230	NE	Koochiching	0	30.7	271.3	296.7
66764	Running	13.2	NE	Koochiching	0	30.3	28.0	28.0
66765	Running	13.2	NE	Koochiching	0	30.7	28.0	28.0
66778	Running	230	NE	Koochiching	0	30.7	70.0	70.0
66779	Running	230	NE	Koochiching	0	30.7	44.8	56.0
66780	Running	69	NE	Koochiching	0	30.7	44.8	56.0
67017	Running	69	NE	Koochiching	0	30.7	30.9	50.4
60167	Running Switch Cap	230	NE	Koochiching	0	32.6	271.3	296.7
62482	Salem SS	69	NE	Cass	0	32.8	46.8	47.5
62495	Sand Lake	69	NE	St. Louis	75	29.5	10.9	11.8
62499	Sand Lake Tap	69	NE	St. Louis	75	29.1	33.6	34.6
61808	Sand46	46	NE	Pine	0	28.7	-488.6	-539.2
62305	Sandstone	69	NE	Pine	0	30.1	-771.5	-790.3
62310	Sandstone S76	69	NE	Pine	0	28.0	-455.5	-502.9
62309	Sandstone SW	69	NE	Pine	0	28.1	-771.5	-790.3
62308	Sandstone Tap	69	NE	Pine	0	30.8	-455.0	-502.3
62051	Schroeder Bank 1	69	NE	Cook	18	22.5	-48.5	-18.9
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8
61749	Shannon	115	NE	St. Louis	75	31.5	251.0	376.6

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61785	Shannon	115	NE	St. Louis	75	34.9	143.7	153.0
62490	Shannon	69	NE	St. Louis	75	31.5	35.0	36.7
61750	Shannon 2TR	13.8	NE	St. Louis	75	31.7	20.0	20.0
61562	Shannon Junction	115	NE	St. Louis	75	31.5	142.9	152.2
61563	Shannon Junction Transformer	13.8	NE	St. Louis	75	31.5	20.0	20.0
61627	Shannon S26	230	NE	St. Louis	75	31.5	252.1	558.4
62518	Shannon Tap	13.2	NE	St. Louis	75	31.5	8.4	8.4
62220	Shim Lake Tap	34.5	NE	Morrison	0	33.0	21.3	22.8
62219	Shimn Tap	34.5	NE	Morrison	0	33.2	21.3	22.8
62491	Side Lake	69	NE	St. Louis	75	29.9	35.0	36.7
61691	Silver Bay	115	NE	Lake	0	21.7	-43.0	5.0
61692	Silver Bay	115	NE	Lake	0	21.8	-43.1	5.0
61763	Silver Bay P	13.8	NE	Lake	0	22.1	-43.1	5.0
61766	Silver Bay P	13.8	NE	Lake	0	20.8	-43.1	5.0
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3
62467	Solway	69	NE	St. Louis	75	30.1	-35.6	36.8
61873	Soudan Park Mine	46	NE	St. Louis	75	32.0	26.1	29.1
62210	Southdale Bank 1	115	NE	Crow Wing	0	30.0	134.7	141.2
62213	Southdale Tap	115	NE	Crow Wing	0	31.2	141.3	166.4
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5
62645	Spirit Lake	69	NE	Aitkin	0	33.5	-174.3	-214.6
62647	Spirit Lake Switch	69	NE	Aitkin	0	33.8	-174.3	-214.6
38789	Spirit Lake Tap	34.5	NE	Wadena	0	34.8	19.8	20.4
61864	St. Croix	46	NE	St. Louis	75	25.0	17.2	17.4
62127	St. Francis Tap	69	NE	Isanti	0	33.9	-299.4	-381.9
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1
38706	Staples Rural	34.5	NE	Todd	30	34.3	25.4	34.1
62188	Stonybrook	69	NE	Cass	0	33.6	36.7	-38.9
62179	Stonybrook Tap	69	NE	Crow Wing	0	32.7	36.7	-38.9
8536	Stud Mill	12.5	NE	Hubbard	0	35.8	-170.6	9.8
62469	Sturgeon Lake	69	NE	Pine	0	30.9	-222.0	-271.5
38886	Sunbridge St	34.5	NE	Morrison	0	34.2	20.6	21.8
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9
61702	Syl Laskin	115	NE	St. Louis	75	27.8	85.9	18.7
38651	Sylvan H.E.	34.5	NE	Cass	0	30.6	-11.4	22.6
61572	Tachonite Harbor Tap	115	NE	Cook	18	23.4	-48.1	-32.2
61573	Taconite	13.8	NE	Cook	18	23.4	-48.1	-32.2
61693	Taconite Harbor	13.2	NE	Cook	18	23.4	-49.8	-32.2
61696	Taconite Harbor	138	NE	Cook	18	21.8	-49.8	-32.2
62049	Taconite Harbor	12.8	NE	Cook	18	23.4	-48.5	-18.9
62050	Taconite Harbor	69	NE	Cook	18	23.4	-48.5	-18.9
61697	Taconite Harbor S42	115	NE	Cook	18	23.4	-48.5	-18.9
38745	Ten Mile Lake	34.5	NE	Cass	0	34.5	25.8	27.5
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2
61665	Thompson	115	NE	Carlton	0	25.2	-32.7	102.9
61803	Thompson	46	NE	Carlton	0	22.3	-252.5	-307.5
62186	Thunder Lake	69	NE	Cass	0	31.9	50.1	52.3
61735	Thunderbird Mine	115	NE	St. Louis	75	29.0	94.6	47.8
61736	Thunderbird Mine	115	NE	St. Louis	75	30.5	46.5	14.9
61883	Tower	115	NE	St. Louis	75	32.1	72.7	40.7
62500	Tower	69	NE	St. Louis	75	32.1	61.4	45.8
62508	Tower	13.8	NE	St. Louis	75	32.1	71.0	40.2
61882	Tower - Soudan	46	NE	St. Louis	75	32.1	46.8	38.2
61874	Tower Soudan	46	NE	St. Louis	75	32.1	28.5	31.1
62412	Tripp Lake	115	NE	Hubbard	0	33.7	-830.6	39.3
38610	Trommald	34.5	NE	Crow Wing	0	29.0	13.3	15.4
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7
61690	Two Harbors	115	NE	Lake	0	22.8	-37.5	9.9
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3
62506	Vermilion	46	NE	St. Louis	75	29.6	27.3	29.3
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2
62650	Vineland	69	NE	Mille Lacs	0	38.8	-588.9	-573.2
62651	Vineland Tap	69	NE	Crow Wing	0	33.2	-205.9	-238.3
61870	Virginia	46	NE	St. Louis	75	28.1	20.2	22.3

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62497	Virginia	69	NE	St. Louis	75	28.1	35.0	36.6
61708	Virginia S27	115	NE	St. Louis	75	28.1	183.1	35.0
62517	Virginia Tap	13.2	NE	St. Louis	75	28.1	8.4	8.4
62189	Wabedo	69	NE	Cass	0	34.2	30.4	32.9
62170	Waldo SS	115	NE	Lake	0	23.4	-37.8	5.0
38743	Walker	34.5	NE	Cass	0	37.2	-481.0	26.9
62485	Warba Switch	69	NE	Itasca	1,141	30.8	39.5	24.9
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5
62218	White Fish Lake	69	NE	Crow Wing	0	31.5	33.4	-35.4
62215	White Fish Lake Tap	69	NE	Crow Wing	0	30.6	33.4	-35.4
62639	Wilson Lake	115	NE	Crow Wing	0	34.1	-92.8	-100.2
62646	Wilson Lake	69	NE	Crow Wing	0	34.9	-44.1	-56.3
62653	Wilson Lake Tap	12.8	NE	Crow Wing	0	34.2	-99.1	-107.0
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1
63058	Wing River	230	NE	Wadena	0	37.7	251.7	245.6
62894	Wing River Transformer	13.8	NE	Wadena	0	37.4	37.9	37.9
61861	Winton	46	NE	Lake	0	26.5	23.5	25.3
62503	Winton	46	NE	St. Louis	75	27.0	19.0	19.8
62698	Wirt	69	NE	Itasca	1,141	33.1	10.8	11.3
62700	Wirt Tap Switches SS	69	NE	Itasca	1,141	31.6	10.8	11.3
61664	Wrenshall	115	NE	Carlton	0	28.1	-33.7	111.2
62460	Wright	69	NE	Carlton	0	31.4	-41.7	11.4

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62412	Tripp Lake	115	NE	Hubbard	0	33.7	-830.6	39.3	-830.6	SUOP
61640	Badoura	115	NE	Hubbard	0	33.1	-814.9	277.3	-814.9	SUOP
62314	Bear Creek	69	NE	Pine	0	28.7	-439.1	-794.0	-794	SUPK
62305	Sandstone	69	NE	Pine	0	30.1	-771.5	-790.3	-790.3	SUPK
62309	Sandstone SW	69	NE	Pine	0	28.1	-771.5	-790.3	-790.3	SUPK
61794	Badoura Junction	115	NE	Hubbard	0	33.8	-779.1	193.7	-779.1	SUOP
61795	Badoura Transformer	13.8	NE	Hubbard	0	33.1	-779.1	20.0	-779.1	SUOP
61801	450 Tap	46	NE	Pine	0	31.9	-760.0	-778.4	-778.4	SUPK
61804	Hinkley East S78	46	NE	Pine	0	29.7	-759.9	-778.4	-778.4	SUPK
62643	Opstead	69	NE	Mille Lacs	0	36.8	-668.1	-513.3	-668.1	SUOP
62648	Opstead Tap	69	NE	Mille Lacs	0	36.6	-668.1	-513.3	-668.1	SUOP
62652	Rum River	69	NE	Mille Lacs	0	34.5	-625.5	-480.5	-625.5	SUOP
62311	Hinckley Tap	69	NE	Pine	0	31.7	-473.4	-621.9	-621.9	SUPK
62321	North Milaca	69	NE	Mille Lacs	0	32.2	-557.6	-621.3	-621.3	SUPK
62642	Onamia	69	NE	Mille Lacs	0	35.2	-620.7	-476.8	-620.7	SUOP
62216	Knife Lake	69	NE	Mille Lacs	0	36.7	-557.2	-615.5	-615.5	SUPK
62217	Knife Lake Tap	69	NE	Mille Lacs	0	36.7	-557.2	-615.5	-615.5	SUPK
61806	Askov	46	NE	Pine	0	31.6	-549.1	-605.2	-605.2	SUPK
62306	Harry Maser	69	NE	Pine	0	32.3	-541.3	-596.6	-596.6	SUPK
61810	Anderson Corner	46	NE	Pine	0	31.7	-535.9	-590.8	-590.8	SUPK
62650	Vineland	69	NE	Mille Lacs	0	38.8	-588.9	-573.2	-588.9	SUOP
62302	Isle	69	NE	Mille Lacs	0	36.7	-588.7	-452.1	-588.7	SUOP
62304	Hinckley	69	NE	Pine	0	31.7	-520.1	-586.9	-586.9	SUPK
62644	Glen	69	NE	Aitkin	0	32.6	-555.6	-541.0	-555.6	SUOP
61808	Sand46	46	NE	Pine	0	28.7	-488.6	-539.2	-539.2	SUPK
62301	Milaca	69	NE	Mille Lacs	0	34.5	-503.1	-537.5	-537.5	SUPK
62273	Milaca Bank 1	69	NE	Mille Lacs	0	34.5	-502.8	-537.1	-537.1	SUPK
62280	Ogilvie	69	NE	Kanabec	0	33.1	-501.8	-529.0	-529	SUPK
62310	Sandstone S76	69	NE	Pine	0	28.0	-455.5	-502.9	-502.9	SUPK
62308	Sandstone Tap	69	NE	Pine	0	30.8	-455.0	-502.3	-502.3	SUPK
61914	Mora	69	NE	Kanabec	0	32.7	-490.3	-501.1	-501.1	SUPK
62303	Mora	69	NE	Kanabec	0	32.7	-490.3	-501.1	-501.1	SUPK
62312	Hinckley - MP	69	NE	Pine	0	27.3	-480.6	-493.8	-493.8	SUPK
62313	Grindstone River	69	NE	Pine	0	30.8	-480.6	-493.8	-493.8	SUPK

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38741	Akeley	34.5	NE	Hubbard	0	33.0	-481.0	17.0	-481	SUOP
38742	Akeley	34.5	NE	Hubbard	0	33.2	-481.0	18.5	-481	SUOP
38743	Walker	34.5	NE	Cass	0	37.2	-481.0	26.9	-481	SUOP
38751	Nevis	34.5	NE	Hubbard	0	33.6	-481.0	19.4	-481	SUOP
38752	Dorset	34.5	NE	Hubbard	0	34.7	-481.0	20.0	-481	SUOP
61638	Akeley	115	NE	Hubbard	0	33.0	-481.0	125.4	-481	SUOP
61838	Akeley	34.5	NE	Hubbard	0	33.0	-481.0	29.9	-481	SUOP
62418	Nevis	34.5	NE	Hubbard	0	34.6	-481.0	22.0	-481	SUOP
62422	Kramer Lake	115	NE	Hubbard	0	34.4	-481.0	125.4	-481	SUOP
62318	HENNRIE8 _1	69	NE	Kanabec	0	32.6	-479.6	-429.7	-479.6	SUOP
62291	Grasston	69	NE	Pine	0	33.1	-474.1	-409.4	-474.1	SUOP
62279	Braham	69	NE	Isanti	0	33.7	-431.8	-409.4	-431.8	SUOP
61728	Hibbing Taconite	115	NE	St. Louis	75	36.6	-428.6	-80.3	-428.6	SUOP
61729	Hibbing Taconite Generator	13.8	NE	St. Louis	75	36.6	-428.6	-80.3	-428.6	SUOP
62143	Athens Switch	69	NE	Isanti	0	33.9	-318.8	-406.6	-406.6	SUPK
62127	St. Francis Tap	69	NE	Isanti	0	33.9	-299.4	-381.9	-381.9	SUPK
63009	Cambridge Gen	16	NE	Isanti	0	33.8	-377.3	-230.4	-377.3	SUOP
63022	Cambridge	69	NE	Isanti	0	33.2	-377.3	-230.4	-377.3	SUOP
62275	Pine City	69	NE	Pine	0	33.0	-330.9	-374.3	-374.3	SUPK
63023	Rock Lake	69	NE	Pine	0	33.4	-330.9	-374.3	-374.3	SUPK
62270	Cambridge Industrial Park Bank 1	69	NE	Isanti	0	33.4	-363.4	-222.0	-363.4	SUOP
62296	INDST Tap	69	NE	Isanti	0	34.2	-363.4	-222.0	-363.4	SUOP
61924	Princeton South	69	NE	Mille Lacs	0	32.5	-340.0	-326.1	-340	SUOP
62109	Isanti	69	NE	Isanti	0	34.0	-333.3	-263.5	-333.3	SUOP
62141	Isanti SS	69	NE	Isanti	0	34.4	-333.3	-263.5	-333.3	SUOP
61805	Kerrick	46	NE	Pine	0	29.0	-327.4	-307.6	-327.4	SUOP
62307	Denham	69	NE	Pine	0	31.1	-321.8	-285.6	-321.8	SUOP
61811	Denham	46	NE	Pine	0	29.4	-318.6	-295.6	-318.6	SUOP
62283	Dalbo	69	NE	Isanti	0	33.7	-313.8	-191.9	-313.8	SUOP
62284	Dalbo Tap	69	NE	Isanti	0	33.7	-313.8	-191.9	-313.8	SUOP
61803	Thompson	46	NE	Carlton	0	22.3	-252.5	-307.5	-307.5	SUPK
62404	Fond Du Lac	46	NE	Carlton	0	27.9	-252.5	-307.5	-307.5	SUPK
62409	Fond Du Lac	69	NE	Carlton	0	26.0	-252.5	-307.5	-307.5	SUPK
61807	Mahtowa	46	NE	Carlton	0	29.3	-242.2	-295.6	-295.6	SUPK

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61812	Barnum Tap	46	NE	Carlton	0	27.8	-242.2	-295.6	-295.6	SUPK
61656	Mahtowa	115	NE	Carlton	0	29.7	-238.5	-288.9	-288.9	SUPK
61809	Mahtowa	46	NE	Carlton	0	29.7	-238.5	-288.9	-288.9	SUPK
61813	Barnum	46	NE	Carlton	0	29.4	-238.5	-288.9	-288.9	SUPK
61814	Mahtowa	24	NE	Carlton	0	28.9	-238.5	-288.9	-288.9	SUPK
61815	Mahtowa	24	NE	Carlton	0	29.9	-238.5	-288.9	-288.9	SUPK
61817	Carl Tap	24	NE	Carlton	0	29.8	-238.5	-288.9	-288.9	SUPK
62405	Peterson	24	NE	Carlton	0	29.5	-238.5	-288.9	-288.9	SUPK
62271	Long Siding	69	NE	Mille Lacs	0	34.7	-283.9	-257.4	-283.9	SUOP
61921	Princeton North	69	NE	Mille Lacs	0	34.2	-273.2	-199.9	-273.2	SUOP
62468	Kettle River SS	69	NE	Carlton	0	31.4	-222.0	-271.5	-271.5	SUPK
62469	Sturgeon Lake	69	NE	Pine	0	30.9	-222.0	-271.5	-271.5	SUPK
62473	Moose Lake Tap	69	NE	Carlton	0	30.7	-222.0	-271.5	-271.5	SUPK
62970	Moose Lake C10	69	NE	Carlton	0	29.1	-222.0	-271.5	-271.5	SUPK
62971	Moose Lake MN	69	NE	Carlton	0	31.1	-222.0	-271.5	-271.5	SUPK
62292	Princeton	69	NE	Mille Lacs	0	34.4	-266.6	-237.0	-266.6	SUOP
66715	Leech Lake	115	NE	Cass	0	35.7	-259.6	66.8	-259.6	SUOP
66716	Laporte	115	NE	Hubbard	0	34.2	-259.6	66.8	-259.6	SUOP
62182	Pine Center	69	NE	Crow Wing	0	33.3	-205.9	-238.3	-238.3	SUPK
62651	Vineland Tap	69	NE	Crow Wing	0	33.2	-205.9	-238.3	-238.3	SUPK
62645	Spirit Lake	69	NE	Aitkin	0	33.5	-174.3	-214.6	-214.6	SUPK
62647	Spirit Lake Switch	69	NE	Aitkin	0	33.8	-174.3	-214.6	-214.6	SUPK
66710	Nary	115	NE	Hubbard	0	36.1	-205.7	81.3	-205.7	SUOP
9461	Mission	69	NE	Cass	0	34.3	-189.4	33.4	-189.4	SUOP
7918	North Cass County	69	NE	Cass	0	34.7	-170.6	22.5	-170.6	SUOP
7949	Potlatch Tap	69	NE	Hubbard	0	36.3	-170.6	31.1	-170.6	SUOP
7950	Potlatch	69	NE	Hubbard	0	35.8	-170.6	33.5	-170.6	SUOP
8536	Stud Mill	12.5	NE	Hubbard	0	35.8	-170.6	9.8	-170.6	SUOP
8537	Old Mill	12.5	NE	Hubbard	0	36.4	-170.6	18.7	-170.6	SUOP
9371	Gutherie Tap	69	NE	Cass	0	34.3	-170.6	29.7	-170.6	SUOP
9372	Gutherie	69	NE	Hubbard	0	35.2	-170.6	29.7	-170.6	SUOP
63197	Cass Lake Y	115	NE	Cass	0	32.3	-170.6	44.9	-170.6	SUOP
63247	Cass Lake S	115	NE	Cass	0	35.3	-170.6	44.9	-170.6	SUOP
63248	Cass Lake N	115	NE	Cass	0	34.2	-170.6	44.9	-170.6	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63347	Cass Lake	69	NE	Cass	0	34.3	-170.6	29.7	-170.6	SUOP
63348	North Pipeline	4.2	NE	Cass	0	35.0	-170.6	26.0	-170.6	SUOP
63349	Cass lake Pipeline	4.2	NE	Cass	0	34.1	-170.6	30.8	-170.6	SUOP
62315	Bear Creek Tap	12.5	NE	Pine	0	30.0	-165.3	-156.0	-165.3	SUOP
63055	Bear Creek	230	NE	Pine	0	28.7	-165.3	-156.0	-165.3	SUOP
62181	Oak Lawn	69	NE	Crow Wing	0	33.3	-81.4	-107.7	-107.7	SUPK
62190	Oak Lawn Tap	69	NE	Crow Wing	0	33.2	-81.4	-107.7	-107.7	SUPK
62653	Wilson Lake Tap	12.8	NE	Crow Wing	0	34.2	-99.1	-107.0	-107	SUPK
62639	Wilson Lake	115	NE	Crow Wing	0	34.1	-92.8	-100.2	-100.2	SUPK
61722	Forbes	115	NE	St. Louis	75	27.7	-14.7	-99.8	-99.8	SUPK
61909	Milaca Tap	13.2	NE	Mille Lacs	0	34.4	-84.2	-82.7	-84.2	SUOP
61910	Milaca	230	NE	Mille Lacs	0	34.5	-84.2	-82.7	-84.2	SUOP
61730	78L Tap	115	NE	St. Louis	75	33.6	-83.7	-15.7	-83.7	SUOP
62191	Pine Center Tap	69	NE	Crow Wing	0	33.4	-60.3	-80.4	-80.4	SUPK
61626	Clay Boswell	230	NE	Itasca	1,141	31.0	-80.2	31.4	-80.2	SUOP
61774	Boswell Generator 3	20.9	NE	Itasca	1,141	31.8	-80.2	31.4	-80.2	SUOP
61775	Boswell Generator 4	22.8	NE	Itasca	1,141	31.9	-80.2	31.4	-80.2	SUOP
62180	Riverton	69	NE	Crow Wing	0	29.6	-63.1	-63.3	-63.3	SUPK
62454	Peary	115	NE	St. Louis	75	25.9	-58.8	50.9	-58.8	SUOP
61718	16L Tap	115	NE	St. Louis	75	23.7	-58.7	50.3	-58.7	SUOP
62638	Aitkin	115	NE	Aitkin	0	32.8	-58.3	110.9	-58.3	SUOP
61701	Laskin	138	NE	St. Louis	75	27.4	-58.2	5.0	-58.2	SUOP
61698	Hoyt Lakes	138	NE	St. Louis	75	33.3	-56.8	2.3	-56.8	SUOP
61716	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3	-56.8	SUOP
61717	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3	-56.8	SUOP
61719	Plant Generator	13.8	NE	St. Louis	75	26.3	-56.8	2.3	-56.8	SUOP
61786	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3	-56.8	SUOP
61787	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3	-56.8	SUOP
61788	Plant Generator	13.8	NE	St. Louis	75	25.9	-56.8	2.3	-56.8	SUOP
62646	Wilson Lake	69	NE	Crow Wing	0	34.9	-44.1	-56.3	-56.3	SUPK
61699	Polymet	138	NE	St. Louis	75	29.4	-56.0	-7.9	-56	SUOP
62637	Kimberly	115	NE	Aitkin	0	31.8	-53.0	109.2	-53	SUOP
61693	Taconite Harbor	13.2	NE	Cook	18	23.4	-49.8	-32.2	-49.8	SUOP
61696	Taconite Harbor	138	NE	Cook	18	21.8	-49.8	-32.2	-49.8	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62636	McGregor	115	NE	Aitkin	0	32.0	-48.9	111.5	-48.9	SUOP
61697	Taconite Harbor S42	115	NE	Cook	18	23.4	-48.5	-18.9	-48.5	SUOP
61918	Grand Marais	69	NE	Cook	18	18.6	-48.5	-18.9	-48.5	SUOP
62049	Taconite Harbor	12.8	NE	Cook	18	23.4	-48.5	-18.9	-48.5	SUOP
62050	Taconite Harbor	69	NE	Cook	18	23.4	-48.5	-18.9	-48.5	SUOP
62051	Schroeder Bank 1	69	NE	Cook	18	22.5	-48.5	-18.9	-48.5	SUOP
62052	Lutsen	69	NE	Cook	18	24.4	-48.5	-18.9	-48.5	SUOP
62053	Maple Hill	69	NE	Cook	18	25.6	-48.5	-18.9	-48.5	SUOP
62054	Grand Marais Tap	69	NE	Cook	18	24.7	-48.5	-18.9	-48.5	SUOP
62055	Colville	69	NE	Cook	18	21.7	-48.5	-18.9	-48.5	SUOP
62056	Maple Hill Tap	69	NE	Cook	18	26.3	-48.5	-18.9	-48.5	SUOP
62057	Cascade	69	NE	Cook	18	24.1	-48.5	-18.9	-48.5	SUOP
61572	Tachonite Harbor Tap	115	NE	Cook	18	23.4	-48.1	-32.2	-48.1	SUOP
61573	Taconite	13.8	NE	Cook	18	23.4	-48.1	-32.2	-48.1	SUOP
61720	Cotton Tap	115	NE	St. Louis	75	27.8	-46.1	96.4	-46.1	SUOP
62452	Cotton	115	NE	St. Louis	75	27.3	-46.1	25.7	-46.1	SUOP
61694	Finland	115	NE	Lake	0	24.1	-44.7	-16.0	-44.7	SUOP
62171	Finland	115	NE	Lake	0	24.8	-44.7	-16.0	-44.7	SUOP
61692	Silver Bay	115	NE	Lake	0	21.8	-43.1	5.0	-43.1	SUOP
61762	National Steel Mill Generator	13.8	NE	Lake	0	22.4	-43.1	5.0	-43.1	SUOP
61763	Silver Bay P	13.8	NE	Lake	0	22.1	-43.1	5.0	-43.1	SUOP
61764	National Steel Mill Generator	13.8	NE	Lake	0	22.6	-43.1	5.0	-43.1	SUOP
61765	National Steel Mill Generator	13.8	NE	Lake	0	20.9	-43.1	5.0	-43.1	SUOP
61766	Silver Bay P	13.8	NE	Lake	0	20.8	-43.1	5.0	-43.1	SUOP
61767	National Steel Mill Generator	13.8	NE	Lake	0	22.3	-43.1	5.0	-43.1	SUOP
61783	National Steel Mill Syn Condenser	13.8	NE	Lake	0	20.4	-43.1	5.0	-43.1	SUOP
61691	Silver Bay	115	NE	Lake	0	21.7	-43.0	5.0	-43	SUOP
62470	Cromwell	69	NE	Carlton	0	31.4	-42.5	86.4	-42.5	SUOP
61663	Floodwood	115	NE	St. Louis	75	29.9	-42.4	103.9	-42.4	SUOP
61670	Meadowlands	115	NE	St. Louis	75	31.1	-42.4	100.7	-42.4	SUOP
61669	Floodwood	115	NE	St. Louis	75	30.5	-41.9	62.3	-41.9	SUOP
62459	Cromwell	69	NE	Carlton	0	32.1	-41.7	60.4	-41.7	SUOP
62460	Wright	69	NE	Carlton	0	31.4	-41.7	11.4	-41.7	SUOP
62461	Round Lake	69	NE	Aitkin	0	30.9	-41.7	11.9	-41.7	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62519	Big Sand Tap	69	NE	Aitkin	0	30.6	-41.7	14.3	-41.7	SUOP
62520	Big Sand	69	NE	Aitkin	0	32.1	-41.7	14.3	-41.7	SUOP
62649	Palisade	69	NE	Aitkin	0	32.7	-41.7	14.3	-41.7	SUOP
61655	Cromwell	115	NE	Carlton	0	31.4	-41.5	62.3	-41.5	SUOP
62514	Cromwell Tertitary	13.2	NE	Carlton	0	30.8	-41.5	9.1	-41.5	SUOP
62463	Cedar Valley	69	NE	St. Louis	75	29.2	-40.9	10.8	-40.9	SUOP
62462	Gowan	69	NE	St. Louis	75	29.9	-40.3	31.0	-40.3	SUOP
62471	Gowan	69	NE	St. Louis	75	28.6	-40.2	48.4	-40.2	SUOP
62464	Enbridge Gowan	69	NE	St. Louis	75	29.5	-40.1	41.4	-40.1	SUOP
62446	Bergen Lake	115	NE	St. Louis	75	28.4	-39.8	80.8	-39.8	SUOP
62447	Bergen Tap	115	NE	St. Louis	75	29.2	-39.8	100.1	-39.8	SUOP
62178	Bass Lake	69	NE	Crow Wing	0	32.0	36.7	-38.9	-38.9	SUPK
62179	Stonybrook Tap	69	NE	Crow Wing	0	32.7	36.7	-38.9	-38.9	SUPK
62188	Stonybrook	69	NE	Cass	0	33.6	36.7	-38.9	-38.9	SUPK
62195	Pequot Lakes	69	NE	Crow Wing	0	32.7	36.7	-38.9	-38.9	SUPK
62465	Brandon Road	69	NE	St. Louis	75	30.8	-38.9	41.4	-38.9	SUOP
39448	Arrowhead	230	NE	St. Louis	75	30.8	-38.5	332.1	-38.5	SUOP
39449	Arrowhead	345	NE	St. Louis	75	30.8	-38.5	332.1	-38.5	SUOP
61614	98L TAP4	230	NE	St. Louis	75	27.4	-38.5	291.8	-38.5	SUOP
61615	Arrowhead	230	NE	St. Louis	75	31.2	-38.5	332.1	-38.5	SUOP
61671	Burnett	115	NE	St. Louis	75	28.3	-37.8	100.2	-37.8	SUOP
62170	Waldo SS	115	NE	Lake	0	23.4	-37.8	5.0	-37.8	SUOP
61690	Two Harbors	115	NE	Lake	0	22.8	-37.5	9.9	-37.5	SUOP
61616	Hilltop	230	NE	St. Louis	75	28.7	-36.9	205.0	-36.9	SUOP
62466	Grand Lake	69	NE	St. Louis	75	30.9	-36.8	40.6	-36.8	SUOP
62172	Clover Valley	115	NE	St. Louis	75	24.4	-36.2	13.2	-36.2	SUOP
61689	French River	115	NE	St. Louis	75	26.0	-35.8	14.9	-35.8	SUOP
62467	Solway	69	NE	St. Louis	75	30.1	-35.6	36.8	-35.6	SUOP
62215	White Fish Lake Tap	69	NE	Crow Wing	0	30.6	33.4	-35.4	-35.4	SUPK
62218	White Fish Lake	69	NE	Crow Wing	0	31.5	33.4	-35.4	-35.4	SUPK
62472	Four Corners	69	NE	St. Louis	75	29.9	-35.4	35.0	-35.4	SUOP
61688	Colbyville	115	NE	St. Louis	75	26.9	-34.6	24.5	-34.6	SUOP
61675	Ridge View	115	NE	St. Louis	75	29.2	-34.1	35.5	-34.1	SUOP
61668	Cloquet	115	NE	Carlton	0	31.4	-34.0	159.0	-34	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61667	Potlatch	115	NE	Carlton	0	31.9	-33.8	93.1	-33.8	SUOP
61674	Haines Road	115	NE	St. Louis	75	29.5	-33.8	162.4	-33.8	SUOP
61664	Wrenshall	115	NE	Carlton	0	28.1	-33.7	111.2	-33.7	SUOP
62445	Four Corners	115	NE	St. Louis	75	31.5	-33.6	35.0	-33.6	SUOP
62516	Four Corners Tap	12.8	NE	St. Louis	75	31.2	-33.6	28.0	-33.6	SUOP
61673	Arrowhead	115	NE	St. Louis	75	31.2	-33.4	287.8	-33.4	SUOP
61687	Midway	115	NE	St. Louis	75	29.7	-33.1	137.6	-33.1	SUOP
61665	Thompson	115	NE	Carlton	0	25.2	-32.7	102.9	-32.7	SUOP
62187	Breezy Point	69	NE	Crow Wing	0	31.9	21.2	-32.4	-32.4	SUPK
62193	Breezy Point	69	NE	Crow Wing	0	31.6	30.6	-32.4	-32.4	SUPK
61554	Arrowhead Junction	115	NE	St. Louis	75	30.9	-32.1	276.9	-32.1	SUOP
61555	Arrowhead	13.8	NE	St. Louis	75	31.1	-32.1	20.0	-32.1	SUOP
61556	Arrowhead Junction	115	NE	St. Louis	75	31.2	-32.1	276.8	-32.1	SUOP
61557	Arrowhead	13.8	NE	St. Louis	75	31.2	-32.1	20.0	-32.1	SUOP
61666	Fond du-Lac	115	NE	St. Louis	75	27.5	-31.8	87.2	-31.8	SUOP
61686	15th Ave	115	NE	St. Louis	75	26.5	-30.4	202.0	-30.4	SUOP
61672	Hilltop	115	NE	St. Louis	75	27.5	-29.3	251.9	-29.3	SUOP
61576	Hilltop	115	NE	St. Louis	75	27.5	-28.3	165.7	-28.3	SUOP
61577	Hilltop Transformer	13.8	NE	St. Louis	75	27.5	-28.3	20.0	-28.3	SUOP
61681	Lake Superior Paper	115	NE	St. Louis	75	25.5	-28.2	242.5	-28.2	SUOP
61682	Lake Superior Paper	14.3	NE	St. Louis	75	25.5	-28.2	191.8	-28.2	SUOP
61676	M. L. Hibbard	115	NE	St. Louis	75	19.7	-28.1	241.5	-28.1	SUOP
61677	Hibbard	14	NE	St. Louis	75	19.7	-28.1	31.0	-28.1	SUOP
62183	Crosslake	69	NE	Crow Wing	0	30.3	26.3	-27.8	-27.8	SUPK
62192	Mission	69	NE	Crow Wing	0	30.3	26.3	-27.8	-27.8	SUPK
61679	Gary	115	NE	St. Louis	75	24.0	-24.3	209.0	-24.3	SUOP
60361	Rock Creek	230	NE	Pine	0	31.8	197.8	-19.9	-19.9	SUPK
61192	Rock Creek	69	NE	Pine	0	31.4	57.5	-19.9	-19.9	SUPK
61756	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4	-13.1	SUOP
61758	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4	-13.1	SUOP
61759	Boise	6.6	NE	Koochiching	0	30.7	-13.1	-11.4	-13.1	SUOP
38651	Sylvan H.E.	34.5	NE	Cass	0	30.6	-11.4	22.6	-11.4	SUOP
38653	Fort Ripley	34.5	NE	Crow Wing	0	32.5	-11.4	18.2	-11.4	SUOP
38654	Brainerd Rural	34.5	NE	Crow Wing	0	30.1	-11.4	23.6	-11.4	SUOP

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38655	NW Paper	34.5	NE	Crow Wing	0	33.1	-11.4	31.5	-11.4	SUOP
38656	NW Paper Tap	34.5	NE	Crow Wing	0	29.8	-11.4	30.1	-11.4	SUOP
61652	Brainerd	115	NE	Crow Wing	0	33.9	-11.4	64.5	-11.4	SUOP
61851	Brainerd - NWP	34.5	NE	Crow Wing	0	33.2	-11.4	30.0	-11.4	SUOP
61852	Brainerd	34.5	NE	Crow Wing	0	33.4	-11.4	56.3	-11.4	SUOP
61651	Mud Lake	115	NE	Crow Wing	0	33.4	-9.5	53.4	-9.5	SUOP
61761	Boise	6.6	NE	Koochiching	0	30.7	-6.4	-4.8	-6.4	SUOP
38824	Industrial Park - REG	34.5	NE	Todd	30	38.2	10.0	-1.4	-1.4	SUPK
62515	Deer River Tertitary	12.5	NE	Itasca	1,141	31.5	0.5	0.5	0.5	EQUAL
61776	Boswell Generator 1	14.4	NE	Itasca	1,141	31.2	48.7	3.3	3.3	SUPK
61777	Boswell Generator 2	14.4	NE	Itasca	1,141	32.3	46.5	3.3	3.3	SUPK
61574	Laskin Junction	115	NE	St. Louis	75	28.8	5.0	5.0	5	EQUAL
61575	Laskin	13.8	NE	St. Louis	75	27.8	5.0	5.0	5	EQUAL
38872	Little Falls HE	34.5	NE	Morrison	0	32.8	5.9	5.9	5.9	EQUAL
38907	525 Voltage Regulator 1	34.5	NE	Morrison	0	33.0	5.9	5.9	5.9	EQUAL
38908	Little Falls HE	34.5	NE	Morrison	0	34.6	5.9	5.9	5.9	EQUAL
38894	Larson	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
38909	13K Capacitor	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
9270	Loman	69	NE	Koochiching	0	31.2	6.5	8.4	6.5	SUOP
38910	Little Falls Industrial Park	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
38911	14K Capacitor	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0	6.7	SUOP
62513	Blackberry Tertitary	12.8	NE	Itasca	1,141	31.2	7.6	7.6	7.6	EQUAL
62211	Pequot Lake Tap	13.2	NE	Crow Wing	0	32.9	8.4	8.4	8.4	EQUAL
62214	Birch Lake Tap	13.2	NE	Cass	0	32.4	8.4	8.4	8.4	EQUAL
62517	Virginia Tap	13.2	NE	St. Louis	75	28.1	8.4	8.4	8.4	EQUAL
62518	Shannon Tap	13.2	NE	St. Louis	75	31.5	8.4	8.4	8.4	EQUAL
38620	MacMillan	4.2	NE	Crow Wing	0	30.3	10.4	8.8	8.8	SUPK
38621	Macmillan Waferizer	4.2	NE	Crow Wing	0	31.0	10.4	8.8	8.8	SUPK
38912	North Sub	34.5	NE	Morrison	0	33.9	8.9	10.2	8.9	SUOP
62212	Riverton	12.8	NE	Crow Wing	0	29.6	9.1	9.1	9.1	EQUAL
38901	525-529T	34.5	NE	Morrison	0	33.4	9.2	10.5	9.2	SUOP
38852	Blandin Paper	6	NE	Morrison	0	36.0	9.9	10.0	9.9	SUOP
38608	Maroco	34.5	NE	Crow Wing	0	30.3	10.0	10.0	10	EQUAL

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1	10	SUOP
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0	10	EQUAL
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38867	529 REG	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0	10	EQUAL
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0	10	EQUAL
38888	529 Voltage Regulator	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL
38889	Fairgrounds	34.5	NE	Morrison	0	34.3	10.0	10.0	10	EQUAL
38890	Highway 10 77	34.5	NE	Morrison	0	33.1	10.0	10.0	10	EQUAL
38891	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38895	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38906	525 Voltage Regulator 2	34.5	NE	Morrison	0	33.0	10.0	10.0	10	EQUAL
38607	506 DIST	34.5	NE	Crow Wing	0	28.8	10.2	10.4	10.2	SUOP
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3	10.3	EQUAL
62507	Onigum	34.5	NE	Cass	0	34.8	10.5	11.1	10.5	SUOP
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6	10.6	EQUAL
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6	10.6	EQUAL
38896	Minnesota Power Tap	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38897	Minnesota Power	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38899	Crestliner	34.5	NE	Morrison	0	33.7	10.7	11.0	10.7	SUOP
38919	36K Capacitor	34.5	NE	Morrison	0	33.8	10.7	11.0	10.7	SUOP
62698	Wirt	69	NE	Itasca	1,141	33.1	10.8	11.3	10.8	SUOP
62699	Evensen	69	NE	Itasca	1,141	32.2	10.8	11.3	10.8	SUOP
62700	Wirt Tap Switches SS	69	NE	Itasca	1,141	31.6	10.8	11.3	10.8	SUOP
38920	Ethanol	34.5	NE	Morrison	0	32.5	10.9	11.2	10.9	SUOP
62495	Sand Lake	69	NE	St. Louis	75	29.5	10.9	11.8	10.9	SUOP
62474	Arbo	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
62484	Arbo Tap	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
61755	Boise Cascade	6.6	NE	Koochiching	0	30.7	11.5	13.1	11.5	SUOP
61757	Boise	2.3	NE	Koochiching	0	30.7	11.5	13.1	11.5	SUOP
38858	529-T77	34.5	NE	Morrison	0	34.4	12.0	12.9	12	SUOP
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5	12	SUOP
38893	High School	34.5	NE	Morrison	0	34.2	12.0	12.9	12	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3	12.4	SUOP
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3	12.4	SUOP
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3	12.4	SUOP
38848	508-511T	34.5	NE	Morrison	0	34.9	12.4	17.3	12.4	SUOP
38850	508-525T	34.5	NE	Morrison	0	34.2	12.4	17.2	12.4	SUOP
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3	12.4	SUOP
38871	Camp Ripley East Sub	34.5	NE	Morrison	0	34.8	12.4	17.2	12.4	SUOP
38882	508-521T	34.5	NE	Morrison	0	33.3	12.4	17.0	12.4	SUOP
38883	MP Flensberg	34.5	NE	Morrison	0	33.0	12.4	17.3	12.4	SUOP
38902	508-502T	34.5	NE	Morrison	0	33.9	12.4	17.2	12.4	SUOP
38905	Little Falls West Side	34.5	NE	Morrison	0	33.3	12.4	13.4	12.4	SUOP
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3	12.4	SUOP
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3	12.4	SUOP
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1	12.7	SUOP
38921	CMEC	34.5	NE	Morrison	0	33.1	12.7	13.8	12.7	SUOP
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9	12.8	SUOP
62697	Big Fork	69	NE	Itasca	1,141	30.9	12.9	14.3	12.9	SUOP
38606	505-06SW	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38611	Maroco Tap	34.5	NE	Crow Wing	0	30.3	13.1	15.1	13.1	SUOP
38612	Cuyuna Tap	34.5	NE	Crow Wing	0	29.6	13.1	15.1	13.1	SUOP
38613	506-TAP	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38614	Deerwood	34.5	NE	Crow Wing	0	30.4	13.1	15.1	13.1	SUOP
38615	Cuyuna	34.5	NE	Crow Wing	0	29.7	13.1	15.1	13.1	SUOP
38624	Highway 12	34.5	NE	Crow Wing	0	32.0	13.1	15.1	13.1	SUOP
38859	EAST88	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38861	529-36ES	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38892	East Side Sub Tap	34.5	NE	Morrison	0	34.2	13.1	14.4	13.1	SUOP
38610	Trommald	34.5	NE	Crow Wing	0	29.0	13.3	15.4	13.3	SUOP
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9	13.3	SUOP
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9	13.3	SUOP
38604	Ironton	34.5	NE	Crow Wing	0	29.6	13.4	13.7	13.4	SUOP
38860	529-DIST	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38914	Riverview F	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38916	529-36SW	34.5	NE	Morrison	0	33.5	13.4	14.7	13.4	SUOP

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38917	529-36E	34.5	NE	Morrison	0	33.1	13.4	14.7	13.4	SUOP
38898	Oakes	34.5	NE	Morrison	0	34.1	13.9	15.6	13.9	SUOP
38915	Riverview Drive 44	34.5	NE	Morrison	0	33.6	13.9	15.2	13.9	SUOP
62478	Goodland	69	NE	Itasca	1,141	31.3	14.4	14.8	14.4	SUOP
38602	Ironton Switch	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38603	Ironton Tap	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38605	Crosby Tap	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP
38609	Crosby	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3	14.5	SUOP
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5	14.5	SUPK
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5	14.5	SUPK
38601	Riverton Rural	34.5	NE	Crow Wing	0	29.6	14.7	17.6	14.7	SUOP
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7	14.7	SUPK
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7	14.7	SUPK
61736	Thunderbird Mine	115	NE	St. Louis	75	30.5	46.5	14.9	14.9	SUPK
38460	Laskin	46	NE	St. Louis	75	27.8	15.0	18.2	15	SUOP
38461	Aurora	46	NE	St. Louis	75	30.5	15.0	18.2	15	SUOP
38463	Hoyt Lakes	46	NE	St. Louis	75	26.3	15.0	18.2	15	SUOP
38873	Hennepin Paper	34.5	NE	Morrison	0	33.2	15.3	17.5	15.3	SUOP
38904	525-08T7	34.5	NE	Morrison	0	33.0	15.3	17.6	15.3	SUOP
62184	Emily	69	NE	Crow Wing	0	30.1	15.3	16.9	15.3	SUOP
62696	Jessie Lake	69	NE	Itasca	1,141	31.0	15.5	16.4	15.5	SUOP
66801	Lund	69	NE	Koochiching	0	31.6	15.5	19.8	15.5	SUOP
38500	Nashwauk Tap	34.5	NE	Itasca	1,141	33.6	16.0	16.4	16	SUOP
38671	531-534T	34.5	NE	Crow Wing	0	32.9	16.3	16.4	16.3	SUOP
62475	Gunn	69	NE	Itasca	1,141	31.5	27.2	16.7	16.7	SUPK
38672	Pillager	34.5	NE	Cass	0	31.9	16.8	17.5	16.8	SUOP
38673	503-531T	34.5	NE	Cass	0	31.3	16.8	17.0	16.8	SUOP
38415	Inland Industrial	46	NE	St. Louis	75	30.1	17.0	17.0	17	EQUAL
38416	McKinley	46	NE	St. Louis	75	30.5	17.0	17.0	17	EQUAL
38618	Macmillan G1	34.5	NE	Crow Wing	0	30.9	17.1	17.0	17	SUPK
38622	Macmillan G2	34.5	NE	Crow Wing	0	30.9	17.0	17.0	17	EQUAL
38675	Baxter - MP	34.5	NE	Crow Wing	0	31.8	17.0	17.0	17	EQUAL
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0	17	EQUAL

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0	17	EQUAL
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0	17	EQUAL
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0	17	EQUAL
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0	17	EQUAL
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0	17	EQUAL
38617	Riverton Downtown	34.5	NE	Crow Wing	0	29.6	17.1	17.3	17.1	SUOP
38787	Menahga	34.5	NE	Wadena	0	33.5	17.1	17.2	17.1	SUOP
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1	17.1	EQUAL
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2	17.1	SUOP
61864	St. Croix	46	NE	St. Louis	75	25.0	17.2	17.4	17.2	SUOP
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6	17.5	SUOP
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6	17.5	SUOP
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1	17.6	SUOP
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1	17.6	SUOP
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6	17.6	EQUAL
38421	Laurentian Mine	46	NE	St. Louis	75	30.0	17.7	18.0	17.7	SUOP
38417	Biwabik	46	NE	St. Louis	75	28.5	17.8	18.2	17.8	SUOP
62855	North Parker	34.5	NE	Morrison	0	34.3	17.8	19.8	17.8	SUOP
38418	Pineville	46	NE	St. Louis	75	26.7	17.9	18.3	17.9	SUOP
38616	Crosby MFG	34.5	NE	Crow Wing	0	29.1	18.0	19.1	18	SUOP
38903	529-525T	34.5	NE	Morrison	0	34.0	18.0	18.0	18	EQUAL
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2	18	SUOP
62908	Orton	34.5	NE	Wadena	0	34.7	18.0	18.2	18	SUOP
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2	18	SUOP
38676	Gull Lake	34.5	NE	Crow Wing	0	34.5	18.3	18.9	18.3	SUOP
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8	18.3	SUOP
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9	18.4	SUOP
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8	18.4	SUOP
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7	18.4	SUOP
38788	Menahga SS	34.5	NE	Wadena	0	34.9	18.5	18.8	18.5	SUOP
61865	Babbitt VL	46	NE	St. Louis	75	30.5	18.5	19.1	18.5	SUOP
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0	18.5	SUOP
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1	18.6	SUOP
38464	Erie	4.8	NE	St. Louis	75	28.8	50.0	18.7	18.7	SUPK

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61702	Syl Laskin	115	NE	St. Louis	75	27.8	85.9	18.7	18.7	SUPK
62503	Winton	46	NE	St. Louis	75	27.0	19.0	19.8	19	SUOP
61862	Ely Sub A	46	NE	St. Louis	75	26.4	19.2	20.1	19.2	SUOP
38674	Pine Beach	34.5	NE	Cass	0	31.5	19.3	20.8	19.3	SUOP
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5	19.3	SUOP
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3	19.3	SUPK
38619	Macmillan	34.5	NE	Crow Wing	0	30.9	20.4	19.5	19.5	SUPK
38623	532-06TS	34.5	NE	Crow Wing	0	32.0	19.6	19.5	19.5	SUPK
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2	19.5	SUOP
62204	Little Falls	34.5	NE	Morrison	0	34.6	21.0	19.5	19.5	SUPK
62481	Boy River	69	NE	Cass	0	32.3	19.5	20.1	19.5	SUOP
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7	19.6	SUOP
38856	MN Pipeline Darling	34.5	NE	Morrison	0	34.8	19.6	20.6	19.6	SUOP
38789	Spirit Lake Tap	34.5	NE	Wadena	0	34.8	19.8	20.4	19.8	SUOP
62205	Motley	34.5	NE	Morrison	0	33.2	19.8	21.7	19.8	SUOP
62476	Blackberry	69	NE	Itasca	1,141	31.7	32.0	19.8	19.8	SUPK
61559	Minntac Transformer 1	13.8	NE	St. Louis	75	31.8	20.0	20.0	20	EQUAL
61561	Minntac Transformer 2	13.8	NE	St. Louis	75	31.8	20.0	20.0	20	EQUAL
61563	Shannon Junction Transformer	13.8	NE	St. Louis	75	31.5	20.0	20.0	20	EQUAL
61565	Forbes TR9	13.8	NE	St. Louis	75	27.6	20.0	20.0	20	EQUAL
61567	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0	20	EQUAL
61569	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0	20	EQUAL
61579	Mud Lake Transformer	13.8	NE	Crow Wing	0	34.0	20.0	20.0	20	EQUAL
61750	Shannon 2TR	13.8	NE	St. Louis	75	31.7	20.0	20.0	20	EQUAL
62451	Lakeland	115	NE	St. Louis	75	26.4	63.7	20.1	20.1	SUPK
61870	Virginia	46	NE	St. Louis	75	28.1	20.2	22.3	20.2	SUOP
38886	Sunbridge St	34.5	NE	Morrison	0	34.2	20.6	21.8	20.6	SUOP
38887	Little Falls South	34.5	NE	Morrison	0	34.2	20.6	21.7	20.6	SUOP
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1	20.7	SUOP
62477	Enbridge Blackberry	69	NE	Itasca	1,141	31.7	33.3	20.7	20.7	SUPK
62486	Lakehead Tap	69	NE	Itasca	1,141	32.0	33.3	20.7	20.7	SUPK
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4	20.7	SUOP
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7	21	SUOP
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0	21	SUOP

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61863	31-32TIE	46	NE	St. Louis	75	27.2	21.0	21.0	21	EQUAL
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9	21.2	SUOP
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3	21.3	SUPK
62219	Shimn Tap	34.5	NE	Morrison	0	33.2	21.3	22.8	21.3	SUOP
62220	Shim Lake Tap	34.5	NE	Morrison	0	33.0	21.3	22.8	21.3	SUOP
38874	525-08T8	34.5	NE	Morrison	0	32.9	22.3	25.8	22.3	SUOP
38875	525-2988	34.5	NE	Morrison	0	34.8	22.3	25.8	22.3	SUOP
66760	Lund	230	NE	Koochiching	0	31.4	22.6	28.8	22.6	SUOP
61860	Babbitt	46	NE	St. Louis	75	28.1	23.5	24.6	23.5	SUOP
61861	Winton	46	NE	Lake	0	26.5	23.5	25.3	23.5	SUOP
61880	32-31TIE	46	NE	St. Louis	75	26.7	23.5	25.3	23.5	SUOP
62504	Babbitt Townsite	46	NE	St. Louis	75	28.4	23.5	24.5	23.5	SUOP
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7	23.6	SUOP
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8	23.7	SUOP
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8	23.7	SUOP
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
38705	Motley	34.5	NE	Morrison	0	32.9	24.1	25.2	24.1	SUOP
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2	24.2	SUPK
38750	Backus	34.5	NE	Cass	0	33.1	24.2	27.2	24.2	SUOP
61855	Hackensack	34.5	NE	Cass	0	33.0	24.2	27.2	24.2	SUOP
62208	Birch Lake	34.5	NE	Cass	0	32.8	24.2	27.2	24.2	SUOP
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3	24.3	SUOP
38754	515-520T	34.5	NE	Hubbard	0	34.8	24.3	26.3	24.3	SUOP
62379	Eagle Lake	34.5	NE	Hubbard	0	33.6	24.3	26.3	24.3	SUOP
62416	Park Rapids	34.5	NE	Hubbard	0	34.8	24.3	31.7	24.3	SUOP
62417	Mantrap	34.5	NE	Hubbard	0	33.1	24.3	26.3	24.3	SUOP
62485	Warba Switch	69	NE	Itasca	1,141	30.8	39.5	24.9	24.9	SUPK
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6	25.2	SUOP
38746	Hackensack	34.5	NE	Cass	0	33.6	25.3	27.5	25.3	SUOP
61872	Ely Sub B	46	NE	St. Louis	75	25.7	25.3	27.9	25.3	SUOP
61879	Ely Sub Tap	46	NE	St. Louis	75	27.3	25.3	27.9	25.3	SUOP
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1	25.4	SUOP
38704	Dog Lake Tap	34.5	NE	Todd	30	33.2	25.4	31.8	25.4	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38706	Staples Rural	34.5	NE	Todd	30	34.3	25.4	34.1	25.4	SUOP
61844	Dog Lake	34.5	NE	Todd	30	33.6	25.4	28.2	25.4	SUOP
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2	25.4	SUOP
38724	Nisswa	34.5	NE	Crow Wing	0	31.5	25.6	27.3	25.6	SUOP
38744	Onigum	34.5	NE	Cass	0	34.1	25.8	27.5	25.8	SUOP
38745	Ten Mile Lake	34.5	NE	Cass	0	34.5	25.8	27.5	25.8	SUOP
61726	Hibbing Taconite Pump	13.8	NE	St. Louis	75	32.3	25.8	25.8	25.8	EQUAL
62502	Clear Lake	46	NE	St. Louis	75	29.0	25.8	28.7	25.8	SUOP
61873	Soudan Park Mine	46	NE	St. Louis	75	32.0	26.1	29.1	26.1	SUOP
62207	Pleasant Lake	69	NE	Cass	0	32.4	26.1	27.0	26.1	SUOP
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1	27.1	SUPK
62506	Vermilion	46	NE	St. Louis	75	29.6	27.3	29.3	27.3	SUOP
62209	Birch Lake	69	NE	Cass	0	32.8	29.2	27.5	27.5	SUPK
61845	Baxter	34.5	NE	Crow Wing	0	31.8	28.4	27.8	27.8	SUPK
66764	Running	13.2	NE	Koochiching	0	30.3	28.0	28.0	28	EQUAL
66765	Running	13.2	NE	Koochiching	0	30.7	28.0	28.0	28	EQUAL
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1	28.3	SUOP
61874	Tower Soudan	46	NE	St. Louis	75	32.1	28.5	31.1	28.5	SUOP
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3	28.8	SUOP
38722	Pine River	34.5	NE	Cass	0	33.3	30.0	30.0	30	EQUAL
61854	Pine River	34.5	NE	Cass	0	34.2	30.0	30.0	30	EQUAL
62189	Wabedo	69	NE	Cass	0	34.2	30.4	32.9	30.4	SUOP
62199	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
62200	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7	30.9	SUOP
9268	Big Falls	69	NE	Koochiching	0	31.9	30.9	33.7	30.9	SUOP
9271	Littlefork	69	NE	Koochiching	0	32.3	30.9	32.9	30.9	SUOP
9272	Rat Root River	69	NE	Koochiching	0	30.5	30.9	33.0	30.9	SUOP
9273	International Falls	69	NE	Koochiching	0	32.1	30.9	33.0	30.9	SUOP
9274	Kabetogama	69	NE	St. Louis	75	31.5	30.9	33.0	30.9	SUOP
9425	Littlefork	69	NE	Koochiching	0	31.3	30.9	33.0	30.9	SUOP
67017	Running	69	NE	Koochiching	0	30.7	30.9	50.4	30.9	SUOP
62488	Blackberry	69	NE	Itasca	1,141	31.2	46.4	31.0	31	SUPK
62198	Crosslake City	69	NE	Crow Wing	0	31.5	31.4	33.0	31.4	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38723	Pine River	34.5	NE	Cass	0	34.0	31.9	32.8	31.9	SUOP
62177	Birch Lake	115	NE	Hubbard	0	33.8	33.5	37.9	33.5	SUOP
62499	Sand Lake Tap	69	NE	St. Louis	75	29.1	33.6	34.6	33.6	SUOP
62492	Meadowbrook	69	NE	St. Louis	75	29.0	33.7	34.9	33.7	SUOP
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0	34	EQUAL
38784	Park Rapids Tap	34.5	NE	Hubbard	0	34.8	34.0	34.0	34	EQUAL
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0	34	EQUAL
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0	34	EQUAL
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0	34	EQUAL
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0	34	EQUAL
38869	526-529T	34.5	NE	Morrison	0	34.8	34.0	34.0	34	EQUAL
38781	Long Lake Cap Bank	34.5	NE	Hubbard	0	34.4	34.1	34.2	34.1	SUOP
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3	34.1	SUOP
38868	529-526T	34.5	NE	Morrison	0	34.6	34.1	34.1	34.1	EQUAL
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1	34.1	EQUAL
61848	Pequot Lakes	34.5	NE	Crow Wing	0	32.9	36.9	34.2	34.2	SUPK
38721	Pequoet Lake District	34.5	NE	Crow Wing	0	32.9	35.3	34.3	34.3	SUPK
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3	34.3	EQUAL
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6	34.6	SUPK
61705	Babbitt	115	NE	St. Louis	75	27.2	124.3	35.0	35	SUPK
61708	Virginia S27	115	NE	St. Louis	75	28.1	183.1	35.0	35	SUPK
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8	35	SUOP
62490	Shannon	69	NE	St. Louis	75	31.5	35.0	36.7	35	SUOP
62491	Side Lake	69	NE	St. Louis	75	29.9	35.0	36.7	35	SUOP
62496	Pike River	69	NE	St. Louis	75	29.6	35.0	36.6	35	SUOP
62497	Virginia	69	NE	St. Louis	75	28.1	35.0	36.6	35	SUOP
62194	Fifty Lakes	69	NE	Crow Wing	0	30.6	35.1	38.3	35.1	SUOP
38854	Bertran	34.5	NE	Morrison	0	37.8	35.2	36.3	35.2	SUOP
61853	Riverton	34.5	NE	Crow Wing	0	28.8	36.0	40.7	36	SUOP
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0	36.4	SUOP
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6	36.4	SUOP
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8	36.6	SUOP
62494	Potlatch	69	NE	St. Louis	75	28.5	37.7	40.5	37.7	SUOP
62498	Potlatch	69	NE	St. Louis	75	28.9	37.7	40.5	37.7	SUOP

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61797	Riverton	13.8	NE	Crow Wing	0	30.1	37.9	37.9	37.9	EQUAL
62894	Wing River Transformer	13.8	NE	Wadena	0	37.4	37.9	37.9	37.9	EQUAL
63078	Hubbard tap	13.8	NE	Hubbard	0	35.9	38.0	38.0	38	EQUAL
61882	Tower - Soudan	46	NE	St. Louis	75	32.1	46.8	38.2	38.2	SUPK
62185	Ox Lake	69	NE	Crow Wing	0	31.3	39.0	43.8	39	SUOP
61704	34L Tap	115	NE	St. Louis	75	29.7	204.5	39.1	39.1	SUPK
61707	Minntac	115	NE	St. Louis	75	32.4	99.0	39.5	39.5	SUPK
62508	Tower	13.8	NE	St. Louis	75	32.1	71.0	40.2	40.2	SUPK
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9	40.3	SUOP
61883	Tower	115	NE	St. Louis	75	32.1	72.7	40.7	40.7	SUPK
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5	42.2	SUOP
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5	42.2	SUOP
62448	Hill City	115	NE	Aitkin	0	31.1	60.4	43.6	43.6	SUPK
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3	44.6	SUOP
61721	Eveleth Taconite Co.	115	NE	St. Louis	75	29.4	165.4	44.8	44.8	SUPK
61723	Eveleth Taconite Co. Gen	13.8	NE	St. Louis	75	29.4	162.8	44.8	44.8	SUPK
66779	Running	230	NE	Koochiching	0	30.7	44.8	56.0	44.8	SUOP
66780	Running	69	NE	Koochiching	0	30.7	44.8	56.0	44.8	SUOP
61734	Iron Tap	115	NE	St. Louis	75	28.2	133.6	45.5	45.5	SUPK
62453	Iron	115	NE	St. Louis	75	27.8	99.6	45.5	45.5	SUPK
62500	Tower	69	NE	St. Louis	75	32.1	61.4	45.8	45.8	SUPK
62483	Bena Tap	69	NE	Itasca	1,141	32.4	45.9	46.4	45.9	SUOP
62482	Salem SS	69	NE	Cass	0	32.8	46.8	47.5	46.8	SUOP
62479	Ball Club	69	NE	Itasca	1,141	31.8	47.5	48.7	47.5	SUOP
61735	Thunderbird Mine	115	NE	St. Louis	75	29.0	94.6	47.8	47.8	SUPK
62489	Remer	69	NE	Cass	0	31.5	48.3	49.6	48.3	SUOP
61551	Forbes 1 TR9	34.5	NE	St. Louis	75	26.8	50.0	50.0	50	EQUAL
61553	Forbes 2 TR9	34.5	NE	St. Louis	75	27.7	50.0	50.0	50	EQUAL
62186	Thunder Lake	69	NE	Cass	0	31.9	50.1	52.3	50.1	SUOP
62196	Blind Lake	69	NE	Cass	0	33.4	55.0	51.9	51.9	SUPK
62501	Frazer	69	NE	St. Louis	75	28.2	61.4	52.5	52.5	SUPK
62450	Deer River	115	NE	Itasca	1,141	37.6	56.0	56.0	56	EQUAL
61780	Deer River	115	NE	Itasca	1,141	37.6	57.9	58.7	57.9	SUOP
62493	Cook	69	NE	St. Louis	75	28.0	59.4	58.0	58	SUPK

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All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62505	Orr	69	NE	St. Louis	75	27.7	59.4	58.0	58	SUPK
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6	58.6	SUPK
61850	Little Falls	34.5	NE	Morrison	0	34.7	64.5	71.2	64.5	SUOP
62202	Nokay	115	NE	Crow Wing	0	33.8	123.1	66.2	66.2	SUPK
61753	International Falls	12.5	NE	Koochiching	0	34.2	68.8	72.6	68.8	SUOP
61791	Lakehead Pumping Station	115	NE	Itasca	1,141	31.7	69.9	70.8	69.9	SUOP
66778	Running	230	NE	Koochiching	0	30.7	70.0	70.0	70	EQUAL
61754	Boise Cascade	118	NE	Koochiching	0	30.7	73.9	75.6	73.9	SUOP
61790	Cohasset Tap	115	NE	Itasca	1,141	31.2	74.4	77.6	74.4	SUOP
62449	Cohasset	115	NE	Itasca	1,141	30.5	74.4	77.6	74.4	SUOP
62487	Deer River	69	NE	Itasca	1,141	32.5	78.3	88.8	78.3	SUOP
62421	Long Lake	34.5	NE	Hubbard	0	34.1	78.7	89.5	78.7	SUOP
61578	Mud Lake Junction	115	NE	Crow Wing	0	32.7	175.7	81.4	81.4	SUPK
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3	83.1	SUOP
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1	88.2	SUOP
62455	Keewatin	115	NE	St. Louis	75	32.3	99.4	100.0	99.4	SUOP
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7	100.1	SUOP
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1	100.1	SUOP
61706	Keewatin	115	NE	St. Louis	75	32.4	100.4	101.0	100.4	SUOP
61792	Boise Cascade Paper	13.8	NE	Koochiching	0	30.7	100.6	102.2	100.6	SUOP
61644	Dog Lake	115	NE	Cass	0	33.7	102.7	123.8	102.7	SUOP
61645	Baxter S47	115	NE	Crow Wing	0	32.9	105.4	109.2	105.4	SUOP
61781	20L TAP7	115	NE	Itasca	1,141	30.9	107.9	117.5	107.9	SUOP
61654	Aitkin	115	NE	Crow Wing	0	31.2	109.4	110.1	109.4	SUOP
61748	Boswell	115	NE	Itasca	1,141	31.0	203.1	109.7	109.7	SUPK
61715	Inland Generator	13.8	NE	St. Louis	75	30.8	109.8	110.0	109.8	SUOP
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5	109.8	SUOP
61740	Grand Rapids	115	NE	Itasca	1,141	31.7	178.5	109.9	109.9	SUPK
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2	110.2	SUOP
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2	110.9	SUOP
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1	111.1	EQUAL
62176	Merrifield	115	NE	Crow Wing	0	31.3	112.4	114.4	112.4	SUOP
62510	Crooked Lake	115	NE	Itasca	1,141	30.2	117.5	119.0	117.5	SUOP
61778	Blandin Tap	115	NE	Itasca	1,141	30.9	206.1	118.8	118.8	SUPK

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62206	Baxter Bank	115	NE	Crow Wing	0	32.6	118.9	127.1	118.9	SUOP
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4	122.2	SUOP
61779	Blandin	115	NE	Itasca	1,141	31.7	250.8	126.6	126.6	SUPK
61739	Blackberry	115	NE	Itasca	1,141	31.2	131.0	236.6	131	SUOP
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2	132.2	SUPK
61646	Dog Lake Tap	115	NE	Cass	0	33.3	134.3	159.7	134.3	SUOP
62210	Southdale Bank 1	115	NE	Crow Wing	0	30.0	134.7	141.2	134.7	SUOP
61796	Riverton	115	NE	Crow Wing	0	29.6	150.5	135.2	135.2	SUPK
61752	International Falls	118	NE	Koochiching	0	34.2	221.9	138.0	138	SUPK
61648	Pequot Lakes	115	NE	Crow Wing	0	32.9	148.0	140.2	140.2	SUPK
62213	Southdale Tap	115	NE	Crow Wing	0	31.2	141.3	166.4	141.3	SUOP
61562	Shannon Junction	115	NE	St. Louis	75	31.5	142.9	152.2	142.9	SUOP
61785	Shannon	115	NE	St. Louis	75	34.9	143.7	153.0	143.7	SUOP
62511	Crooked Lake Tap	115	NE	St. Louis	75	32.6	147.5	149.0	147.5	SUOP
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6	147.6	SUOP
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7	150.1	SUOP
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5	156.7	SUOP
61725	44L Tap	115	NE	St. Louis	75	34.1	169.3	157.7	157.7	SUPK
61650	Little Falls S68	115	NE	Morrison	0	34.6	161.6	194.6	161.6	SUOP
62201	Pine River	115	NE	Cass	0	32.9	169.0	177.1	169	SUOP
61714	Minntac Load A	13.8	NE	St. Louis	75	34.6	172.1	173.0	172.1	SUOP
61709	Inland Taconite Co.	115	NE	St. Louis	75	30.8	176.0	176.1	176	SUOP
61732	National G	13.8	NE	St. Louis	75	33.4	180.9	181.3	180.9	SUOP
61724	Hibbing	115	NE	St. Louis	75	34.3	188.9	197.8	188.9	SUOP
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4	191.4	SUPK
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5	192.6	SUOP
61751	Littlefork	118	NE	Koochiching	0	31.6	198.0	196.5	196.5	SUPK
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1	197.6	SUOP
61731	14L Tap	115	NE	St. Louis	75	32.3	201.7	197.8	197.8	SUPK
62411	Long Lake	115	NE	Hubbard	0	34.8	220.4	231.2	220.4	SUOP
63053	Hubbard	230	NE	Hubbard	0	35.9	220.8	323.7	220.8	SUOP
61737	Nashwauk	115	NE	Itasca	1,141	32.4	241.0	227.2	227.2	SUPK
60100	Forbes	500	NE	St. Louis	75	27.3	234.9	861.6	234.9	SUOP
60101	Forbes	500	NE	St. Louis	75	27.7	234.9	861.6	234.9	SUOP

Appendix C - Screening Steps

All NE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61617	Mud Lake	230	NE	Crow Wing	0	32.2	236.1	246.8	236.1	SUOP
61564	Forbes Junction	115	NE	St. Louis	75	27.7	238.7	260.2	238.7	SUOP
61653	Riverton	115	NE	Crow Wing	0	29.6	240.0	284.4	240	SUOP
61612	Riverton	230	NE	Crow Wing	0	30.4	241.3	343.0	241.3	SUOP
61713	Minntac Load C	13.8	NE	St. Louis	75	33.7	242.4	243.2	242.4	SUOP
61624	Forbes	230	NE	St. Louis	75	27.7	242.6	822.6	242.6	SUOP
61550	Forbes 1 Junction	230	NE	St. Louis	75	27.7	243.8	474.0	243.8	SUOP
61552	Forbes Junction	230	NE	St. Louis	75	27.7	243.8	473.5	243.8	SUOP
63058	Wing River	230	NE	Wadena	0	37.7	251.7	245.6	245.6	SUPK
61558	Minntac Junction 1	115	NE	St. Louis	75	31.8	247.6	326.3	247.6	SUOP
61560	Minntac Junction 2	115	NE	St. Louis	75	31.8	247.6	326.9	247.6	SUOP
61623	Minntac	230	NE	St. Louis	75	32.8	247.9	722.3	247.9	SUOP
61710	Minntac	115	NE	St. Louis	75	33.1	248.3	420.1	248.3	SUOP
61711	Minntac Tap C	115	NE	St. Louis	75	34.6	248.3	385.0	248.3	SUOP
61712	Minntac Tap A	115	NE	St. Louis	75	34.6	248.3	349.0	248.3	SUOP
61727	H. T. Pumps	115	NE	St. Louis	75	30.1	248.8	248.8	248.8	EQUAL
61749	Shannon	115	NE	St. Louis	75	31.5	251.0	376.6	251	SUOP
61610	Badoura	230	NE	Hubbard	0	33.5	251.5	435.5	251.5	SUOP
61625	Blackberry	230	NE	Itasca	1,141	31.2	252.1	757.0	252.1	SUOP
61627	Shannon S26	230	NE	St. Louis	75	31.5	252.1	558.4	252.1	SUOP
61566	Blackberry	115	NE	Itasca	1,141	31.2	252.2	336.6	252.2	SUOP
61568	Blackberry	115	NE	Itasca	1,141	31.2	252.2	338.0	252.2	SUOP
60167	Running Switch Cap	230	NE	Koochiching	0	32.6	271.3	296.7	271.3	SUOP
66753	Running	230	NE	Koochiching	0	30.7	271.3	296.7	271.3	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62515	Deer River Tertitary	12.5	NE	Itasca	1,141	31.5	0.5	0.5	0.5	EQUAL
61776	Boswell Generator 1	14.4	NE	Itasca	1,141	31.2	48.7	3.3	3.3	SUPK
61777	Boswell Generator 2	14.4	NE	Itasca	1,141	32.3	46.5	3.3	3.3	SUPK
61575	Laskin	13.8	NE	St. Louis	75	27.8	5.0	5.0	5	EQUAL
61574	Laskin Junction	115	NE	St. Louis	75	28.8	5.0	5.0	5	EQUAL
38872	Little Falls HE	34.5	NE	Morrison	0	32.8	5.9	5.9	5.9	EQUAL
38907	525 Voltage Regulator 1	34.5	NE	Morrison	0	33.0	5.9	5.9	5.9	EQUAL
38908	Little Falls HE	34.5	NE	Morrison	0	34.6	5.9	5.9	5.9	EQUAL
38894	Larson	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
38909	13K Capacitor	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
9270	Loman	69	NE	Koochiching	0	31.2	6.5	8.4	6.5	SUOP
38910	Little Falls Industrial Park	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
38911	14K Capacitor	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0	6.7	SUOP
62513	Blackberry Tertitary	12.8	NE	Itasca	1,141	31.2	7.6	7.6	7.6	EQUAL
62211	Pequot Lake Tap	13.2	NE	Crow Wing	0	32.9	8.4	8.4	8.4	EQUAL
62214	Birch Lake Tap	13.2	NE	Cass	0	32.4	8.4	8.4	8.4	EQUAL
62517	Virginia Tap	13.2	NE	St. Louis	75	28.1	8.4	8.4	8.4	EQUAL
62518	Shannon Tap	13.2	NE	St. Louis	75	31.5	8.4	8.4	8.4	EQUAL
38620	MacMillan	4.2	NE	Crow Wing	0	30.3	10.4	8.8	8.8	SUPK
38621	Macmillan Waferizer	4.2	NE	Crow Wing	0	31.0	10.4	8.8	8.8	SUPK
38912	North Sub	34.5	NE	Morrison	0	33.9	8.9	10.2	8.9	SUOP
62212	Riverton	12.8	NE	Crow Wing	0	29.6	9.1	9.1	9.1	EQUAL
38901	525-529T	34.5	NE	Morrison	0	33.4	9.2	10.5	9.2	SUOP
38852	Blandin Paper	6	NE	Morrison	0	36.0	9.9	10.0	9.9	SUOP
38608	Maroco	34.5	NE	Crow Wing	0	30.3	10.0	10.0	10	EQUAL
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1	10	SUOP
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0	10	EQUAL
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38867	529 REG	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0	10	EQUAL
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0	10	EQUAL
38888	529 Voltage Regulator	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38889	Fairgrounds	34.5	NE	Morrison	0	34.3	10.0	10.0	10	EQUAL
38890	Highway 10 77	34.5	NE	Morrison	0	33.1	10.0	10.0	10	EQUAL
38891	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38895	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38906	525 Voltage Regulator 2	34.5	NE	Morrison	0	33.0	10.0	10.0	10	EQUAL
38607	506 DIST	34.5	NE	Crow Wing	0	28.8	10.2	10.4	10.2	SUOP
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3	10.3	EQUAL
62507	Onigum	34.5	NE	Cass	0	34.8	10.5	11.1	10.5	SUOP
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6	10.6	EQUAL
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6	10.6	EQUAL
38896	Minnesota Power Tap	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38897	Minnesota Power	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38899	Crestliner	34.5	NE	Morrison	0	33.7	10.7	11.0	10.7	SUOP
38919	36K Capacitor	34.5	NE	Morrison	0	33.8	10.7	11.0	10.7	SUOP
62698	Wirt	69	NE	Itasca	1,141	33.1	10.8	11.3	10.8	SUOP
62699	Evensen	69	NE	Itasca	1,141	32.2	10.8	11.3	10.8	SUOP
62700	Wirt Tap Switches SS	69	NE	Itasca	1,141	31.6	10.8	11.3	10.8	SUOP
38920	Ethanol	34.5	NE	Morrison	0	32.5	10.9	11.2	10.9	SUOP
62495	Sand Lake	69	NE	St. Louis	75	29.5	10.9	11.8	10.9	SUOP
62474	Arbo	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
62484	Arbo Tap	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
61757	Boise	2.3	NE	Koochiching	0	30.7	11.5	13.1	11.5	SUOP
61755	Boise Cascade	6.6	NE	Koochiching	0	30.7	11.5	13.1	11.5	SUOP
38858	529-T77	34.5	NE	Morrison	0	34.4	12.0	12.9	12	SUOP
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5	12	SUOP
38893	High School	34.5	NE	Morrison	0	34.2	12.0	12.9	12	SUOP
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3	12.4	SUOP
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3	12.4	SUOP
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3	12.4	SUOP
38848	508-511T	34.5	NE	Morrison	0	34.9	12.4	17.3	12.4	SUOP
38850	508-525T	34.5	NE	Morrison	0	34.2	12.4	17.2	12.4	SUOP
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3	12.4	SUOP
38871	Camp Ripley East Sub	34.5	NE	Morrison	0	34.8	12.4	17.2	12.4	SUOP
38882	508-521T	34.5	NE	Morrison	0	33.3	12.4	17.0	12.4	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38883	MP Flensberg	34.5	NE	Morrison	0	33.0	12.4	17.3	12.4	SUOP
38902	508-502T	34.5	NE	Morrison	0	33.9	12.4	17.2	12.4	SUOP
38905	Little Falls West Side	34.5	NE	Morrison	0	33.3	12.4	13.4	12.4	SUOP
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3	12.4	SUOP
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3	12.4	SUOP
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1	12.7	SUOP
38921	CMEC	34.5	NE	Morrison	0	33.1	12.7	13.8	12.7	SUOP
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9	12.8	SUOP
62697	Big Fork	69	NE	Itasca	1,141	30.9	12.9	14.3	12.9	SUOP
38606	505-06SW	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38611	Maroco Tap	34.5	NE	Crow Wing	0	30.3	13.1	15.1	13.1	SUOP
38612	Cuyuna Tap	34.5	NE	Crow Wing	0	29.6	13.1	15.1	13.1	SUOP
38613	506-TAP	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38614	Deerwood	34.5	NE	Crow Wing	0	30.4	13.1	15.1	13.1	SUOP
38615	Cuyuna	34.5	NE	Crow Wing	0	29.7	13.1	15.1	13.1	SUOP
38624	Highway 12	34.5	NE	Crow Wing	0	32.0	13.1	15.1	13.1	SUOP
38859	EAST88	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38861	529-36ES	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38892	East Side Sub Tap	34.5	NE	Morrison	0	34.2	13.1	14.4	13.1	SUOP
38610	Trommald	34.5	NE	Crow Wing	0	29.0	13.3	15.4	13.3	SUOP
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9	13.3	SUOP
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9	13.3	SUOP
38604	Ironton	34.5	NE	Crow Wing	0	29.6	13.4	13.7	13.4	SUOP
38860	529-DIST	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38914	Riverview F	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38916	529-36SW	34.5	NE	Morrison	0	33.5	13.4	14.7	13.4	SUOP
38917	529-36E	34.5	NE	Morrison	0	33.1	13.4	14.7	13.4	SUOP
38898	Oakes	34.5	NE	Morrison	0	34.1	13.9	15.6	13.9	SUOP
38915	Riverview Drive 44	34.5	NE	Morrison	0	33.6	13.9	15.2	13.9	SUOP
62478	Goodland	69	NE	Itasca	1,141	31.3	14.4	14.8	14.4	SUOP
38602	Ironton Switch	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38603	Ironton Tap	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38605	Crosby Tap	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP
38609	Crosby	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3	14.5	SUOP
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5	14.5	SUPK
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5	14.5	SUPK
38601	Riverton Rural	34.5	NE	Crow Wing	0	29.6	14.7	17.6	14.7	SUOP
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7	14.7	SUPK
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7	14.7	SUPK
61736	Thunderbird Mine	115	NE	St. Louis	75	30.5	46.5	14.9	14.9	SUPK
38460	Laskin	46	NE	St. Louis	75	27.8	15.0	18.2	15	SUOP
38461	Aurora	46	NE	St. Louis	75	30.5	15.0	18.2	15	SUOP
38463	Hoyt Lakes	46	NE	St. Louis	75	26.3	15.0	18.2	15	SUOP
38873	Hennepin Paper	34.5	NE	Morrison	0	33.2	15.3	17.5	15.3	SUOP
38904	525-08T7	34.5	NE	Morrison	0	33.0	15.3	17.6	15.3	SUOP
62184	Emily	69	NE	Crow Wing	0	30.1	15.3	16.9	15.3	SUOP
62696	Jessie Lake	69	NE	Itasca	1,141	31.0	15.5	16.4	15.5	SUOP
66801	Lund	69	NE	Koochiching	0	31.6	15.5	19.8	15.5	SUOP
38500	Nashwauk Tap	34.5	NE	Itasca	1,141	33.6	16.0	16.4	16	SUOP
38671	531-534T	34.5	NE	Crow Wing	0	32.9	16.3	16.4	16.3	SUOP
62475	Gunn	69	NE	Itasca	1,141	31.5	27.2	16.7	16.7	SUPK
38672	Pillager	34.5	NE	Cass	0	31.9	16.8	17.5	16.8	SUOP
38673	503-531T	34.5	NE	Cass	0	31.3	16.8	17.0	16.8	SUOP
38618	Macmillan G1	34.5	NE	Crow Wing	0	30.9	17.1	17.0	17	SUPK
38622	Macmillan G2	34.5	NE	Crow Wing	0	30.9	17.0	17.0	17	EQUAL
38675	Baxter - MP	34.5	NE	Crow Wing	0	31.8	17.0	17.0	17	EQUAL
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0	17	EQUAL
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0	17	EQUAL
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0	17	EQUAL
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0	17	EQUAL
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0	17	EQUAL
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0	17	EQUAL
38415	Inland Industrial	46	NE	St. Louis	75	30.1	17.0	17.0	17	EQUAL
38416	McKinley	46	NE	St. Louis	75	30.5	17.0	17.0	17	EQUAL
38617	Riverton Downtown	34.5	NE	Crow Wing	0	29.6	17.1	17.3	17.1	SUOP
38787	Menahga	34.5	NE	Wadena	0	33.5	17.1	17.2	17.1	SUOP
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1	17.1	EQUAL

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2	17.1	SUOP
61864	St. Croix	46	NE	St. Louis	75	25.0	17.2	17.4	17.2	SUOP
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6	17.5	SUOP
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6	17.5	SUOP
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1	17.6	SUOP
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1	17.6	SUOP
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6	17.6	EQUAL
38421	Laurentian Mine	46	NE	St. Louis	75	30.0	17.7	18.0	17.7	SUOP
62855	North Parker	34.5	NE	Morrison	0	34.3	17.8	19.8	17.8	SUOP
38417	Biwabik	46	NE	St. Louis	75	28.5	17.8	18.2	17.8	SUOP
38418	Pineville	46	NE	St. Louis	75	26.7	17.9	18.3	17.9	SUOP
38616	Crosby MFG	34.5	NE	Crow Wing	0	29.1	18.0	19.1	18	SUOP
38903	529-525T	34.5	NE	Morrison	0	34.0	18.0	18.0	18	EQUAL
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2	18	SUOP
62908	Orton	34.5	NE	Wadena	0	34.7	18.0	18.2	18	SUOP
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2	18	SUOP
38676	Gull Lake	34.5	NE	Crow Wing	0	34.5	18.3	18.9	18.3	SUOP
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8	18.3	SUOP
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9	18.4	SUOP
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8	18.4	SUOP
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7	18.4	SUOP
38788	Menahga SS	34.5	NE	Wadena	0	34.9	18.5	18.8	18.5	SUOP
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0	18.5	SUOP
61865	Babbitt VL	46	NE	St. Louis	75	30.5	18.5	19.1	18.5	SUOP
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1	18.6	SUOP
38464	Erie	4.8	NE	St. Louis	75	28.8	50.0	18.7	18.7	SUPK
61702	Syl Laskin	115	NE	St. Louis	75	27.8	85.9	18.7	18.7	SUPK
62503	Winton	46	NE	St. Louis	75	27.0	19.0	19.8	19	SUOP
61862	Ely Sub A	46	NE	St. Louis	75	26.4	19.2	20.1	19.2	SUOP
38674	Pine Beach	34.5	NE	Cass	0	31.5	19.3	20.8	19.3	SUOP
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5	19.3	SUOP
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3	19.3	SUPK
38619	Macmillan	34.5	NE	Crow Wing	0	30.9	20.4	19.5	19.5	SUPK
38623	532-06TS	34.5	NE	Crow Wing	0	32.0	19.6	19.5	19.5	SUPK

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2	19.5	SUOP
62204	Little Falls	34.5	NE	Morrison	0	34.6	21.0	19.5	19.5	SUPK
62481	Boy River	69	NE	Cass	0	32.3	19.5	20.1	19.5	SUOP
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7	19.6	SUOP
38856	MN Pipeline Darling	34.5	NE	Morrison	0	34.8	19.6	20.6	19.6	SUOP
38789	Spirit Lake Tap	34.5	NE	Wadena	0	34.8	19.8	20.4	19.8	SUOP
62205	Motley	34.5	NE	Morrison	0	33.2	19.8	21.7	19.8	SUOP
62476	Blackberry	69	NE	Itasca	1,141	31.7	32.0	19.8	19.8	SUPK
61559	Minntac Transformer 1	13.8	NE	St. Louis	75	31.8	20.0	20.0	20	EQUAL
61561	Minntac Transformer 2	13.8	NE	St. Louis	75	31.8	20.0	20.0	20	EQUAL
61563	Shannon Junction Transformer	13.8	NE	St. Louis	75	31.5	20.0	20.0	20	EQUAL
61565	Forbes TR9	13.8	NE	St. Louis	75	27.6	20.0	20.0	20	EQUAL
61567	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0	20	EQUAL
61569	Blackberry	13.8	NE	Itasca	1,141	31.2	20.0	20.0	20	EQUAL
61579	Mud Lake Transformer	13.8	NE	Crow Wing	0	34.0	20.0	20.0	20	EQUAL
61750	Shannon 2TR	13.8	NE	St. Louis	75	31.7	20.0	20.0	20	EQUAL
62451	Lakeland	115	NE	St. Louis	75	26.4	63.7	20.1	20.1	SUPK
61870	Virginia	46	NE	St. Louis	75	28.1	20.2	22.3	20.2	SUOP
38886	Sunbridge St	34.5	NE	Morrison	0	34.2	20.6	21.8	20.6	SUOP
38887	Little Falls South	34.5	NE	Morrison	0	34.2	20.6	21.7	20.6	SUOP
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1	20.7	SUOP
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4	20.7	SUOP
62477	Enbridge Blackberry	69	NE	Itasca	1,141	31.7	33.3	20.7	20.7	SUPK
62486	Lakehead Tap	69	NE	Itasca	1,141	32.0	33.3	20.7	20.7	SUPK
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7	21	SUOP
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0	21	SUOP
61863	31-32TIE	46	NE	St. Louis	75	27.2	21.0	21.0	21	EQUAL
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9	21.2	SUOP
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3	21.3	SUPK
62219	Shimn Tap	34.5	NE	Morrison	0	33.2	21.3	22.8	21.3	SUOP
62220	Shim Lake Tap	34.5	NE	Morrison	0	33.0	21.3	22.8	21.3	SUOP
38874	525-08T8	34.5	NE	Morrison	0	32.9	22.3	25.8	22.3	SUOP
38875	525-2988	34.5	NE	Morrison	0	34.8	22.3	25.8	22.3	SUOP
66760	Lund	230	NE	Koochiching	0	31.4	22.6	28.8	22.6	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61860	Babbitt	46	NE	St. Louis	75	28.1	23.5	24.6	23.5	SUOP
61861	Winton	46	NE	Lake	0	26.5	23.5	25.3	23.5	SUOP
61880	32-31TIE	46	NE	St. Louis	75	26.7	23.5	25.3	23.5	SUOP
62504	Babbitt Townsite	46	NE	St. Louis	75	28.4	23.5	24.5	23.5	SUOP
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7	23.6	SUOP
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8	23.7	SUOP
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8	23.7	SUOP
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
38705	Motley	34.5	NE	Morrison	0	32.9	24.1	25.2	24.1	SUOP
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2	24.2	SUPK
38750	Backus	34.5	NE	Cass	0	33.1	24.2	27.2	24.2	SUOP
61855	Hackensack	34.5	NE	Cass	0	33.0	24.2	27.2	24.2	SUOP
62208	Birch Lake	34.5	NE	Cass	0	32.8	24.2	27.2	24.2	SUOP
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3	24.3	SUOP
38754	515-520T	34.5	NE	Hubbard	0	34.8	24.3	26.3	24.3	SUOP
62379	Eagle Lake	34.5	NE	Hubbard	0	33.6	24.3	26.3	24.3	SUOP
62416	Park Rapids	34.5	NE	Hubbard	0	34.8	24.3	31.7	24.3	SUOP
62417	Mantrap	34.5	NE	Hubbard	0	33.1	24.3	26.3	24.3	SUOP
62485	Warba Switch	69	NE	Itasca	1,141	30.8	39.5	24.9	24.9	SUPK
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6	25.2	SUOP
38746	Hackensack	34.5	NE	Cass	0	33.6	25.3	27.5	25.3	SUOP
61872	Ely Sub B	46	NE	St. Louis	75	25.7	25.3	27.9	25.3	SUOP
61879	Ely Sub Tap	46	NE	St. Louis	75	27.3	25.3	27.9	25.3	SUOP
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1	25.4	SUOP
38704	Dog Lake Tap	34.5	NE	Todd	30	33.2	25.4	31.8	25.4	SUOP
38706	Staples Rural	34.5	NE	Todd	30	34.3	25.4	34.1	25.4	SUOP
61844	Dog Lake	34.5	NE	Todd	30	33.6	25.4	28.2	25.4	SUOP
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2	25.4	SUOP
38724	Nisswa	34.5	NE	Crow Wing	0	31.5	25.6	27.3	25.6	SUOP
61726	Hibbing Taconite Pump	13.8	NE	St. Louis	75	32.3	25.8	25.8	25.8	EQUAL
38744	Onigum	34.5	NE	Cass	0	34.1	25.8	27.5	25.8	SUOP
38745	Ten Mile Lake	34.5	NE	Cass	0	34.5	25.8	27.5	25.8	SUOP
62502	Clear Lake	46	NE	St. Louis	75	29.0	25.8	28.7	25.8	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61873	Soudan Park Mine	46	NE	St. Louis	75	32.0	26.1	29.1	26.1	SUOP
62207	Pleasant Lake	69	NE	Cass	0	32.4	26.1	27.0	26.1	SUOP
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1	27.1	SUPK
62506	Vermilion	46	NE	St. Louis	75	29.6	27.3	29.3	27.3	SUOP
62209	Birch Lake	69	NE	Cass	0	32.8	29.2	27.5	27.5	SUPK
61845	Baxter	34.5	NE	Crow Wing	0	31.8	28.4	27.8	27.8	SUPK
66764	Running	13.2	NE	Koochiching	0	30.3	28.0	28.0	28	EQUAL
66765	Running	13.2	NE	Koochiching	0	30.7	28.0	28.0	28	EQUAL
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1	28.3	SUOP
61874	Tower Soudan	46	NE	St. Louis	75	32.1	28.5	31.1	28.5	SUOP
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3	28.8	SUOP
38722	Pine River	34.5	NE	Cass	0	33.3	30.0	30.0	30	EQUAL
61854	Pine River	34.5	NE	Cass	0	34.2	30.0	30.0	30	EQUAL
62189	Wabedo	69	NE	Cass	0	34.2	30.4	32.9	30.4	SUOP
62199	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
62200	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7	30.9	SUOP
9268	Big Falls	69	NE	Koochiching	0	31.9	30.9	33.7	30.9	SUOP
9271	Littlefork	69	NE	Koochiching	0	32.3	30.9	32.9	30.9	SUOP
9272	Rat Root River	69	NE	Koochiching	0	30.5	30.9	33.0	30.9	SUOP
9273	International Falls	69	NE	Koochiching	0	32.1	30.9	33.0	30.9	SUOP
9274	Kabetogama	69	NE	St. Louis	75	31.5	30.9	33.0	30.9	SUOP
9425	Littlefork	69	NE	Koochiching	0	31.3	30.9	33.0	30.9	SUOP
67017	Running	69	NE	Koochiching	0	30.7	30.9	50.4	30.9	SUOP
62488	Blackberry	69	NE	Itasca	1,141	31.2	46.4	31.0	31	SUPK
62198	Crosslake City	69	NE	Crow Wing	0	31.5	31.4	33.0	31.4	SUOP
38723	Pine River	34.5	NE	Cass	0	34.0	31.9	32.8	31.9	SUOP
62177	Birch Lake	115	NE	Hubbard	0	33.8	33.5	37.9	33.5	SUOP
62499	Sand Lake Tap	69	NE	St. Louis	75	29.1	33.6	34.6	33.6	SUOP
62492	Meadowbrook	69	NE	St. Louis	75	29.0	33.7	34.9	33.7	SUOP
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0	34	EQUAL
38784	Park Rapids Tap	34.5	NE	Hubbard	0	34.8	34.0	34.0	34	EQUAL
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0	34	EQUAL
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0	34	EQUAL

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0	34	EQUAL
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0	34	EQUAL
38869	526-529T	34.5	NE	Morrison	0	34.8	34.0	34.0	34	EQUAL
38781	Long Lake Cap Bank	34.5	NE	Hubbard	0	34.4	34.1	34.2	34.1	SUOP
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3	34.1	SUOP
38868	529-526T	34.5	NE	Morrison	0	34.6	34.1	34.1	34.1	EQUAL
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1	34.1	EQUAL
61848	Pequot Lakes	34.5	NE	Crow Wing	0	32.9	36.9	34.2	34.2	SUPK
38721	Pequoet Lake District	34.5	NE	Crow Wing	0	32.9	35.3	34.3	34.3	SUPK
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3	34.3	EQUAL
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6	34.6	SUPK
62490	Shannon	69	NE	St. Louis	75	31.5	35.0	36.7	35	SUOP
62491	Side Lake	69	NE	St. Louis	75	29.9	35.0	36.7	35	SUOP
62496	Pike River	69	NE	St. Louis	75	29.6	35.0	36.6	35	SUOP
62497	Virginia	69	NE	St. Louis	75	28.1	35.0	36.6	35	SUOP
61705	Babbitt	115	NE	St. Louis	75	27.2	124.3	35.0	35	SUPK
61708	Virginia S27	115	NE	St. Louis	75	28.1	183.1	35.0	35	SUPK
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8	35	SUOP
62194	Fifty Lakes	69	NE	Crow Wing	0	30.6	35.1	38.3	35.1	SUOP
38854	Bertran	34.5	NE	Morrison	0	37.8	35.2	36.3	35.2	SUOP
61853	Riverton	34.5	NE	Crow Wing	0	28.8	36.0	40.7	36	SUOP
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0	36.4	SUOP
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6	36.4	SUOP
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8	36.6	SUOP
62494	Potlatch	69	NE	St. Louis	75	28.5	37.7	40.5	37.7	SUOP
62498	Potlatch	69	NE	St. Louis	75	28.9	37.7	40.5	37.7	SUOP
61797	Riverton	13.8	NE	Crow Wing	0	30.1	37.9	37.9	37.9	EQUAL
62894	Wing River Transformer	13.8	NE	Wadena	0	37.4	37.9	37.9	37.9	EQUAL
63078	Hubbard tap	13.8	NE	Hubbard	0	35.9	38.0	38.0	38	EQUAL
61882	Tower - Soudan	46	NE	St. Louis	75	32.1	46.8	38.2	38.2	SUPK
62185	Ox Lake	69	NE	Crow Wing	0	31.3	39.0	43.8	39	SUOP
61704	34L Tap	115	NE	St. Louis	75	29.7	204.5	39.1	39.1	SUPK
61707	Minntac	115	NE	St. Louis	75	32.4	99.0	39.5	39.5	SUPK
62508	Tower	13.8	NE	St. Louis	75	32.1	71.0	40.2	40.2	SUPK

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NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9	40.3	SUOP
61883	Tower	115	NE	St. Louis	75	32.1	72.7	40.7	40.7	SUPK
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5	42.2	SUOP
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5	42.2	SUOP
62448	Hill City	115	NE	Aitkin	0	31.1	60.4	43.6	43.6	SUPK
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3	44.6	SUOP
61723	Eveleth Taconite Co. Gen	13.8	NE	St. Louis	75	29.4	162.8	44.8	44.8	SUPK
66780	Running	69	NE	Koochiching	0	30.7	44.8	56.0	44.8	SUOP
61721	Eveleth Taconite Co.	115	NE	St. Louis	75	29.4	165.4	44.8	44.8	SUPK
66779	Running	230	NE	Koochiching	0	30.7	44.8	56.0	44.8	SUOP
61734	Iron Tap	115	NE	St. Louis	75	28.2	133.6	45.5	45.5	SUPK
62453	Iron	115	NE	St. Louis	75	27.8	99.6	45.5	45.5	SUPK
62500	Tower	69	NE	St. Louis	75	32.1	61.4	45.8	45.8	SUPK
62483	Bena Tap	69	NE	Itasca	1,141	32.4	45.9	46.4	45.9	SUOP
62482	Salem SS	69	NE	Cass	0	32.8	46.8	47.5	46.8	SUOP
62479	Ball Club	69	NE	Itasca	1,141	31.8	47.5	48.7	47.5	SUOP
61735	Thunderbird Mine	115	NE	St. Louis	75	29.0	94.6	47.8	47.8	SUPK
62489	Remer	69	NE	Cass	0	31.5	48.3	49.6	48.3	SUOP
61551	Forbes 1 TR9	34.5	NE	St. Louis	75	26.8	50.0	50.0	50	EQUAL
61553	Forbes 2 TR9	34.5	NE	St. Louis	75	27.7	50.0	50.0	50	EQUAL
62186	Thunder Lake	69	NE	Cass	0	31.9	50.1	52.3	50.1	SUOP
62196	Blind Lake	69	NE	Cass	0	33.4	55.0	51.9	51.9	SUPK
62501	Frazer	69	NE	St. Louis	75	28.2	61.4	52.5	52.5	SUPK
62450	Deer River	115	NE	Itasca	1,141	37.6	56.0	56.0	56	EQUAL
61780	Deer River	115	NE	Itasca	1,141	37.6	57.9	58.7	57.9	SUOP
62493	Cook	69	NE	St. Louis	75	28.0	59.4	58.0	58	SUPK
62505	Orr	69	NE	St. Louis	75	27.7	59.4	58.0	58	SUPK
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6	58.6	SUPK
61850	Little Falls	34.5	NE	Morrison	0	34.7	64.5	71.2	64.5	SUOP
62202	Nokay	115	NE	Crow Wing	0	33.8	123.1	66.2	66.2	SUPK
61753	International Falls	12.5	NE	Koochiching	0	34.2	68.8	72.6	68.8	SUOP
61791	Lakehead Pumping Station	115	NE	Itasca	1,141	31.7	69.9	70.8	69.9	SUOP
66778	Running	230	NE	Koochiching	0	30.7	70.0	70.0	70	EQUAL
61754	Boise Cascade	118	NE	Koochiching	0	30.7	73.9	75.6	73.9	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61790	Cohasset Tap	115	NE	Itasca	1,141	31.2	74.4	77.6	74.4	SUOP
62449	Cohasset	115	NE	Itasca	1,141	30.5	74.4	77.6	74.4	SUOP
62487	Deer River	69	NE	Itasca	1,141	32.5	78.3	88.8	78.3	SUOP
62421	Long Lake	34.5	NE	Hubbard	0	34.1	78.7	89.5	78.7	SUOP
61578	Mud Lake Junction	115	NE	Crow Wing	0	32.7	175.7	81.4	81.4	SUPK
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3	83.1	SUOP
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1	88.2	SUOP
62455	Keewatin	115	NE	St. Louis	75	32.3	99.4	100.0	99.4	SUOP
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7	100.1	SUOP
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1	100.1	SUOP
61706	Keewatin	115	NE	St. Louis	75	32.4	100.4	101.0	100.4	SUOP
61792	Boise Cascade Paper	13.8	NE	Koochiching	0	30.7	100.6	102.2	100.6	SUOP
61644	Dog Lake	115	NE	Cass	0	33.7	102.7	123.8	102.7	SUOP
61645	Baxter S47	115	NE	Crow Wing	0	32.9	105.4	109.2	105.4	SUOP
61781	20L TAP7	115	NE	Itasca	1,141	30.9	107.9	117.5	107.9	SUOP
61654	Aitkin	115	NE	Crow Wing	0	31.2	109.4	110.1	109.4	SUOP
61748	Boswell	115	NE	Itasca	1,141	31.0	203.1	109.7	109.7	SUPK
61715	Inland Generator	13.8	NE	St. Louis	75	30.8	109.8	110.0	109.8	SUOP
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5	109.8	SUOP
61740	Grand Rapids	115	NE	Itasca	1,141	31.7	178.5	109.9	109.9	SUPK
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2	110.2	SUOP
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2	110.9	SUOP
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1	111.1	EQUAL
62176	Merrifield	115	NE	Crow Wing	0	31.3	112.4	114.4	112.4	SUOP
62510	Crooked Lake	115	NE	Itasca	1,141	30.2	117.5	119.0	117.5	SUOP
61778	Blandin Tap	115	NE	Itasca	1,141	30.9	206.1	118.8	118.8	SUPK
62206	Baxter Bank	115	NE	Crow Wing	0	32.6	118.9	127.1	118.9	SUOP
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4	122.2	SUOP
61779	Blandin	115	NE	Itasca	1,141	31.7	250.8	126.6	126.6	SUPK
61739	Blackberry	115	NE	Itasca	1,141	31.2	131.0	236.6	131	SUOP
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2	132.2	SUPK
61646	Dog Lake Tap	115	NE	Cass	0	33.3	134.3	159.7	134.3	SUOP
62210	Southdale Bank 1	115	NE	Crow Wing	0	30.0	134.7	141.2	134.7	SUOP
61796	Riverton	115	NE	Crow Wing	0	29.6	150.5	135.2	135.2	SUPK

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61752	International Falls	118	NE	Koochiching	0	34.2	221.9	138.0	138	SUPK
61648	Pequot Lakes	115	NE	Crow Wing	0	32.9	148.0	140.2	140.2	SUPK
62213	Southdale Tap	115	NE	Crow Wing	0	31.2	141.3	166.4	141.3	SUOP
61562	Shannon Junction	115	NE	St. Louis	75	31.5	142.9	152.2	142.9	SUOP
61785	Shannon	115	NE	St. Louis	75	34.9	143.7	153.0	143.7	SUOP
62511	Crooked Lake Tap	115	NE	St. Louis	75	32.6	147.5	149.0	147.5	SUOP
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6	147.6	SUOP
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7	150.1	SUOP
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5	156.7	SUOP
61725	44L Tap	115	NE	St. Louis	75	34.1	169.3	157.7	157.7	SUPK
61650	Little Falls S68	115	NE	Morrison	0	34.6	161.6	194.6	161.6	SUOP
62201	Pine River	115	NE	Cass	0	32.9	169.0	177.1	169	SUOP
61714	Minntac Load A	13.8	NE	St. Louis	75	34.6	172.1	173.0	172.1	SUOP
61709	Inland Taconite Co.	115	NE	St. Louis	75	30.8	176.0	176.1	176	SUOP
61732	National G	13.8	NE	St. Louis	75	33.4	180.9	181.3	180.9	SUOP
61724	Hibbing	115	NE	St. Louis	75	34.3	188.9	197.8	188.9	SUOP
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4	191.4	SUPK
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5	192.6	SUOP
61751	Littlefork	118	NE	Koochiching	0	31.6	198.0	196.5	196.5	SUPK
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1	197.6	SUOP
61731	14L Tap	115	NE	St. Louis	75	32.3	201.7	197.8	197.8	SUPK
62411	Long Lake	115	NE	Hubbard	0	34.8	220.4	231.2	220.4	SUOP
63053	Hubbard	230	NE	Hubbard	0	35.9	220.8	323.7	220.8	SUOP
61737	Nashwauk	115	NE	Itasca	1,141	32.4	241.0	227.2	227.2	SUPK
60100	Forbes	500	NE	St. Louis	75	27.3	234.9	861.6	234.9	SUOP
60101	Forbes	500	NE	St. Louis	75	27.7	234.9	861.6	234.9	SUOP
61617	Mud Lake	230	NE	Crow Wing	0	32.2	236.1	246.8	236.1	SUOP
61564	Forbes Junction	115	NE	St. Louis	75	27.7	238.7	260.2	238.7	SUOP
61653	Riverton	115	NE	Crow Wing	0	29.6	240.0	284.4	240	SUOP
61612	Riverton	230	NE	Crow Wing	0	30.4	241.3	343.0	241.3	SUOP
61713	Minntac Load C	13.8	NE	St. Louis	75	33.7	242.4	243.2	242.4	SUOP
61624	Forbes	230	NE	St. Louis	75	27.7	242.6	822.6	242.6	SUOP
61550	Forbes 1 Junction	230	NE	St. Louis	75	27.7	243.8	474.0	243.8	SUOP
61552	Forbes Junction	230	NE	St. Louis	75	27.7	243.8	473.5	243.8	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63058	Wing River	230	NE	Wadena	0	37.7	251.7	245.6	245.6	SUPK
61558	Minntac Junction 1	115	NE	St. Louis	75	31.8	247.6	326.3	247.6	SUOP
61560	Minntac Junction 2	115	NE	St. Louis	75	31.8	247.6	326.9	247.6	SUOP
61623	Minntac	230	NE	St. Louis	75	32.8	247.9	722.3	247.9	SUOP
61710	Minntac	115	NE	St. Louis	75	33.1	248.3	420.1	248.3	SUOP
61711	Minntac Tap C	115	NE	St. Louis	75	34.6	248.3	385.0	248.3	SUOP
61712	Minntac Tap A	115	NE	St. Louis	75	34.6	248.3	349.0	248.3	SUOP
61727	H. T. Pumps	115	NE	St. Louis	75	30.1	248.8	248.8	248.8	EQUAL
61749	Shannon	115	NE	St. Louis	75	31.5	251.0	376.6	251	SUOP
61610	Badoura	230	NE	Hubbard	0	33.5	251.5	435.5	251.5	SUOP
61625	Blackberry	230	NE	Itasca	1,141	31.2	252.1	757.0	252.1	SUOP
61627	Shannon S26	230	NE	St. Louis	75	31.5	252.1	558.4	252.1	SUOP
61566	Blackberry	115	NE	Itasca	1,141	31.2	252.2	336.6	252.2	SUOP
61568	Blackberry	115	NE	Itasca	1,141	31.2	252.2	338.0	252.2	SUOP
60167	Running Switch Cap	230	NE	Koochiching	0	32.6	271.3	296.7	271.3	SUOP
66753	Running	230	NE	Koochiching	0	30.7	271.3	296.7	271.3	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61574	Laskin Junction	115	NE	St. Louis	75	28.8	5.0	5.0	5	EQUAL
38872	Little Falls HE	34.5	NE	Morrison	0	32.8	5.9	5.9	5.9	EQUAL
38907	525 Voltage Regulator 1	34.5	NE	Morrison	0	33.0	5.9	5.9	5.9	EQUAL
38908	Little Falls HE	34.5	NE	Morrison	0	34.6	5.9	5.9	5.9	EQUAL
38894	Larson	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
38909	13K Capacitor	34.5	NE	Morrison	0	34.6	6.3	6.5	6.3	SUOP
9270	Loman	69	NE	Koochiching	0	31.2	6.5	8.4	6.5	SUOP
38910	Little Falls Industrial Park	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
38911	14K Capacitor	34.5	NE	Morrison	0	34.6	6.7	7.1	6.7	SUOP
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0	6.7	SUOP
38912	North Sub	34.5	NE	Morrison	0	33.9	8.9	10.2	8.9	SUOP
38901	525-529T	34.5	NE	Morrison	0	33.4	9.2	10.5	9.2	SUOP
38608	Maroco	34.5	NE	Crow Wing	0	30.3	10.0	10.0	10	EQUAL
38906	525 Voltage Regulator 2	34.5	NE	Morrison	0	33.0	10.0	10.0	10	EQUAL
38890	Highway 10 77	34.5	NE	Morrison	0	33.1	10.0	10.0	10	EQUAL
38891	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38895	536 Voltage Regulator	34.5	NE	Morrison	0	33.6	10.0	10.0	10	EQUAL
38888	529 Voltage Regulator	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL
38867	529 REG	34.5	NE	Morrison	0	34.2	10.0	10.0	10	EQUAL
38889	Fairgrounds	34.5	NE	Morrison	0	34.3	10.0	10.0	10	EQUAL
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0	10	EQUAL
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0	10	EQUAL
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1	10	SUOP
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0	10	EQUAL
38607	506 DIST	34.5	NE	Crow Wing	0	28.8	10.2	10.4	10.2	SUOP
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3	10.3	EQUAL
62507	Onigum	34.5	NE	Cass	0	34.8	10.5	11.1	10.5	SUOP
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6	10.6	EQUAL
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6	10.6	EQUAL
38896	Minnesota Power Tap	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38897	Minnesota Power	34.5	NE	Morrison	0	33.6	10.7	11.0	10.7	SUOP
38899	Crestliner	34.5	NE	Morrison	0	33.7	10.7	11.0	10.7	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38919	36K Capacitor	34.5	NE	Morrison	0	33.8	10.7	11.0	10.7	SUOP
62700	Wirt Tap Switches SS	69	NE	Itasca	1,141	31.6	10.8	11.3	10.8	SUOP
62699	Evensen	69	NE	Itasca	1,141	32.2	10.8	11.3	10.8	SUOP
62698	Wirt	69	NE	Itasca	1,141	33.1	10.8	11.3	10.8	SUOP
62495	Sand Lake	69	NE	St. Louis	75	29.5	10.9	11.8	10.9	SUOP
38920	Ethanol	34.5	NE	Morrison	0	32.5	10.9	11.2	10.9	SUOP
62474	Arbo	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
62484	Arbo Tap	69	NE	Itasca	1,141	30.4	18.7	11.3	11.3	SUPK
38893	High School	34.5	NE	Morrison	0	34.2	12.0	12.9	12	SUOP
38858	529-T77	34.5	NE	Morrison	0	34.4	12.0	12.9	12	SUOP
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5	12	SUOP
38883	MP Flensberg	34.5	NE	Morrison	0	33.0	12.4	17.3	12.4	SUOP
38882	508-521T	34.5	NE	Morrison	0	33.3	12.4	17.0	12.4	SUOP
38905	Little Falls West Side	34.5	NE	Morrison	0	33.3	12.4	13.4	12.4	SUOP
38902	508-502T	34.5	NE	Morrison	0	33.9	12.4	17.2	12.4	SUOP
38850	508-525T	34.5	NE	Morrison	0	34.2	12.4	17.2	12.4	SUOP
38871	Camp Ripley East Sub	34.5	NE	Morrison	0	34.8	12.4	17.2	12.4	SUOP
38848	508-511T	34.5	NE	Morrison	0	34.9	12.4	17.3	12.4	SUOP
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3	12.4	SUOP
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3	12.4	SUOP
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3	12.4	SUOP
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3	12.4	SUOP
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3	12.4	SUOP
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3	12.4	SUOP
38921	CMEC	34.5	NE	Morrison	0	33.1	12.7	13.8	12.7	SUOP
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1	12.7	SUOP
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9	12.8	SUOP
62697	Big Fork	69	NE	Itasca	1,141	30.9	12.9	14.3	12.9	SUOP
38612	Cuyuna Tap	34.5	NE	Crow Wing	0	29.6	13.1	15.1	13.1	SUOP
38615	Cuyuna	34.5	NE	Crow Wing	0	29.7	13.1	15.1	13.1	SUOP
38606	505-06SW	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38613	506-TAP	34.5	NE	Crow Wing	0	30.0	13.1	15.1	13.1	SUOP
38611	Maroco Tap	34.5	NE	Crow Wing	0	30.3	13.1	15.1	13.1	SUOP
38614	Deerwood	34.5	NE	Crow Wing	0	30.4	13.1	15.1	13.1	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38624	Highway 12	34.5	NE	Crow Wing	0	32.0	13.1	15.1	13.1	SUOP
38892	East Side Sub Tap	34.5	NE	Morrison	0	34.2	13.1	14.4	13.1	SUOP
38859	EAST88	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38861	529-36ES	34.5	NE	Morrison	0	34.3	13.1	14.4	13.1	SUOP
38610	Trommald	34.5	NE	Crow Wing	0	29.0	13.3	15.4	13.3	SUOP
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9	13.3	SUOP
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9	13.3	SUOP
38604	Ironton	34.5	NE	Crow Wing	0	29.6	13.4	13.7	13.4	SUOP
38917	529-36E	34.5	NE	Morrison	0	33.1	13.4	14.7	13.4	SUOP
38914	Riverview F	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38860	529-DIST	34.5	NE	Morrison	0	33.4	13.4	14.7	13.4	SUOP
38916	529-36SW	34.5	NE	Morrison	0	33.5	13.4	14.7	13.4	SUOP
38915	Riverview Drive 44	34.5	NE	Morrison	0	33.6	13.9	15.2	13.9	SUOP
38898	Oakes	34.5	NE	Morrison	0	34.1	13.9	15.6	13.9	SUOP
62478	Goodland	69	NE	Itasca	1,141	31.3	14.4	14.8	14.4	SUOP
38602	Ironton Switch	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38603	Ironton Tap	34.5	NE	Crow Wing	0	29.6	14.5	17.3	14.5	SUOP
38605	Crosby Tap	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP
38609	Crosby	34.5	NE	Crow Wing	0	30.0	14.5	17.3	14.5	SUOP
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5	14.5	SUPK
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5	14.5	SUPK
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3	14.5	SUOP
38601	Riverton Rural	34.5	NE	Crow Wing	0	29.6	14.7	17.6	14.7	SUOP
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7	14.7	SUPK
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7	14.7	SUPK
61736	Thunderbird Mine	115	NE	St. Louis	75	30.5	46.5	14.9	14.9	SUPK
38463	Hoyt Lakes	46	NE	St. Louis	75	26.3	15.0	18.2	15	SUOP
38460	Laskin	46	NE	St. Louis	75	27.8	15.0	18.2	15	SUOP
38461	Aurora	46	NE	St. Louis	75	30.5	15.0	18.2	15	SUOP
62184	Emily	69	NE	Crow Wing	0	30.1	15.3	16.9	15.3	SUOP
38904	525-08T7	34.5	NE	Morrison	0	33.0	15.3	17.6	15.3	SUOP
38873	Hennepin Paper	34.5	NE	Morrison	0	33.2	15.3	17.5	15.3	SUOP
62696	Jessie Lake	69	NE	Itasca	1,141	31.0	15.5	16.4	15.5	SUOP
66801	Lund	69	NE	Koochiching	0	31.6	15.5	19.8	15.5	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38500	Nashwauk Tap	34.5	NE	Itasca	1,141	33.6	16.0	16.4	16	SUOP
38671	531-534T	34.5	NE	Crow Wing	0	32.9	16.3	16.4	16.3	SUOP
62475	Gunn	69	NE	Itasca	1,141	31.5	27.2	16.7	16.7	SUPK
38673	503-531T	34.5	NE	Cass	0	31.3	16.8	17.0	16.8	SUOP
38672	Pillager	34.5	NE	Cass	0	31.9	16.8	17.5	16.8	SUOP
38415	Inland Industrial	46	NE	St. Louis	75	30.1	17.0	17.0	17	EQUAL
38416	McKinley	46	NE	St. Louis	75	30.5	17.0	17.0	17	EQUAL
38618	Macmillan G1	34.5	NE	Crow Wing	0	30.9	17.1	17.0	17	SUPK
38622	Macmillan G2	34.5	NE	Crow Wing	0	30.9	17.0	17.0	17	EQUAL
38675	Baxter - MP	34.5	NE	Crow Wing	0	31.8	17.0	17.0	17	EQUAL
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0	17	EQUAL
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0	17	EQUAL
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0	17	EQUAL
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0	17	EQUAL
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0	17	EQUAL
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0	17	EQUAL
38617	Riverton Downtown	34.5	NE	Crow Wing	0	29.6	17.1	17.3	17.1	SUOP
38787	Menahga	34.5	NE	Wadena	0	33.5	17.1	17.2	17.1	SUOP
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1	17.1	EQUAL
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2	17.1	SUOP
61864	St. Croix	46	NE	St. Louis	75	25.0	17.2	17.4	17.2	SUOP
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6	17.5	SUOP
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6	17.5	SUOP
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6	17.6	EQUAL
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1	17.6	SUOP
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1	17.6	SUOP
38421	Laurentian Mine	46	NE	St. Louis	75	30.0	17.7	18.0	17.7	SUOP
38417	Biwabik	46	NE	St. Louis	75	28.5	17.8	18.2	17.8	SUOP
62855	North Parker	34.5	NE	Morrison	0	34.3	17.8	19.8	17.8	SUOP
38418	Pineville	46	NE	St. Louis	75	26.7	17.9	18.3	17.9	SUOP
38616	Crosby MFG	34.5	NE	Crow Wing	0	29.1	18.0	19.1	18	SUOP
38903	529-525T	34.5	NE	Morrison	0	34.0	18.0	18.0	18	EQUAL
62908	Orton	34.5	NE	Wadena	0	34.7	18.0	18.2	18	SUOP
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2	18	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2	18	SUOP
38676	Gull Lake	34.5	NE	Crow Wing	0	34.5	18.3	18.9	18.3	SUOP
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8	18.3	SUOP
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7	18.4	SUOP
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8	18.4	SUOP
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9	18.4	SUOP
61865	Babbitt VL	46	NE	St. Louis	75	30.5	18.5	19.1	18.5	SUOP
38788	Menahga SS	34.5	NE	Wadena	0	34.9	18.5	18.8	18.5	SUOP
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0	18.5	SUOP
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1	18.6	SUOP
61702	Syl Laskin	115	NE	St. Louis	75	27.8	85.9	18.7	18.7	SUPK
62503	Winton	46	NE	St. Louis	75	27.0	19.0	19.8	19	SUOP
61862	Ely Sub A	46	NE	St. Louis	75	26.4	19.2	20.1	19.2	SUOP
38674	Pine Beach	34.5	NE	Cass	0	31.5	19.3	20.8	19.3	SUOP
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5	19.3	SUOP
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3	19.3	SUPK
38619	Macmillan	34.5	NE	Crow Wing	0	30.9	20.4	19.5	19.5	SUPK
38623	532-06TS	34.5	NE	Crow Wing	0	32.0	19.6	19.5	19.5	SUPK
62481	Boy River	69	NE	Cass	0	32.3	19.5	20.1	19.5	SUOP
62204	Little Falls	34.5	NE	Morrison	0	34.6	21.0	19.5	19.5	SUPK
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2	19.5	SUOP
38856	MN Pipeline Darling	34.5	NE	Morrison	0	34.8	19.6	20.6	19.6	SUOP
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7	19.6	SUOP
62476	Blackberry	69	NE	Itasca	1,141	31.7	32.0	19.8	19.8	SUPK
62205	Motley	34.5	NE	Morrison	0	33.2	19.8	21.7	19.8	SUOP
38789	Spirit Lake Tap	34.5	NE	Wadena	0	34.8	19.8	20.4	19.8	SUOP
62451	Lakeland	115	NE	St. Louis	75	26.4	63.7	20.1	20.1	SUPK
61870	Virginia	46	NE	St. Louis	75	28.1	20.2	22.3	20.2	SUOP
38886	Sunbridge St	34.5	NE	Morrison	0	34.2	20.6	21.8	20.6	SUOP
38887	Little Falls South	34.5	NE	Morrison	0	34.2	20.6	21.7	20.6	SUOP
62477	Enbridge Blackberry	69	NE	Itasca	1,141	31.7	33.3	20.7	20.7	SUPK
62486	Lakehead Tap	69	NE	Itasca	1,141	32.0	33.3	20.7	20.7	SUPK
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4	20.7	SUOP
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1	20.7	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61863	31-32TIE	46	NE	St. Louis	75	27.2	21.0	21.0	21	EQUAL
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7	21	SUOP
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0	21	SUOP
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9	21.2	SUOP
62220	Shim Lake Tap	34.5	NE	Morrison	0	33.0	21.3	22.8	21.3	SUOP
62219	Shimn Tap	34.5	NE	Morrison	0	33.2	21.3	22.8	21.3	SUOP
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3	21.3	SUPK
38874	525-08T8	34.5	NE	Morrison	0	32.9	22.3	25.8	22.3	SUOP
38875	525-2988	34.5	NE	Morrison	0	34.8	22.3	25.8	22.3	SUOP
61861	Winton	46	NE	Lake	0	26.5	23.5	25.3	23.5	SUOP
61880	32-31TIE	46	NE	St. Louis	75	26.7	23.5	25.3	23.5	SUOP
61860	Babbitt	46	NE	St. Louis	75	28.1	23.5	24.6	23.5	SUOP
62504	Babbitt Townsite	46	NE	St. Louis	75	28.4	23.5	24.5	23.5	SUOP
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7	23.6	SUOP
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8	23.7	SUOP
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8	23.7	SUOP
38705	Motley	34.5	NE	Morrison	0	32.9	24.1	25.2	24.1	SUOP
62208	Birch Lake	34.5	NE	Cass	0	32.8	24.2	27.2	24.2	SUOP
61855	Hackensack	34.5	NE	Cass	0	33.0	24.2	27.2	24.2	SUOP
38750	Backus	34.5	NE	Cass	0	33.1	24.2	27.2	24.2	SUOP
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2	24.2	SUPK
62417	Mantrap	34.5	NE	Hubbard	0	33.1	24.3	26.3	24.3	SUOP
62379	Eagle Lake	34.5	NE	Hubbard	0	33.6	24.3	26.3	24.3	SUOP
38754	515-520T	34.5	NE	Hubbard	0	34.8	24.3	26.3	24.3	SUOP
62416	Park Rapids	34.5	NE	Hubbard	0	34.8	24.3	31.7	24.3	SUOP
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3	24.3	SUOP
62485	Warba Switch	69	NE	Itasca	1,141	30.8	39.5	24.9	24.9	SUPK
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6	25.2	SUOP
61872	Ely Sub B	46	NE	St. Louis	75	25.7	25.3	27.9	25.3	SUOP
61879	Ely Sub Tap	46	NE	St. Louis	75	27.3	25.3	27.9	25.3	SUOP
38746	Hackensack	34.5	NE	Cass	0	33.6	25.3	27.5	25.3	SUOP
38704	Dog Lake Tap	34.5	NE	Todd	30	33.2	25.4	31.8	25.4	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61844	Dog Lake	34.5	NE	Todd	30	33.6	25.4	28.2	25.4	SUOP
38706	Staples Rural	34.5	NE	Todd	30	34.3	25.4	34.1	25.4	SUOP
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1	25.4	SUOP
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2	25.4	SUOP
38724	Nisswa	34.5	NE	Crow Wing	0	31.5	25.6	27.3	25.6	SUOP
62502	Clear Lake	46	NE	St. Louis	75	29.0	25.8	28.7	25.8	SUOP
38744	Onigum	34.5	NE	Cass	0	34.1	25.8	27.5	25.8	SUOP
38745	Ten Mile Lake	34.5	NE	Cass	0	34.5	25.8	27.5	25.8	SUOP
61873	Soudan Park Mine	46	NE	St. Louis	75	32.0	26.1	29.1	26.1	SUOP
62207	Pleasant Lake	69	NE	Cass	0	32.4	26.1	27.0	26.1	SUOP
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1	27.1	SUPK
62506	Vermilion	46	NE	St. Louis	75	29.6	27.3	29.3	27.3	SUOP
62209	Birch Lake	69	NE	Cass	0	32.8	29.2	27.5	27.5	SUPK
61845	Baxter	34.5	NE	Crow Wing	0	31.8	28.4	27.8	27.8	SUPK
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1	28.3	SUOP
61874	Tower Soudan	46	NE	St. Louis	75	32.1	28.5	31.1	28.5	SUOP
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3	28.8	SUOP
38722	Pine River	34.5	NE	Cass	0	33.3	30.0	30.0	30	EQUAL
61854	Pine River	34.5	NE	Cass	0	34.2	30.0	30.0	30	EQUAL
62199	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
62200	Longville	69	NE	Cass	0	32.4	30.4	32.9	30.4	SUOP
62189	Wabedo	69	NE	Cass	0	34.2	30.4	32.9	30.4	SUOP
9272	Rat Root River	69	NE	Koochiching	0	30.5	30.9	33.0	30.9	SUOP
67017	Running	69	NE	Koochiching	0	30.7	30.9	50.4	30.9	SUOP
9425	Littlefork	69	NE	Koochiching	0	31.3	30.9	33.0	30.9	SUOP
9274	Kabetogama	69	NE	St. Louis	75	31.5	30.9	33.0	30.9	SUOP
9268	Big Falls	69	NE	Koochiching	0	31.9	30.9	33.7	30.9	SUOP
9273	International Falls	69	NE	Koochiching	0	32.1	30.9	33.0	30.9	SUOP
9271	Littlefork	69	NE	Koochiching	0	32.3	30.9	32.9	30.9	SUOP
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7	30.9	SUOP
62488	Blackberry	69	NE	Itasca	1,141	31.2	46.4	31.0	31	SUPK
62198	Crosslake City	69	NE	Crow Wing	0	31.5	31.4	33.0	31.4	SUOP
38723	Pine River	34.5	NE	Cass	0	34.0	31.9	32.8	31.9	SUOP
62177	Birch Lake	115	NE	Hubbard	0	33.8	33.5	37.9	33.5	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62499	Sand Lake Tap	69	NE	St. Louis	75	29.1	33.6	34.6	33.6	SUOP
62492	Meadowbrook	69	NE	St. Louis	75	29.0	33.7	34.9	33.7	SUOP
38784	Park Rapids Tap	34.5	NE	Hubbard	0	34.8	34.0	34.0	34	EQUAL
38869	526-529T	34.5	NE	Morrison	0	34.8	34.0	34.0	34	EQUAL
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0	34	EQUAL
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0	34	EQUAL
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0	34	EQUAL
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0	34	EQUAL
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0	34	EQUAL
38781	Long Lake Cap Bank	34.5	NE	Hubbard	0	34.4	34.1	34.2	34.1	SUOP
38868	529-526T	34.5	NE	Morrison	0	34.6	34.1	34.1	34.1	EQUAL
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3	34.1	SUOP
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1	34.1	EQUAL
61848	Pequot Lakes	34.5	NE	Crow Wing	0	32.9	36.9	34.2	34.2	SUPK
38721	Pequoet Lake District	34.5	NE	Crow Wing	0	32.9	35.3	34.3	34.3	SUPK
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3	34.3	EQUAL
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6	34.6	SUPK
61705	Babbitt	115	NE	St. Louis	75	27.2	124.3	35.0	35	SUPK
62497	Virginia	69	NE	St. Louis	75	28.1	35.0	36.6	35	SUOP
61708	Virginia S27	115	NE	St. Louis	75	28.1	183.1	35.0	35	SUPK
62496	Pike River	69	NE	St. Louis	75	29.6	35.0	36.6	35	SUOP
62491	Side Lake	69	NE	St. Louis	75	29.9	35.0	36.7	35	SUOP
62490	Shannon	69	NE	St. Louis	75	31.5	35.0	36.7	35	SUOP
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8	35	SUOP
62194	Fifty Lakes	69	NE	Crow Wing	0	30.6	35.1	38.3	35.1	SUOP
38854	Bertran	34.5	NE	Morrison	0	37.8	35.2	36.3	35.2	SUOP
61853	Riverton	34.5	NE	Crow Wing	0	28.8	36.0	40.7	36	SUOP
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0	36.4	SUOP
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6	36.4	SUOP
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8	36.6	SUOP
62494	Potlatch	69	NE	St. Louis	75	28.5	37.7	40.5	37.7	SUOP
62498	Potlatch	69	NE	St. Louis	75	28.9	37.7	40.5	37.7	SUOP
61882	Tower - Soudan	46	NE	St. Louis	75	32.1	46.8	38.2	38.2	SUPK
62185	Ox Lake	69	NE	Crow Wing	0	31.3	39.0	43.8	39	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61704	34L Tap	115	NE	St. Louis	75	29.7	204.5	39.1	39.1	SUPK
61707	Minntac	115	NE	St. Louis	75	32.4	99.0	39.5	39.5	SUPK
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9	40.3	SUOP
61883	Tower	115	NE	St. Louis	75	32.1	72.7	40.7	40.7	SUPK
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5	42.2	SUOP
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5	42.2	SUOP
62448	Hill City	115	NE	Aitkin	0	31.1	60.4	43.6	43.6	SUPK
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3	44.6	SUOP
61721	Eveleth Taconite Co.	115	NE	St. Louis	75	29.4	165.4	44.8	44.8	SUPK
66780	Running	69	NE	Koochiching	0	30.7	44.8	56.0	44.8	SUOP
62453	Iron	115	NE	St. Louis	75	27.8	99.6	45.5	45.5	SUPK
61734	Iron Tap	115	NE	St. Louis	75	28.2	133.6	45.5	45.5	SUPK
62500	Tower	69	NE	St. Louis	75	32.1	61.4	45.8	45.8	SUPK
62483	Bena Tap	69	NE	Itasca	1,141	32.4	45.9	46.4	45.9	SUOP
62482	Salem SS	69	NE	Cass	0	32.8	46.8	47.5	46.8	SUOP
62479	Ball Club	69	NE	Itasca	1,141	31.8	47.5	48.7	47.5	SUOP
61735	Thunderbird Mine	115	NE	St. Louis	75	29.0	94.6	47.8	47.8	SUPK
62489	Remer	69	NE	Cass	0	31.5	48.3	49.6	48.3	SUOP
61551	Forbes 1 TR9	34.5	NE	St. Louis	75	26.8	50.0	50.0	50	EQUAL
61553	Forbes 2 TR9	34.5	NE	St. Louis	75	27.7	50.0	50.0	50	EQUAL
62186	Thunder Lake	69	NE	Cass	0	31.9	50.1	52.3	50.1	SUOP
62196	Blind Lake	69	NE	Cass	0	33.4	55.0	51.9	51.9	SUPK
62501	Frazer	69	NE	St. Louis	75	28.2	61.4	52.5	52.5	SUPK
62450	Deer River	115	NE	Itasca	1,141	37.6	56.0	56.0	56	EQUAL
61780	Deer River	115	NE	Itasca	1,141	37.6	57.9	58.7	57.9	SUOP
62505	Orr	69	NE	St. Louis	75	27.7	59.4	58.0	58	SUPK
62493	Cook	69	NE	St. Louis	75	28.0	59.4	58.0	58	SUPK
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6	58.6	SUPK
61850	Little Falls	34.5	NE	Morrison	0	34.7	64.5	71.2	64.5	SUOP
62202	Nokay	115	NE	Crow Wing	0	33.8	123.1	66.2	66.2	SUPK
61791	Lakehead Pumping Station	115	NE	Itasca	1,141	31.7	69.9	70.8	69.9	SUOP
61754	Boise Cascade	118	NE	Koochiching	0	30.7	73.9	75.6	73.9	SUOP
62449	Cohasset	115	NE	Itasca	1,141	30.5	74.4	77.6	74.4	SUOP
61790	Cohasset Tap	115	NE	Itasca	1,141	31.2	74.4	77.6	74.4	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62487	Deer River	69	NE	Itasca	1,141	32.5	78.3	88.8	78.3	SUOP
62421	Long Lake	34.5	NE	Hubbard	0	34.1	78.7	89.5	78.7	SUOP
61578	Mud Lake Junction	115	NE	Crow Wing	0	32.7	175.7	81.4	81.4	SUPK
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3	83.1	SUOP
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1	88.2	SUOP
62455	Keewatin	115	NE	St. Louis	75	32.3	99.4	100.0	99.4	SUOP
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1	100.1	SUOP
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7	100.1	SUOP
61706	Keewatin	115	NE	St. Louis	75	32.4	100.4	101.0	100.4	SUOP
61644	Dog Lake	115	NE	Cass	0	33.7	102.7	123.8	102.7	SUOP
61645	Baxter S47	115	NE	Crow Wing	0	32.9	105.4	109.2	105.4	SUOP
61781	20L TAP7	115	NE	Itasca	1,141	30.9	107.9	117.5	107.9	SUOP
61654	Aitkin	115	NE	Crow Wing	0	31.2	109.4	110.1	109.4	SUOP
61748	Boswell	115	NE	Itasca	1,141	31.0	203.1	109.7	109.7	SUPK
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5	109.8	SUOP
61740	Grand Rapids	115	NE	Itasca	1,141	31.7	178.5	109.9	109.9	SUPK
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2	110.2	SUOP
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2	110.9	SUOP
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1	111.1	EQUAL
62176	Merrifield	115	NE	Crow Wing	0	31.3	112.4	114.4	112.4	SUOP
62510	Crooked Lake	115	NE	Itasca	1,141	30.2	117.5	119.0	117.5	SUOP
61778	Blandin Tap	115	NE	Itasca	1,141	30.9	206.1	118.8	118.8	SUPK
62206	Baxter Bank	115	NE	Crow Wing	0	32.6	118.9	127.1	118.9	SUOP
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4	122.2	SUOP
61779	Blandin	115	NE	Itasca	1,141	31.7	250.8	126.6	126.6	SUPK
61739	Blackberry	115	NE	Itasca	1,141	31.2	131.0	236.6	131	SUOP
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2	132.2	SUPK
61646	Dog Lake Tap	115	NE	Cass	0	33.3	134.3	159.7	134.3	SUOP
62210	Southdale Bank 1	115	NE	Crow Wing	0	30.0	134.7	141.2	134.7	SUOP
61796	Riverton	115	NE	Crow Wing	0	29.6	150.5	135.2	135.2	SUPK
61752	International Falls	118	NE	Koochiching	0	34.2	221.9	138.0	138	SUPK
61648	Pequot Lakes	115	NE	Crow Wing	0	32.9	148.0	140.2	140.2	SUPK
62213	Southdale Tap	115	NE	Crow Wing	0	31.2	141.3	166.4	141.3	SUOP
61562	Shannon Junction	115	NE	St. Louis	75	31.5	142.9	152.2	142.9	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61785	Shannon	115	NE	St. Louis	75	34.9	143.7	153.0	143.7	SUOP
62511	Crooked Lake Tap	115	NE	St. Louis	75	32.6	147.5	149.0	147.5	SUOP
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6	147.6	SUOP
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7	150.1	SUOP
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5	156.7	SUOP
61725	44L Tap	115	NE	St. Louis	75	34.1	169.3	157.7	157.7	SUPK
61650	Little Falls S68	115	NE	Morrison	0	34.6	161.6	194.6	161.6	SUOP
62201	Pine River	115	NE	Cass	0	32.9	169.0	177.1	169	SUOP
61709	Inland Taconite Co.	115	NE	St. Louis	75	30.8	176.0	176.1	176	SUOP
61724	Hibbing	115	NE	St. Louis	75	34.3	188.9	197.8	188.9	SUOP
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4	191.4	SUPK
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5	192.6	SUOP
61751	Littlefork	118	NE	Koochiching	0	31.6	198.0	196.5	196.5	SUPK
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1	197.6	SUOP
61731	14L Tap	115	NE	St. Louis	75	32.3	201.7	197.8	197.8	SUPK
62411	Long Lake	115	NE	Hubbard	0	34.8	220.4	231.2	220.4	SUOP
61737	Nashwauk	115	NE	Itasca	1,141	32.4	241.0	227.2	227.2	SUPK
61564	Forbes Junction	115	NE	St. Louis	75	27.7	238.7	260.2	238.7	SUOP
61653	Riverton	115	NE	Crow Wing	0	29.6	240.0	284.4	240	SUOP
61558	Minntac Junction 1	115	NE	St. Louis	75	31.8	247.6	326.3	247.6	SUOP
61560	Minntac Junction 2	115	NE	St. Louis	75	31.8	247.6	326.9	247.6	SUOP
61710	Minntac	115	NE	St. Louis	75	33.1	248.3	420.1	248.3	SUOP
61711	Minntac Tap C	115	NE	St. Louis	75	34.6	248.3	385.0	248.3	SUOP
61712	Minntac Tap A	115	NE	St. Louis	75	34.6	248.3	349.0	248.3	SUOP
61727	H. T. Pumps	115	NE	St. Louis	75	30.1	248.8	248.8	248.8	EQUAL
61749	Shannon	115	NE	St. Louis	75	31.5	251.0	376.6	251	SUOP
61566	Blackberry	115	NE	Itasca	1,141	31.2	252.2	336.6	252.2	SUOP
61568	Blackberry	115	NE	Itasca	1,141	31.2	252.2	338.0	252.2	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0	6.7	SUOP
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0	10	EQUAL
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0	10	EQUAL
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1	10	SUOP
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0	10	EQUAL
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3	10.3	EQUAL
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6	10.6	EQUAL
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6	10.6	EQUAL
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5	12	SUOP
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3	12.4	SUOP
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3	12.4	SUOP
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3	12.4	SUOP
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3	12.4	SUOP
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3	12.4	SUOP
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3	12.4	SUOP
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1	12.7	SUOP
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9	12.8	SUOP
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9	13.3	SUOP
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9	13.3	SUOP
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5	14.5	SUPK
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5	14.5	SUPK
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3	14.5	SUOP
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7	14.7	SUPK
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7	14.7	SUPK
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0	17	EQUAL
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0	17	EQUAL
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0	17	EQUAL
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0	17	EQUAL
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0	17	EQUAL
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0	17	EQUAL
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1	17.1	EQUAL
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2	17.1	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6	17.5	SUOP
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6	17.5	SUOP
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6	17.6	EQUAL
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1	17.6	SUOP
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1	17.6	SUOP
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2	18	SUOP
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2	18	SUOP
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8	18.3	SUOP
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7	18.4	SUOP
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8	18.4	SUOP
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9	18.4	SUOP
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0	18.5	SUOP
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1	18.6	SUOP
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5	19.3	SUOP
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3	19.3	SUPK
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2	19.5	SUOP
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7	19.6	SUOP
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4	20.7	SUOP
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1	20.7	SUOP
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7	21	SUOP
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0	21	SUOP
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9	21.2	SUOP
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3	21.3	SUPK
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7	23.6	SUOP
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8	23.7	SUOP
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8	23.7	SUOP
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2	24.2	SUPK
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3	24.3	SUOP
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6	25.2	SUOP
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1	25.4	SUOP
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2	25.4	SUOP
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1	27.1	SUPK

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1	28.3	SUOP
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3	28.8	SUOP
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7	30.9	SUOP
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0	34	EQUAL
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0	34	EQUAL
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0	34	EQUAL
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0	34	EQUAL
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0	34	EQUAL
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3	34.1	SUOP
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1	34.1	EQUAL
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3	34.3	EQUAL
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6	34.6	SUPK
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8	35	SUOP
38854	Bertran	34.5	NE	Morrison	0	37.8	35.2	36.3	35.2	SUOP
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0	36.4	SUOP
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6	36.4	SUOP
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8	36.6	SUOP
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9	40.3	SUOP
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5	42.2	SUOP
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5	42.2	SUOP
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3	44.6	SUOP
62450	Deer River	115	NE	Itasca	1,141	37.6	56.0	56.0	56	EQUAL
61780	Deer River	115	NE	Itasca	1,141	37.6	57.9	58.7	57.9	SUOP
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6	58.6	SUPK
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3	83.1	SUOP
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1	88.2	SUOP
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1	100.1	SUOP
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7	100.1	SUOP
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5	109.8	SUOP
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2	110.2	SUOP
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2	110.9	SUOP
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1	111.1	EQUAL
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4	122.2	SUOP
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2	132.2	SUPK

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6	147.6	SUOP
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7	150.1	SUOP
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5	156.7	SUOP
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4	191.4	SUPK
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5	192.6	SUOP
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1	197.6	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62203	Lastrup	34.5	NE	Morrison	0	36.6	6.7	7.0	6.7	SUOP
38842	Rice Tap	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38843	Royalton	34.5	NE	Morrison	0	35.4	10.0	10.0	10	EQUAL
38878	Pierz RG	34.5	NE	Morrison	0	36.7	10.0	10.0	10	EQUAL
38879	Pierz RG	34.5	NE	Morrison	0	36.9	10.0	10.0	10	EQUAL
38825	Industrial Park - REG	34.5	NE	Todd	30	38.6	10.0	10.1	10	SUOP
38831	Long Prairie	34.5	NE	Todd	30	38.7	10.0	10.0	10	EQUAL
38840	61K-DIST	34.5	NE	Morrison	0	36.0	10.3	10.3	10.3	EQUAL
38839	511-5261	34.5	NE	Morrison	0	37.2	10.6	10.6	10.6	EQUAL
38841	Little Rock	34.5	NE	Morrison	0	37.3	10.6	10.6	10.6	EQUAL
38884	Buckman	34.5	NE	Morrison	0	36.4	12.0	12.5	12	SUOP
38847	511-508T	34.5	NE	Morrison	0	35.1	12.4	17.3	12.4	SUOP
38844	Royalton RG	34.5	NE	Morrison	0	35.4	12.4	17.3	12.4	SUOP
38845	15K-DIST	34.5	NE	Morrison	0	35.6	12.4	17.3	12.4	SUOP
61849	Blanchard	34.5	NE	Morrison	0	36.0	12.4	17.3	12.4	SUOP
62856	Sobieski	34.5	NE	Morrison	0	36.9	12.4	17.3	12.4	SUOP
38853	Upsala	34.5	NE	Morrison	0	37.4	12.4	17.3	12.4	SUOP
38827	501-535S	34.5	NE	Todd	30	38.1	12.7	13.1	12.7	SUOP
38880	Rich Prairie	34.5	NE	Morrison	0	37.1	12.8	13.9	12.8	SUOP
38826	Industrial Park	34.5	NE	Todd	30	38.6	13.3	13.9	13.3	SUOP
38833	Long Prairie Packing	34.5	NE	Todd	30	38.7	13.3	13.9	13.3	SUOP
38877	Pierz	34.5	NE	Morrison	0	36.4	15.3	14.5	14.5	SUPK
38876	526-5261	34.5	NE	Morrison	0	36.7	15.3	14.5	14.5	SUPK
38834	Hart Press	34.5	NE	Todd	30	38.6	14.5	16.3	14.5	SUOP
38865	21K	34.5	NE	Morrison	0	35.8	15.4	14.7	14.7	SUPK
38866	22K	34.5	NE	Morrison	0	36.1	15.4	14.7	14.7	SUPK
38835	12K	34.5	NE	Todd	30	35.0	17.0	17.0	17	EQUAL
38836	11K	34.5	NE	Todd	30	35.9	17.0	17.0	17	EQUAL
38820	9K-10K	34.5	NE	Todd	30	38.2	17.0	17.0	17	EQUAL
62911	Hartford Tap	34.5	NE	Todd	30	38.3	17.0	17.0	17	EQUAL
38806	Sebeka Nimrod	34.5	NE	Wadena	0	35.5	17.0	17.0	17	EQUAL
38805	Sebeka	34.5	NE	Wadena	0	36.2	17.0	17.0	17	EQUAL
38828	Long Prairie Rural	34.5	NE	Todd	30	38.3	17.1	17.2	17.1	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38804	Blue Grass	34.5	NE	Wadena	0	36.8	17.1	17.1	17.1	EQUAL
38808	Orton	34.5	NE	Wadena	0	35.1	17.5	17.6	17.5	SUOP
38807	Sebeka	34.5	NE	Wadena	0	36.0	17.5	17.6	17.5	SUOP
62857	NPKRJCT	34.5	NE	Morrison	0	35.8	17.6	17.6	17.6	EQUAL
62854	Flensburg	34.5	NE	Morrison	0	36.7	17.6	19.1	17.6	SUOP
62852	Flensburg	34.5	NE	Morrison	0	36.8	17.6	19.1	17.6	SUOP
62912	Iona Tap	34.5	NE	Todd	30	38.2	18.0	18.2	18	SUOP
62902	Iona	34.5	NE	Todd	30	38.6	18.0	18.2	18	SUOP
62909	Leaf River	34.5	NE	Wadena	0	36.9	18.3	18.8	18.3	SUOP
38885	508-27T7	34.5	NE	Morrison	0	36.4	18.4	21.9	18.4	SUOP
62913	Twin Lakes	34.5	NE	Wadena	0	35.0	18.4	18.7	18.4	SUOP
62904	Sebeka SS	34.5	NE	Wadena	0	36.2	18.4	18.8	18.4	SUOP
62910	Leaf River Tap	34.5	NE	Wadena	0	36.2	18.5	19.0	18.5	SUOP
62853	Pillsbury	34.5	NE	Todd	30	35.6	18.6	19.1	18.6	SUOP
62901	Hartford	34.5	NE	Todd	30	37.4	19.4	19.3	19.3	SUPK
38790	Spirit Lake	34.5	NE	Wadena	0	35.3	19.3	19.5	19.3	SUOP
38822	Clarissa	34.5	NE	Todd	30	38.3	19.5	20.2	19.5	SUOP
38855	521-08SW	34.5	NE	Morrison	0	35.8	19.6	20.7	19.6	SUOP
38823	Browerville	34.5	NE	Todd	30	38.0	20.7	22.1	20.7	SUOP
62907	Menahga	34.5	NE	Wadena	0	35.7	20.7	21.4	20.7	SUOP
38786	RDO MP _1	34.5	NE	Hubbard	0	35.1	21.0	21.7	21	SUOP
38881	Swanville	34.5	NE	Morrison	0	36.0	21.0	27.0	21	SUOP
38785	Park Rapids	34.5	NE	Hubbard	0	35.8	21.2	21.9	21.2	SUOP
38791	Minnesota Pipeline	34.5	NE	Hubbard	0	35.1	21.9	21.3	21.3	SUPK
61856	Blanchard	34.5	NE	Morrison	0	36.0	23.6	24.7	23.6	SUOP
38803	Bertha	34.5	NE	Todd	30	38.6	23.7	25.8	23.7	SUOP
62900	Eagle Bend SS/Cap Bank	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
61843	Eagle Valley	34.5	NE	Todd	30	38.8	23.7	25.8	23.7	SUOP
38821	Eagle Bend	34.5	NE	Todd	30	39.0	23.7	25.8	23.7	SUOP
38701	Aldrich	34.5	NE	Todd	30	37.0	34.9	24.2	24.2	SUPK
38753	Mantrap	34.5	NE	Hubbard	0	35.0	24.3	26.3	24.3	SUOP
38792	Long Lake - MP	34.5	NE	Hubbard	0	35.5	25.2	26.6	25.2	SUOP
38703	Ward SS/Cap Bank	34.5	NE	Todd	30	35.4	25.4	34.1	25.4	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62906	Ward	34.5	NE	Todd	30	36.5	25.4	26.2	25.4	SUOP
62905	Staples	34.5	NE	Todd	30	35.8	30.3	27.1	27.1	SUPK
38702	Staples	34.5	NE	Todd	30	35.5	28.3	34.1	28.3	SUOP
62480	Bena	69	NE	Cass	0	37.2	28.8	29.3	28.8	SUOP
9267	Northhome	69	NE	Koochiching	0	35.2	30.9	33.7	30.9	SUOP
38783	Osage	34.5	NE	Hubbard	0	35.9	34.0	34.0	34	EQUAL
38829	527-535T	34.5	NE	Todd	30	36.3	34.0	34.0	34	EQUAL
38802	501-533H	34.5	NE	Todd	30	38.5	34.0	34.0	34	EQUAL
38811	Compton Tap	34.5	NE	Wadena	0	37.3	34.0	34.0	34	EQUAL
38812	501-533W	34.5	NE	Wadena	0	37.4	34.0	34.0	34	EQUAL
62859	Pine Lake	34.5	NE	Morrison	0	37.6	34.1	34.1	34.1	EQUAL
38809	533-TIE	34.5	NE	Wadena	0	37.5	34.1	34.3	34.1	SUOP
38782	Hubbard	34.5	NE	Hubbard	0	35.9	34.3	34.3	34.3	EQUAL
38801	Hewitt	34.5	NE	Todd	30	38.8	35.1	34.6	34.6	SUPK
62175	Dewing	115	NE	Crow Wing	0	35.9	35.0	67.8	35	SUOP
38854	Bertram	34.5	NE	Morrison	0	37.8	35.2	36.3	35.2	SUOP
38830	Gutches Grove	34.5	NE	Todd	30	38.7	36.4	39.0	36.4	SUOP
61847	Long Prairie	34.5	NE	Todd	30	38.7	36.4	40.6	36.4	SUOP
62899	Hewitt	34.5	NE	Wadena	0	38.8	36.6	37.8	36.6	SUOP
61836	Swanville	34.5	NE	Todd	30	36.6	40.3	54.9	40.3	SUOP
62820	West Union	69	NE	Todd	30	39.0	42.2	42.5	42.2	SUOP
38810	City of Wadena	34.5	NE	Wadena	0	36.5	42.2	46.5	42.2	SUOP
62898	Hubbard	34.5	NE	Hubbard	0	35.9	44.6	45.3	44.6	SUOP
61842	Verndale	34.5	NE	Wadena	0	37.5	59.0	58.6	58.6	SUPK
61649	Blanchard	115	NE	Morrison	0	36.0	83.1	89.3	83.1	SUOP
61636	Swanville	115	NE	Todd	30	37.2	88.2	115.1	88.2	SUOP
62818	Little Sauk	115	NE	Todd	30	38.0	100.1	115.1	100.1	SUOP
62817	Little Sauk	115	NE	Todd	30	39.1	100.1	121.7	100.1	SUOP
62410	Palmer Lake	115	NE	Hubbard	0	35.5	109.8	110.5	109.8	SUOP
62896	Aldrich (Verndale)	115	NE	Wadena	0	37.3	110.2	111.2	110.2	SUOP
62895	Thomastown	115	NE	Wadena	0	35.7	110.9	112.2	110.9	SUOP
61639	Minnesota Pipeling	115	NE	Wadena	0	36.7	111.1	111.1	111.1	EQUAL
62415	RDO	115	NE	Hubbard	0	35.7	122.2	123.4	122.2	SUOP

Appendix C - Screening Steps

NE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61642	Verndale S136	115	NE	Wadena	0	37.5	132.7	132.2	132.2	SUPK
61643	Eagle Valley	115	NE	Todd	30	38.4	147.6	151.6	147.6	SUOP
61647	Long Prairie S67	115	NE	Todd	30	38.7	150.1	160.7	150.1	SUOP
62897	Hubbard	115	NE	Hubbard	0	35.9	156.7	200.5	156.7	SUOP
61733	National Taconite Plant	115	NE	St. Louis	75	35.2	203.8	191.4	191.4	SUPK
62420	RDO Tap	115	NE	Hubbard	0	35.8	192.6	195.5	192.6	SUOP
62893	Wing River	115	NE	Wadena	0	37.7	197.6	230.1	197.6	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62019	Akron	41.6	WC	Big Stone	571	38.1	8.0	7.9
62042	Akron Tap	41.6	WC	Big Stone	571	38.1	9.2	9.8
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0
62929	Albertville	69	WC	Wright	2,074	36.3	-123.0	-7.9
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7
60712	Annadale	69	WC	Wright	2,074	36.8	46.8	-21.2
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5
62024	Artichoke	41.6	WC	Big Stone	571	39.2	7.6	7.6
62020	Artichoke Tap	41.6	WC	Big Stone	571	39.2	9.2	9.1
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1
62099	Baldwin	69	WC	Sherburne	120	34.1	-388.1	-401.3
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6
7480	Beardsley	41.6	WC	Big Stone	571	37.7	-201.1	-248.0
8787	Beardsley	41.6	WC	Big Stone	571	38.4	-201.1	-248.0
7479	Beardsley Tap	41.6	WC	Big Stone	571	38.4	-201.1	-248.0
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60713	Becker	69	WC	Sherburne	120	35.4	50.4	-11.3
62125	Becker	69	WC	Sherburne	120	35.6	80.8	-13.2
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4
62602	Bell	69	WC	McLeod	0	37.5	34.9	-99.1
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9
62001	Benson	115	WC	Swift	117	37.0	-7.2	-1.5
62012	Benson	69	WC	Swift	117	37.0	-7.2	-1.5
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9
91053	Benson Tap	12.8	WC	Swift	117	37.5	-7.2	-1.5
63075	Benton 1 Xfmr Tert	13.8	WC	Benton	0	36.1	42.9	42.9
63079	Benton 2 Xfmr Tert	13.8	WC	Benton	0	36.1	46.7	46.7
63045	Benton 4	230	WC	Benton	0	35.2	207.3	618.3
60142	Benton County	345	WC	Benton	0	36.1	203.7	826.1
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6
62839	Big Fish	69	WC	Stearns	218	38.7	48.2	-65.4
62840	Big Fish	69	WC	Stearns	218	37.0	48.1	-65.4
62100	Big Lake	69	WC	Sherburne	120	34.4	-155.4	-95.4
62628	Big Swam Tap	13.8	WC	Meeker	240	37.5	7.6	7.6
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9
60770	Birch Coolley	69	WC	Renville	85	37.1	-39.1	-19.9
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7
60873	Biscay Junction	69	WC	McLeod	0	36.9	72.2	-330.0
60404	Biscayne	115	WC	McLeod	0	36.9	186.6	-330.0
62948	Black Lake	69	WC	Wright	2,074	36.6	-49.7	52.5
62949	Black Lake Tap	69	WC	Wright	2,074	37.1	-49.7	52.5
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9
60707	Blue Huron	69	WC	Stearns	218	37.0	56.6	-178.8
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9
62138	Briggs Lake	69	WC	Sherburne	120	34.3	75.4	-17.8
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7
62604	Brownton Tap	69	WC	McLeod	0	37.2	31.6	-129.5
60283	Buffalo	69	WC	Wright	2,074	36.2	31.8	34.1
60762	Buffalo	69	WC	Wright	2,074	36.5	71.7	81.9
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7
9495	Burdick	41.6	WC	Big Stone	571	37.1	21.5	20.5
9570	Burdick Junction	41.6	WC	Big Stone	571	37.3	21.5	20.5
62102	Cable	69	WC	Sherburne	120	35.7	76.8	-25.6
62139	Cable Tap	69	WC	Sherburne	120	35.6	76.9	-25.6
60769	Cairo	69	WC	Renville	85	37.2	-38.0	-35.0
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3
60727	City of Fairfax	69	WC	Renville	85	37.0	-38.1	-33.2
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9
7476	Clinton	41.6	WC	Big Stone	571	39.0	22.5	17.3
62018	Clinton	41.6	WC	Big Stone	571	38.2	22.5	17.3

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9
60737	Cokato	69	WC	Wright	2,074	37.2	40.3	42.2
60773	Cokato Tap	69	WC	Wright	2,074	37.5	44.0	45.8
63289	Correll 115	115	WC	Big Stone	571	35.9	16.1	23.3
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4
60164	Crossroads	115	WC	Stearns	218	34.2	208.3	262.4
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0
60206	Crow River	115	WC	Wright	2,074	35.7	202.0	-743.2
60652	Crow River	69	WC	Wright	2,074	36.0	92.8	-744.9
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7
60882	Delano	69	WC	Wright	2,074	36.8	58.4	-723.3
60891	Delano	69	WC	Wright	2,074	35.9	39.8	-780.0
62925	Dickinson	115	WC	Wright	2,074	35.1	201.0	-329.6
62926	Dickinson	115	WC	Wright	2,074	36.7	173.8	-335.6
62947	Dickinson	69	WC	Wright	2,074	35.8	-16.1	-112.1
63030	Dickinson	345	WC	Wright	2,074	35.1	198.0	-289.1
63081	Dickinson Tap	12.5	WC	Wright	2,074	35.6	117.6	-321.3
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8
62277	Duelm	69	WC	Benton	0	36.1	12.4	-17.8
62295	Duelm SS	69	WC	Benton	0	35.7	45.5	-17.8

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3
36238	East Big Lake Tap	69	WC	Sherburne	120	34.4	-141.3	-86.8
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0
63020	Elk River	69	WC	Sherburne	120	33.5	-92.3	-4.9
63043	Elk River	230	WC	Sherburne	120	31.8	-279.6	-171.0
62134	Elk River #14	69	WC	Sherburne	120	31.8	-110.4	-67.8
62967	Elk River Muni West	69	WC	Sherburne	120	32.9	-122.8	-75.4
62965	Elk River Municipal West SS	69	WC	Sherburne	120	32.9	-122.8	-75.5
62968	Elk River North	69	WC	Sherburne	120	34.0	-125.9	-77.4
62966	Elk River Otsego	69	WC	Sherburne	120	33.5	-98.2	-5.4
62156	Elk River Xfmr 1 Tert	13	WC	Sherburne	120	33.4	-306.1	-187.1
62157	Elk River Xfmr 1 Tert	13	WC	Sherburne	120	33.4	-326.8	-199.6
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1
62845	Fairhaven	69	WC	Stearns	218	38.0	34.7	-243.1
62846	Fairhaven	69	WC	Stearns	218	38.9	41.5	-243.1
60710	Farm Tap	69	WC	Stearns	218	37.5	73.6	-127.3
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8
60374	Fibromin	115	WC	Swift	117	37.0	-7.2	-1.5

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8
60145	Franklin	115	WC	Renville	85	36.4	-38.6	52.0
60728	Franklin	69	WC	Renville	85	36.6	-38.8	-24.6
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9
62015	Gilchrist	69	WC	Pope	80	39.4	-7.2	-1.5
62272	Gilman	69	WC	Benton	0	37.8	-434.3	-429.2
60888	Glencoe	69	WC	McLeod	0	37.0	31.1	-330.0
60898	Glencoe Municipal	115	WC	McLeod	0	36.9	192.3	-329.4
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4
62932	Goose Lake	69	WC	Wright	2,074	37.8	43.8	37.6
62944	Goose Tap	69	WC	Wright	2,074	36.7	43.8	37.6
7477	Graceville	41.6	WC	Big Stone	571	39.2	22.5	17.3
8784	Graceville	41.6	WC	Big Stone	571	38.8	22.5	17.3
62004	Graceville	115	WC	Big Stone	571	39.3	22.5	17.3
62017	Graceville	41.6	WC	Big Stone	571	39.0	22.5	17.3
60146	Granite City	115	WC	Stearns	218	33.9	208.0	322.5
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7
66296	Granite Falls	230	WC	Chippewa	0	37.6	269.0	218.4
66297	Granite Falls	13.8	WC	Chippewa	0	37.6	269.0	218.4
66550	Granite Falls S49	230	WC	Chippewa	0	37.6	268.6	781.3
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4
62603	Hassan Junction	69	WC	McLeod	0	37.5	37.8	-88.1

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62952	Hasty	69	WC	Wright	2,074	36.1	44.0	-18.7
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7
62587	Helen	69	WC	McLeod	0	36.9	37.8	-88.1
60677	Henry Tap	69	WC	Renville	85	37.8	-39.6	-14.6
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1
62933	Highland	69	WC	Wright	2,074	38.6	33.4	34.2
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8
62601	Hook Lake	69	WC	McLeod	0	37.8	38.7	-88.0
62606	Hook Lake Tap	69	WC	McLeod	0	37.8	38.7	-88.0
60736	Howard Lake	69	WC	Wright	2,074	37.1	42.7	45.6
62934	Howard Lake	69	WC	Wright	2,074	37.5	36.7	38.8
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2
62986	Hutchinson	69	WC	McLeod	0	37.3	51.8	-78.0
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9
62988	Hutchinson HTI Tap	69	WC	McLeod	0	37.2	67.7	-5.4
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2
62985	Hutchinson Plant 2 Tap	69	WC	McLeod	0	37.3	6.6	-78.0
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9
62989	Hutchinson Xfmr Tert	13.8	WC	McLeod	0	37.2	0.3	-367.8
60158	I-94 Industrial Park	115	WC	Sherburne	120	35.7	207.7	-649.2
62815	I-94 Industrial Park	115	WC	Stearns	218	35.5	195.5	-651.3
7481	Johnson	41.6	WC	Big Stone	571	39.4	22.5	17.3
62003	Johnson Junction	115	WC	Big Stone	571	39.8	22.5	17.3
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6
60704	Kimbal	69	WC	Stearns	218	38.0	45.1	-12.3
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6
62622	Kingston	69	WC	Meeker	240	37.8	44.1	-12.3
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1
62927	Lake Constance	115	WC	Wright	2,074	36.4	180.1	105.1
62630	Lake Jennie	69	WC	Meeker	240	38.3	12.7	-134.7
62627	Lake Jennie Switch	69	WC	Meeker	240	38.5	11.7	-134.7
62946	Lake Jennie Tap	69	WC	Meeker	240	38.6	37.2	-134.7
62009	Lake Johanna	69	WC	Pope	80	39.6	-7.2	-1.5
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9
60155	Lake Pulaski	115	WC	Wright	2,074	35.8	201.1	153.8
62269	Langola	115	WC	Benton	0	34.8	104.3	107.8
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1
60879	Lester Prairie 69 kV	69	WC	McLeod	0	36.9	31.1	-330.0
60880	Lester Prairie Tap	69	WC	McLeod	0	36.6	31.1	-330.0
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3
62093	Liberty	115	WC	Sherburne	120	35.0	202.6	-52.3
62137	Liberty	69	WC	Sherburne	120	35.6	90.4	-11.3

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62162	Liberty Tap	12.8	WC	Sherburne	120	35.6	30.0	30.0
60764	Linn Street	69	WC	Wright	2,074	36.2	56.5	63.5
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4
62844	Luxemburg	69	WC	Stearns	218	39.0	43.6	-256.0
60705	Luxemburg Tap	69	WC	Stearns	218	39.2	43.6	-256.0
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5
60765	Maple Lake	69	WC	Wright	2,074	36.3	55.0	38.9
62935	Maple Lake	69	WC	Wright	2,074	36.7	79.1	62.8
63024	Maple Lake	69	WC	Wright	2,074	36.7	47.8	47.8
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7
62000	Marsh Lake	115	WC	Big Stone	571	35.9	16.6	22.9
62038	Marsh Lake	41.6	WC	Big Stone	571	35.9	10.9	11.4
62936	Mary Lake	69	WC	Wright	2,074	36.0	31.8	34.1
62281	Mayhew	69	WC	Benton	0	36.2	-186.1	-222.2
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9
62290	Mayhew SW	69	WC	Benton	0	36.9	-211.4	-230.5
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1
62981	McLeod	115	WC	McLeod	0	37.7	219.7	-321.2
62980	McLeod S38	230	WC	McLeod	0	37.7	225.1	-235.5
63074	McLeod Xfmr Tert	13.8	WC	McLeod	0	37.7	16.7	-344.1
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8
62300	Minden Township	69	WC	Benton	0	35.2	-182.8	-217.6
60147	Minnesota Valley	230	WC	Chippewa	0	37.2	215.0	215.0
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6
60149	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	458.8
60150	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	585.6
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1
60151	Monticello	345	WC	Wright	2,074	35.1	200.9	248.2
60152	Monticello	230	WC	Wright	2,074	35.1	-515.4	-313.2
60153	Monticello	115	WC	Wright	2,074	36.0	201.4	155.8
60005	Monticello Generator	22	WC	Wright	2,074	36.2	141.0	139.1
60734	Montrose	69	WC	Wright	2,074	36.9	45.2	47.6
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2
66554	Morris	230	WC	Stevens	460	39.1	116.9	142.7
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2
62836	Munson	69	WC	Stearns	218	37.8	37.6	-151.1
62837	Munson Tap	69	WC	Stearns	218	37.5	55.5	-151.1
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5
62287	Oak Park	69	WC	Benton	0	36.2	-211.4	-230.5
62288	Oak Park Tap	69	WC	Benton	0	36.7	-211.4	-230.5

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62955	Oakwood	115	WC	Wright	2,074	36.2	69.8	50.6
63288	Odessa 115	115	WC	Big Stone	571	36.6	18.6	21.7
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1
63116	Ortonville	41.6	WC	Big Stone	571	36.8	21.5	20.5
63216	Ortonville	115	WC	Big Stone	571	36.8	21.5	20.5
9562	Ortonville Municipal	41.6	WC	Big Stone	571	36.8	21.5	20.5
63287	Ortonville-Cold Spring Quarry	115	WC	Big Stone	571	35.8	20.2	21.0
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1
62938	Otsego	69	WC	Wright	2,074	34.8	-98.2	-5.4
62957	Otsego Tap	69	WC	Wright	2,074	34.6	-100.2	-5.4
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1
63054	Panther	230	WC	Renville	85	37.8	140.7	195.2
62585	Panther Tap	13.8	WC	Renville	85	37.9	18.7	18.7
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5
60356	Paynesville	230	WC	Stearns	218	38.5	247.0	139.1
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3
62289	Pipeline #2	69	WC	Benton	0	36.6	-190.9	-229.2
62286	Pipeline #2 Tap	69	WC	Benton	0	36.9	-190.9	-229.2
60878	Plato	69	WC	McLeod	0	36.6	33.1	-330.0
61637	Platte River	115	WC	Benton	0	34.8	104.3	107.8
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2
62298	Popple Creek SW	69	WC	Benton	0	36.7	-186.1	-222.2
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7
62155	Princeton Industrial	69	WC	Sherburne	120	33.5	-340.0	-326.1
61920	Princeton Plant	69	WC	Sherburne	120	33.7	-340.0	-326.1

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61922	Princeton Tap	69	WC	Sherburne	120	33.4	-340.0	-326.1
60763	Pulaski	69	WC	Wright	2,074	35.8	53.0	53.3
62115	RDF	69	WC	Sherburne	120	33.8	-113.9	-5.4
62114	RDF Tap	69	WC	Sherburne	120	33.6	-113.9	-5.4
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1
62136	Remmele	69	WC	Sherburne	120	35.5	-185.9	-114.1
62142	RemmeleTap	69	WC	Sherburne	120	35.5	-185.9	-114.1
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9
62149	Rice Lake SS	69	WC	Sherburne	120	34.0	-136.8	-84.0
60711	Richmond	69	WC	Stearns	218	36.2	55.9	-128.5
62950	Rockford	69	WC	Wright	2,074	36.8	-18.9	-132.0
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3
62834	Roscoe	69	WC	Stearns	218	37.6	47.3	-233.2
62835	Roscoe Tap	69	WC	Stearns	218	38.3	57.7	-233.2
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7
60166	Salida Crossing	115	WC	Sherburne	120	35.1	202.4	-56.6
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1
60160	Sherburne County	345	WC	Sherburne	120	36.0	201.4	655.9
60601	Sherburne County	115	WC	Sherburne	120	35.6	202.6	-54.1
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5
62939	Silver Creek	69	WC	Wright	2,074	37.4	40.0	26.9
60761	South Haven	69	WC	Wright	2,074	36.6	40.1	-15.5
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7
62816	St. Augusta	115	WC	Stearns	218	35.9	195.8	-656.4
60157	St. Cloud	115	WC	Stearns	218	34.7	208.2	-1138.2
60159	St. Cloud Tap	115	WC	Stearns	218	35.3	180.2	-662.6
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6
62014	Swift Falls	69	WC	Swift	117	38.8	-7.2	-1.5
62119	Thompson Lake	69	WC	Sherburne	120	35.4	-386.9	-236.1
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7
62943	Victor	69	WC	Wright	2,074	37.4	114.2	110.1
60872	Victor Tap	69	WC	Wright	2,074	37.5	46.3	49.2
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6
36238	Waco	69	WC	Sherburne	120	34.4	-141.3	-86.8
60162	Wakefield	115	WC	Stearns	218	38.7	201.8	-351.4
60706	Wakefield	34.5	WC	Stearns	218	38.7	16.0	-351.4
60717	Wakefield	69	WC	Stearns	218	38.7	86.6	-233.1
62849	Wakefield Tap	13.8	WC	Stearns	218	38.7	11.2	-304.6
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0
60703	Watkins	69	WC	Meeker	240	38.4	40.8	-291.6
62620	Watkins	69	WC	Meeker	240	38.3	41.9	-282.4
60735	Waverly	69	WC	Wright	2,074	36.9	41.0	41.7
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9
62122	West End 1	69	WC	Sherburne	120	34.8	82.9	-15.9
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8
62850	West St. Cloud	13.8	WC	Stearns	218	35.1	7.6	7.6
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1
62814	Westwood	115	WC	Stearns	218	32.9	61.3	62.9
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8
62010	Williams	69	WC	Pope	80	40.0	-7.2	-1.5
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8
63050	Willmar	230	WC	Kandiyohi	300	37.0	256.4	244.3
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7
62426	Willmar Transformer	12.8	WC	Kandiyohi	300	37.0	18.2	18.2
62443	Willmar Transformer	12.5	WC	Kandiyohi	300	37.3	28.0	28.0
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4
60738	Winsted Tap	69	WC	Wright	2,074	37.6	45.3	47.3
62586	Winthrop	69	WC	McLeod	0	37.3	-38.7	-165.7
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7
62124	Zimmerman	69	WC	Sherburne	120	33.8	-578.5	-508.7
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60157	St. Cloud	115	WC	Stearns	218	34.7	208.2	-1138.2	-1138.2	SUPK
60891	Delano	69	WC	Wright	2,074	35.9	39.8	-780.0	-780	SUPK
60652	Crow River	69	WC	Wright	2,074	36.0	92.8	-744.9	-744.9	SUPK
60206	Crow River	115	WC	Wright	2,074	35.7	202.0	-743.2	-743.2	SUPK
60882	Delano	69	WC	Wright	2,074	36.8	58.4	-723.3	-723.3	SUPK
60159	St. Cloud Tap	115	WC	Stearns	218	35.3	180.2	-662.6	-662.6	SUPK
62816	St. Augusta	115	WC	Stearns	218	35.9	195.8	-656.4	-656.4	SUPK
62815	I-94 Industrial Park	115	WC	Stearns	218	35.5	195.5	-651.3	-651.3	SUPK
60158	I-94 Industrial Park	115	WC	Sherburne	120	35.7	207.7	-649.2	-649.2	SUPK
62124	Zimmerman	69	WC	Sherburne	120	33.8	-578.5	-508.7	-578.5	SUOP
60152	Monticello	230	WC	Wright	2,074	35.1	-515.4	-313.2	-515.4	SUOP
62272	Gilman	69	WC	Benton	0	37.8	-434.3	-429.2	-434.3	SUOP
62099	Baldwin	69	WC	Sherburne	120	34.1	-388.1	-401.3	-401.3	SUPK
62119	Thompson Lake	69	WC	Sherburne	120	35.4	-386.9	-236.1	-386.9	SUOP
62989	Hutchinson Xfmr Tert	13.8	WC	McLeod	0	37.2	0.3	-367.8	-367.8	SUPK
60162	Wakefield	115	WC	Stearns	218	38.7	201.8	-351.4	-351.4	SUPK
60706	Wakefield	34.5	WC	Stearns	218	38.7	16.0	-351.4	-351.4	SUPK
63074	McLeod Xfmr Tert	13.8	WC	McLeod	0	37.7	16.7	-344.1	-344.1	SUPK
61920	Princeton Plant	69	WC	Sherburne	120	33.7	-340.0	-326.1	-340	SUOP
61922	Princeton Tap	69	WC	Sherburne	120	33.4	-340.0	-326.1	-340	SUOP
62155	Princeton Industrial	69	WC	Sherburne	120	33.5	-340.0	-326.1	-340	SUOP
62926	Dickinson	115	WC	Wright	2,074	36.7	173.8	-335.6	-335.6	SUPK
60404	Biscayne	115	WC	McLeod	0	36.9	186.6	-330.0	-330	SUPK
60873	Biscay Junction	69	WC	McLeod	0	36.9	72.2	-330.0	-330	SUPK
60878	Plato	69	WC	McLeod	0	36.6	33.1	-330.0	-330	SUPK
60879	Lester Prairie 69 kV	69	WC	McLeod	0	36.9	31.1	-330.0	-330	SUPK
60880	Lester Prairie Tap	69	WC	McLeod	0	36.6	31.1	-330.0	-330	SUPK
60888	Glencoe	69	WC	McLeod	0	37.0	31.1	-330.0	-330	SUPK
62925	Dickinson	115	WC	Wright	2,074	35.1	201.0	-329.6	-329.6	SUPK
60898	Glencoe Municipal	115	WC	McLeod	0	36.9	192.3	-329.4	-329.4	SUPK
62157	Elk River Xfmr 1 Tert	13	WC	Sherburne	120	33.4	-326.8	-199.6	-326.8	SUOP
63081	Dickinson Tap	12.5	WC	Wright	2,074	35.6	117.6	-321.3	-321.3	SUPK
62981	McLeod	115	WC	McLeod	0	37.7	219.7	-321.2	-321.2	SUPK
62156	Elk River Xfmr 1 Tert	13	WC	Sherburne	120	33.4	-306.1	-187.1	-306.1	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62849	Wakefield Tap	13.8	WC	Stearns	218	38.7	11.2	-304.6	-304.6	SUPK
60703	Watkins	69	WC	Meeker	240	38.4	40.8	-291.6	-291.6	SUPK
63030	Dickinson	345	WC	Wright	2,074	35.1	198.0	-289.1	-289.1	SUPK
62620	Watkins	69	WC	Meeker	240	38.3	41.9	-282.4	-282.4	SUPK
63043	Elk River	230	WC	Sherburne	120	31.8	-279.6	-171.0	-279.6	SUOP
60705	Luxemburg Tap	69	WC	Stearns	218	39.2	43.6	-256.0	-256	SUPK
62844	Luxemburg	69	WC	Stearns	218	39.0	43.6	-256.0	-256	SUPK
7479	Beardsley Tap	41.6	WC	Big Stone	571	38.4	-201.1	-248.0	-248	SUPK
7480	Beardsley	41.6	WC	Big Stone	571	37.7	-201.1	-248.0	-248	SUPK
8787	Beardsley	41.6	WC	Big Stone	571	38.4	-201.1	-248.0	-248	SUPK
62845	Fairhaven	69	WC	Stearns	218	38.0	34.7	-243.1	-243.1	SUPK
62846	Fairhaven	69	WC	Stearns	218	38.9	41.5	-243.1	-243.1	SUPK
62980	McLeod S38	230	WC	McLeod	0	37.7	225.1	-235.5	-235.5	SUPK
62834	Roscoe	69	WC	Stearns	218	37.6	47.3	-233.2	-233.2	SUPK
62835	Roscoe Tap	69	WC	Stearns	218	38.3	57.7	-233.2	-233.2	SUPK
60717	Wakefield	69	WC	Stearns	218	38.7	86.6	-233.1	-233.1	SUPK
62287	Oak Park	69	WC	Benton	0	36.2	-211.4	-230.5	-230.5	SUPK
62288	Oak Park Tap	69	WC	Benton	0	36.7	-211.4	-230.5	-230.5	SUPK
62290	Mayhew SW	69	WC	Benton	0	36.9	-211.4	-230.5	-230.5	SUPK
62286	Pipeline #2 Tap	69	WC	Benton	0	36.9	-190.9	-229.2	-229.2	SUPK
62289	Pipeline #2	69	WC	Benton	0	36.6	-190.9	-229.2	-229.2	SUPK
62281	Mayhew	69	WC	Benton	0	36.2	-186.1	-222.2	-222.2	SUPK
62298	Popple Creek SW	69	WC	Benton	0	36.7	-186.1	-222.2	-222.2	SUPK
62300	Minden Township	69	WC	Benton	0	35.2	-182.8	-217.6	-217.6	SUPK
62136	Remmele	69	WC	Sherburne	120	35.5	-185.9	-114.1	-185.9	SUOP
62142	RemmeleTap	69	WC	Sherburne	120	35.5	-185.9	-114.1	-185.9	SUOP
60707	Blue Huron	69	WC	Stearns	218	37.0	56.6	-178.8	-178.8	SUPK
62586	Winthrop	69	WC	McLeod	0	37.3	-38.7	-165.7	-165.7	SUPK
62100	Big Lake	69	WC	Sherburne	120	34.4	-155.4	-95.4	-155.4	SUOP
62836	Munson	69	WC	Stearns	218	37.8	37.6	-151.1	-151.1	SUPK
62837	Munson Tap	69	WC	Stearns	218	37.5	55.5	-151.1	-151.1	SUPK
36238	East Big Lake Tap	69	WC	Sherburne	120	34.4	-141.3	-86.8	-141.3	SUOP
36238	Waco	69	WC	Sherburne	120	34.4	-141.3	-86.8	-141.3	SUOP
62149	Rice Lake SS	69	WC	Sherburne	120	34.0	-136.8	-84.0	-136.8	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62627	Lake Jennie Switch	69	WC	Meeker	240	38.5	11.7	-134.7	-134.7	SUPK
62630	Lake Jennie	69	WC	Meeker	240	38.3	12.7	-134.7	-134.7	SUPK
62946	Lake Jennie Tap	69	WC	Meeker	240	38.6	37.2	-134.7	-134.7	SUPK
62950	Rockford	69	WC	Wright	2,074	36.8	-18.9	-132.0	-132	SUPK
62604	Brownton Tap	69	WC	McLeod	0	37.2	31.6	-129.5	-129.5	SUPK
60711	Richmond	69	WC	Stearns	218	36.2	55.9	-128.5	-128.5	SUPK
60710	Farm Tap	69	WC	Stearns	218	37.5	73.6	-127.3	-127.3	SUPK
62968	Elk River North	69	WC	Sherburne	120	34.0	-125.9	-77.4	-125.9	SUOP
62929	Albertville	69	WC	Wright	2,074	36.3	-123.0	-7.9	-123	SUOP
62965	Elk River Municipal West SS	69	WC	Sherburne	120	32.9	-122.8	-75.5	-122.8	SUOP
62967	Elk River Muni West	69	WC	Sherburne	120	32.9	-122.8	-75.4	-122.8	SUOP
62114	RDF Tap	69	WC	Sherburne	120	33.6	-113.9	-5.4	-113.9	SUOP
62115	RDF	69	WC	Sherburne	120	33.8	-113.9	-5.4	-113.9	SUOP
62947	Dickinson	69	WC	Wright	2,074	35.8	-16.1	-112.1	-112.1	SUPK
62134	Elk River #14	69	WC	Sherburne	120	31.8	-110.4	-67.8	-110.4	SUOP
62957	Otsego Tap	69	WC	Wright	2,074	34.6	-100.2	-5.4	-100.2	SUOP
62602	Bell	69	WC	McLeod	0	37.5	34.9	-99.1	-99.1	SUPK
62938	Otsego	69	WC	Wright	2,074	34.8	-98.2	-5.4	-98.2	SUOP
62966	Elk River Otsego	69	WC	Sherburne	120	33.5	-98.2	-5.4	-98.2	SUOP
63020	Elk River	69	WC	Sherburne	120	33.5	-92.3	-4.9	-92.3	SUOP
62587	Helen	69	WC	McLeod	0	36.9	37.8	-88.1	-88.1	SUPK
62603	Hassan Junction	69	WC	McLeod	0	37.5	37.8	-88.1	-88.1	SUPK
62601	Hook Lake	69	WC	McLeod	0	37.8	38.7	-88.0	-88	SUPK
62606	Hook Lake Tap	69	WC	McLeod	0	37.8	38.7	-88.0	-88	SUPK
62985	Hutchinson Plant 2 Tap	69	WC	McLeod	0	37.3	6.6	-78.0	-78	SUPK
62986	Hutchinson	69	WC	McLeod	0	37.3	51.8	-78.0	-78	SUPK
62839	Big Fish	69	WC	Stearns	218	38.7	48.2	-65.4	-65.4	SUPK
62840	Big Fish	69	WC	Stearns	218	37.0	48.1	-65.4	-65.4	SUPK
60166	Salida Crossing	115	WC	Sherburne	120	35.1	202.4	-56.6	-56.6	SUPK
60601	Sherburne County	115	WC	Sherburne	120	35.6	202.6	-54.1	-54.1	SUPK
62093	Liberty	115	WC	Sherburne	120	35.0	202.6	-52.3	-52.3	SUPK
62948	Black Lake	69	WC	Wright	2,074	36.6	-49.7	52.5	-49.7	SUOP
62949	Black Lake Tap	69	WC	Wright	2,074	37.1	-49.7	52.5	-49.7	SUOP
60677	Henry Tap	69	WC	Renville	85	37.8	-39.6	-14.6	-39.6	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60770	Birch Coolley	69	WC	Renville	85	37.1	-39.1	-19.9	-39.1	SUOP
60728	Franklin	69	WC	Renville	85	36.6	-38.8	-24.6	-38.8	SUOP
60145	Franklin	115	WC	Renville	85	36.4	-38.6	52.0	-38.6	SUOP
60727	City of Fairfax	69	WC	Renville	85	37.0	-38.1	-33.2	-38.1	SUOP
60769	Cairo	69	WC	Renville	85	37.2	-38.0	-35.0	-38	SUOP
62102	Cable	69	WC	Sherburne	120	35.7	76.8	-25.6	-25.6	SUPK
62139	Cable Tap	69	WC	Sherburne	120	35.6	76.9	-25.6	-25.6	SUPK
60712	Annadale	69	WC	Wright	2,074	36.8	46.8	-21.2	-21.2	SUPK
62952	Hasty	69	WC	Wright	2,074	36.1	44.0	-18.7	-18.7	SUPK
62138	Briggs Lake	69	WC	Sherburne	120	34.3	75.4	-17.8	-17.8	SUPK
62277	Duelm	69	WC	Benton	0	36.1	12.4	-17.8	-17.8	SUPK
62295	Duelm SS	69	WC	Benton	0	35.7	45.5	-17.8	-17.8	SUPK
62122	West End 1	69	WC	Sherburne	120	34.8	82.9	-15.9	-15.9	SUPK
60761	South Haven	69	WC	Wright	2,074	36.6	40.1	-15.5	-15.5	SUPK
62125	Becker	69	WC	Sherburne	120	35.6	80.8	-13.2	-13.2	SUPK
60704	Kimbal	69	WC	Stearns	218	38.0	45.1	-12.3	-12.3	SUPK
62622	Kingston	69	WC	Meeker	240	37.8	44.1	-12.3	-12.3	SUPK
60713	Becker	69	WC	Sherburne	120	35.4	50.4	-11.3	-11.3	SUPK
62137	Liberty	69	WC	Sherburne	120	35.6	90.4	-11.3	-11.3	SUPK
60374	Fibromin	115	WC	Swift	117	37.0	-7.2	-1.5	-7.2	SUOP
62001	Benson	115	WC	Swift	117	37.0	-7.2	-1.5	-7.2	SUOP
62009	Lake Johanna	69	WC	Pope	80	39.6	-7.2	-1.5	-7.2	SUOP
62010	Williams	69	WC	Pope	80	40.0	-7.2	-1.5	-7.2	SUOP
62012	Benson	69	WC	Swift	117	37.0	-7.2	-1.5	-7.2	SUOP
62014	Swift Falls	69	WC	Swift	117	38.8	-7.2	-1.5	-7.2	SUOP
62015	Gilchrist	69	WC	Pope	80	39.4	-7.2	-1.5	-7.2	SUOP
91053	Benson Tap	12.8	WC	Swift	117	37.5	-7.2	-1.5	-7.2	SUOP
62988	Hutchinson HTI Tap	69	WC	McLeod	0	37.2	67.7	-5.4	-5.4	SUPK
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4	2.8	SUOP
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2	2.8	SUOP
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4	2.8	SUOP
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9	2.8	SUOP
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9	2.8	SUOP
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9	2.8	SUOP
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2	2.8	SUOP
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0	2.8	SUOP
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4	2.8	SUOP
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2	5	SUOP
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0	5	SUOP
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8	5	SUOP
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8	5	SUOP
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8	5	SUOP
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0	5	EQUAL
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0	5	EQUAL
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1	5	SUOP
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7	5	SUOP
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8	5	SUOP
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8	5	SUOP
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8	5	SUOP
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8	5	SUOP
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8	5	SUOP
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5	7	SUOP
62024	Artichoke	41.6	WC	Big Stone	571	39.2	7.6	7.6	7.6	EQUAL
62628	Big Swam Tap	13.8	WC	Meeker	240	37.5	7.6	7.6	7.6	EQUAL
62850	West St. Cloud	13.8	WC	Stearns	218	35.1	7.6	7.6	7.6	EQUAL
62019	Akron	41.6	WC	Big Stone	571	38.1	8.0	7.9	7.9	SUPK
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0	8	SUPK
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0	8	SUPK
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1	8.1	SUPK
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0	8.5	SUOP
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0	8.5	SUOP
62020	Artichoke Tap	41.6	WC	Big Stone	571	39.2	9.2	9.1	9.1	SUPK
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1	9.1	SUPK
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1	9.1	SUPK
62042	Akron Tap	41.6	WC	Big Stone	571	38.1	9.2	9.8	9.2	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7	9.6	SUOP
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5	9.6	SUOP
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8	9.6	SUOP
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0	9.6	SUOP
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5	9.6	SUOP
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6	9.6	SUOP
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2	10.5	SUOP
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5	10.5	SUOP
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6	10.5	SUOP
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8	10.5	SUOP
62038	Marsh Lake	41.6	WC	Big Stone	571	35.9	10.9	11.4	10.9	SUOP
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7	11.2	SUOP
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6	11.6	SUOP
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6	11.6	SUOP
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5	12.1	SUOP
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2	12.4	SUOP
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8	12.8	SUPK
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3	13.3	EQUAL
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4	13.4	SUPK
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3	13.4	SUOP
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7	13.7	SUOP
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5	14.8	SUOP
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0	14.8	SUOP
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5	14.8	SUOP
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5	14.8	SUOP
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5	14.8	SUOP
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1	14.8	SUOP
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4	15.2	SUOP
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4	15.2	SUOP
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4	15.2	SUOP
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6	15.2	SUOP
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7	15.7	SUPK
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7	15.7	SUPK
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7	15.7	SUPK
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
63289	Correll 115	115	WC	Big Stone	571	35.9	16.1	23.3	16.1	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
62000	Marsh Lake	115	WC	Big Stone	571	35.9	16.6	22.9	16.6	SUOP
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3	17.3	SUPK
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3	17.3	SUPK
7476	Clinton	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7477	Graceville	41.6	WC	Big Stone	571	39.2	22.5	17.3	17.3	SUPK
7481	Johnson	41.6	WC	Big Stone	571	39.4	22.5	17.3	17.3	SUPK
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3	17.3	SUPK
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3	17.3	SUPK
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3	17.3	SUPK
8784	Graceville	41.6	WC	Big Stone	571	38.8	22.5	17.3	17.3	SUPK
62003	Johnson Junction	115	WC	Big Stone	571	39.8	22.5	17.3	17.3	SUPK
62004	Graceville	115	WC	Big Stone	571	39.3	22.5	17.3	17.3	SUPK
62017	Graceville	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
62018	Clinton	41.6	WC	Big Stone	571	38.2	22.5	17.3	17.3	SUPK
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6	17.6	SUPK

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0	18	EQUAL
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1	18.1	SUPK
62426	Willmar Transformer	12.8	WC	Kandiyohi	300	37.0	18.2	18.2	18.2	EQUAL
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3	18.3	SUPK
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6	18.6	SUPK
63288	Odessa 115	115	WC	Big Stone	571	36.6	18.6	21.7	18.6	SUOP
62585	Panther Tap	13.8	WC	Renville	85	37.9	18.7	18.7	18.7	EQUAL
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6	19.6	SUPK
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9	19.7	SUOP
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7	19.7	SUPK
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2	20.2	SUPK
63287	Ortonville-Cold Spring Quarry	115	WC	Big Stone	571	35.8	20.2	21.0	20.2	SUOP
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9	20.4	SUOP
9495	Burdick	41.6	WC	Big Stone	571	37.1	21.5	20.5	20.5	SUPK
9562	Ortonville Municipal	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9570	Burdick Junction	41.6	WC	Big Stone	571	37.3	21.5	20.5	20.5	SUPK
63116	Ortonville	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63216	Ortonville	115	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1	20.6	SUOP
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8	20.8	SUPK
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1	21.1	SUPK
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1	21.1	SUPK
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8	21.1	SUOP
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1	21.1	SUPK
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1	21.1	SUPK
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1	21.1	SUPK
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1	21.1	SUPK
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1	21.1	SUPK
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5	21.3	SUOP
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1	21.5	SUOP
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9	21.5	SUOP
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1	21.5	SUOP
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1	21.5	SUOP
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8	21.5	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7	21.6	SUOP
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7	21.6	SUOP
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9	21.8	SUOP
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2	21.9	SUOP
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0	23	EQUAL
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6	23.1	SUOP
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7	23.2	SUOP
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4	23.4	SUPK
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0	24	EQUAL
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2	24.1	SUOP
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1	24.1	SUPK
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1	24.1	SUPK
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3	24.3	EQUAL
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7	24.4	SUOP
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7	24.6	SUOP
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7	24.7	SUOP
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7	24.7	SUOP
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7	24.7	SUOP
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1	25	SUOP
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0	25	SUPK
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6	25.4	SUOP
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9	25.6	SUOP
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7	26.7	SUPK
62939	Silver Creek	69	WC	Wright	2,074	37.4	40.0	26.9	26.9	SUPK
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3	27.1	SUOP
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2	27.7	SUOP
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6	27.9	SUOP
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9	27.9	SUPK
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9	27.9	SUPK
62443	Willmar Transformer	12.5	WC	Kandiyohi	300	37.3	28.0	28.0	28	EQUAL

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1	28.4	SUOP
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6	28.6	SUPK
62162	Liberty Tap	12.8	WC	Sherburne	120	35.6	30.0	30.0	30	EQUAL
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2	30.2	SUPK
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3	30.3	SUPK
60283	Buffalo	69	WC	Wright	2,074	36.2	31.8	34.1	31.8	SUOP
62936	Mary Lake	69	WC	Wright	2,074	36.0	31.8	34.1	31.8	SUOP
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2	32.6	SUOP
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2	32.6	SUOP
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6	32.6	SUPK
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4	33.4	SUOP
62933	Highland	69	WC	Wright	2,074	38.6	33.4	34.2	33.4	SUOP
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7	33.8	SUOP
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1	34.1	SUOP
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9	34.2	SUOP
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4	34.5	SUOP
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0	34.5	SUOP
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0	34.5	SUOP
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0	34.7	SUOP
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4	35.5	SUOP
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2	35.6	SUOP
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7	35.8	SUOP
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9	35.9	EQUAL
62934	Howard Lake	69	WC	Wright	2,074	37.5	36.7	38.8	36.7	SUOP
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0	37	EQUAL
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2	37.2	SUPK
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6	37.6	SUPK
62932	Goose Lake	69	WC	Wright	2,074	37.8	43.8	37.6	37.6	SUPK
62944	Goose Tap	69	WC	Wright	2,074	36.7	43.8	37.6	37.6	SUPK
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5	38.5	SUPK
60765	Maple Lake	69	WC	Wright	2,074	36.3	55.0	38.9	38.9	SUPK
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1	39.5	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4	39.9	SUOP
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1	40.1	SUPK
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4	40.1	SUOP
60737	Cokato	69	WC	Wright	2,074	37.2	40.3	42.2	40.3	SUOP
60735	Waverly	69	WC	Wright	2,074	36.9	41.0	41.7	41	SUOP
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1	41	SUOP
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5	41.1	SUOP
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7	41.4	SUOP
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9	41.6	SUOP
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9	41.6	SUOP
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7	41.8	SUOP
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7	42.1	SUOP
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4	42.4	EQUAL
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1	42.6	SUOP
60736	Howard Lake	69	WC	Wright	2,074	37.1	42.7	45.6	42.7	SUOP
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
63075	Benton 1 Xfmr Tert	13.8	WC	Benton	0	36.1	42.9	42.9	42.9	EQUAL
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1	43.1	SUOP
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9	43.3	SUOP
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9	43.3	SUOP
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0	43.4	SUOP
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1	43.8	SUOP
60773	Cokato Tap	69	WC	Wright	2,074	37.5	44.0	45.8	44	SUOP
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6	44.8	SUOP
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8	44.8	SUPK
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1	45.1	SUOP
60734	Montrose	69	WC	Wright	2,074	36.9	45.2	47.6	45.2	SUOP
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9	45.3	SUOP
60738	Winsted Tap	69	WC	Wright	2,074	37.6	45.3	47.3	45.3	SUOP
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9	45.4	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0	45.6	SUOP
60872	Victor Tap	69	WC	Wright	2,074	37.5	46.3	49.2	46.3	SUOP
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7	46.3	SUOP
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3	46.7	SUOP
63079	Benton 2 Xfmr Tert	13.8	WC	Benton	0	36.1	46.7	46.7	46.7	EQUAL
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3	47.1	SUOP
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1	47.1	SUOP
63024	Maple Lake	69	WC	Wright	2,074	36.7	47.8	47.8	47.8	EQUAL
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0	48	SUPK
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1	48.5	SUOP
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6	49	SUOP
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0	49.3	SUOP
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2	49.8	SUOP
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2	50.2	SUPK
62955	Oakwood	115	WC	Wright	2,074	36.2	69.8	50.6	50.6	SUPK
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4	50.7	SUOP
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1	51.1	SUPK
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0	51.9	SUOP
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4	52.1	SUOP
60763	Pulaski	69	WC	Wright	2,074	35.8	53.0	53.3	53	SUOP
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2	54.2	SUOP
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2	55.1	SUOP
60764	Linn Street	69	WC	Wright	2,074	36.2	56.5	63.5	56.5	SUOP
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1	57.9	SUOP
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9	57.9	SUPK
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0	58.4	SUOP
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8	58.8	SUPK
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9	61.3	SUOP
62814	Westwood	115	WC	Stearns	218	32.9	61.3	62.9	61.3	SUOP
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6	62.6	SUPK
62935	Maple Lake	69	WC	Wright	2,074	36.7	79.1	62.8	62.8	SUPK
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9	68	SUOP
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2	68.2	SUOP

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60762	Buffalo	69	WC	Wright	2,074	36.5	71.7	81.9	71.7	SUOP
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9	71.9	SUPK
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3	80.7	SUOP
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9	80.7	SUOP
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7	82	SUOP
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9	86.5	SUOP
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5	87	SUOP
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4	88.7	SUOP
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4	88.7	SUOP
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3	89.3	SUPK
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2	91	SUOP
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1	93.1	SUPK
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2	94.3	SUOP
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6	95.6	SUPK
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3	97.3	SUPK
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3	97.3	SUPK
61637	Platte River	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8	104.3	SUOP
62269	Langola	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5	104.5	SUPK
62927	Lake Constance	115	WC	Wright	2,074	36.4	180.1	105.1	105.1	SUPK
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5	105.5	SUPK
62943	Victor	69	WC	Wright	2,074	37.4	114.2	110.1	110.1	SUPK
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3	112.3	SUOP
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1	113.5	SUOP
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9	113.9	SUOP
66554	Morris	230	WC	Stevens	460	39.1	116.9	142.7	116.9	SUOP
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6	125.6	SUPK
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8	126.7	SUOP
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4	127.4	SUPK
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5	129.2	SUOP
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5	131.5	SUPK

Appendix C - Screening Steps

All WC Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3	132.3	SUPK
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3	132.3	SUPK
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2	133.2	SUPK
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4	133.4	SUPK
60005	Monticello Generator	22	WC	Wright	2,074	36.2	141.0	139.1	139.1	SUPK
60356	Paynesville	230	WC	Stearns	218	38.5	247.0	139.1	139.1	SUPK
63054	Panther	230	WC	Renville	85	37.8	140.7	195.2	140.7	SUOP
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6	141.6	EQUAL
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5	144.4	SUOP
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5	149.7	SUOP
60155	Lake Pulaski	115	WC	Wright	2,074	35.8	201.1	153.8	153.8	SUPK
60153	Monticello	115	WC	Wright	2,074	36.0	201.4	155.8	155.8	SUPK
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7	164.7	SUPK
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2	179.2	SUOP
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9	180.7	SUOP
60151	Monticello	345	WC	Wright	2,074	35.1	200.9	248.2	200.9	SUOP
60160	Sherburne County	345	WC	Sherburne	120	36.0	201.4	655.9	201.4	SUOP
60142	Benton County	345	WC	Benton	0	36.1	203.7	826.1	203.7	SUOP
63045	Benton 4	230	WC	Benton	0	35.2	207.3	618.3	207.3	SUOP
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1	207.7	SUOP
60146	Granite City	115	WC	Stearns	218	33.9	208.0	322.5	208	SUOP
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7	208	SUOP
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9	208	SUOP
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6	208	SUOP
60164	Crossroads	115	WC	Stearns	218	34.2	208.3	262.4	208.3	SUOP
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5	208.3	SUOP
60147	Minnesota Valley	230	WC	Chippewa	0	37.2	215.0	215.0	215	EQUAL
66296	Granite Falls	230	WC	Chippewa	0	37.6	269.0	218.4	218.4	SUPK
66297	Granite Falls	13.8	WC	Chippewa	0	37.6	269.0	218.4	218.4	SUPK
63050	Willmar	230	WC	Kandiyohi	300	37.0	256.4	244.3	244.3	SUPK
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6	266.5	SUOP
60149	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	458.8	266.9	SUOP
60150	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	585.6	266.9	SUOP
66550	Granite Falls S49	230	WC	Chippewa	0	37.6	268.6	781.3	268.6	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4	2.8	SUOP
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2	2.8	SUOP
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4	2.8	SUOP
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9	2.8	SUOP
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9	2.8	SUOP
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9	2.8	SUOP
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2	2.8	SUOP
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0	2.8	SUOP
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4	2.8	SUOP
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0	5	EQUAL
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0	5	EQUAL
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2	5	SUOP
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0	5	SUOP
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8	5	SUOP
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8	5	SUOP
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8	5	SUOP
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7	5	SUOP
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8	5	SUOP
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8	5	SUOP
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8	5	SUOP
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8	5	SUOP
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8	5	SUOP
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1	5	SUOP
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5	7	SUOP
62628	Big Swam Tap	13.8	WC	Meeker	240	37.5	7.6	7.6	7.6	EQUAL
62850	West St. Cloud	13.8	WC	Stearns	218	35.1	7.6	7.6	7.6	EQUAL
62024	Artichoke	41.6	WC	Big Stone	571	39.2	7.6	7.6	7.6	EQUAL
62019	Akron	41.6	WC	Big Stone	571	38.1	8.0	7.9	7.9	SUPK
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0	8	SUPK
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0	8	SUPK
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1	8.1	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0	8.5	SUOP
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0	8.5	SUOP
62020	Artichoke Tap	41.6	WC	Big Stone	571	39.2	9.2	9.1	9.1	SUPK
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1	9.1	SUPK
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1	9.1	SUPK
62042	Akron Tap	41.6	WC	Big Stone	571	38.1	9.2	9.8	9.2	SUOP
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7	9.6	SUOP
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5	9.6	SUOP
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8	9.6	SUOP
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5	9.6	SUOP
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6	9.6	SUOP
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0	9.6	SUOP
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2	10.5	SUOP
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5	10.5	SUOP
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6	10.5	SUOP
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8	10.5	SUOP
62038	Marsh Lake	41.6	WC	Big Stone	571	35.9	10.9	11.4	10.9	SUOP
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7	11.2	SUOP
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6	11.6	SUOP
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6	11.6	SUOP
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5	12.1	SUOP
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2	12.4	SUOP
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8	12.8	SUPK
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3	13.3	EQUAL
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4	13.4	SUPK
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3	13.4	SUOP
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7	13.7	SUOP
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5	14.8	SUOP
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0	14.8	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5	14.8	SUOP
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5	14.8	SUOP
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5	14.8	SUOP
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1	14.8	SUOP
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4	15.2	SUOP
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4	15.2	SUOP
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4	15.2	SUOP
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6	15.2	SUOP
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7	15.7	SUPK
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7	15.7	SUPK
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7	15.7	SUPK
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
63289	Correll 115	115	WC	Big Stone	571	35.9	16.1	23.3	16.1	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
62000	Marsh Lake	115	WC	Big Stone	571	35.9	16.6	22.9	16.6	SUOP
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3	17.3	SUPK
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3	17.3	SUPK
7476	Clinton	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7477	Graceville	41.6	WC	Big Stone	571	39.2	22.5	17.3	17.3	SUPK
7481	Johnson	41.6	WC	Big Stone	571	39.4	22.5	17.3	17.3	SUPK
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3	17.3	SUPK
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3	17.3	SUPK
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3	17.3	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
8784	Graceville	41.6	WC	Big Stone	571	38.8	22.5	17.3	17.3	SUPK
62017	Graceville	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
62018	Clinton	41.6	WC	Big Stone	571	38.2	22.5	17.3	17.3	SUPK
62003	Johnson Junction	115	WC	Big Stone	571	39.8	22.5	17.3	17.3	SUPK
62004	Graceville	115	WC	Big Stone	571	39.3	22.5	17.3	17.3	SUPK
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6	17.6	SUPK
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0	18	EQUAL
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1	18.1	SUPK
62426	Willmar Transformer	12.8	WC	Kandiyohi	300	37.0	18.2	18.2	18.2	EQUAL
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3	18.3	SUPK
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6	18.6	SUPK
63288	Odessa 115	115	WC	Big Stone	571	36.6	18.6	21.7	18.6	SUOP
62585	Panther Tap	13.8	WC	Renville	85	37.9	18.7	18.7	18.7	EQUAL
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6	19.6	SUPK
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9	19.7	SUOP
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7	19.7	SUPK
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2	20.2	SUPK
63287	Ortonville-Cold Spring Quarry	115	WC	Big Stone	571	35.8	20.2	21.0	20.2	SUOP
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9	20.4	SUOP
9495	Burdick	41.6	WC	Big Stone	571	37.1	21.5	20.5	20.5	SUPK
9562	Ortonville Municipal	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9570	Burdick Junction	41.6	WC	Big Stone	571	37.3	21.5	20.5	20.5	SUPK
63116	Ortonville	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63216	Ortonville	115	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1	20.6	SUOP
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8	20.8	SUPK
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8	21.1	SUOP
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1	21.1	SUPK
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1	21.1	SUPK
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1	21.1	SUPK
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1	21.1	SUPK
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1	21.1	SUPK
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1	21.1	SUPK
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1	21.1	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5	21.3	SUOP
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1	21.5	SUOP
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9	21.5	SUOP
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1	21.5	SUOP
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1	21.5	SUOP
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8	21.5	SUOP
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7	21.6	SUOP
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7	21.6	SUOP
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9	21.8	SUOP
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2	21.9	SUOP
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0	23	EQUAL
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6	23.1	SUOP
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7	23.2	SUOP
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4	23.4	SUPK
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0	24	EQUAL
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2	24.1	SUOP
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1	24.1	SUPK
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1	24.1	SUPK
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3	24.3	EQUAL
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7	24.4	SUOP
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7	24.6	SUOP
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7	24.7	SUOP
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7	24.7	SUOP
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7	24.7	SUOP
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1	25	SUOP
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0	25	SUPK
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6	25.4	SUOP
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9	25.6	SUOP
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7	26.7	SUPK
62939	Silver Creek	69	WC	Wright	2,074	37.4	40.0	26.9	26.9	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3	27.1	SUOP
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2	27.7	SUOP
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6	27.9	SUOP
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9	27.9	SUPK
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9	27.9	SUPK
62443	Willmar Transformer	12.5	WC	Kandiyohi	300	37.3	28.0	28.0	28	EQUAL
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1	28.4	SUOP
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6	28.6	SUPK
62162	Liberty Tap	12.8	WC	Sherburne	120	35.6	30.0	30.0	30	EQUAL
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2	30.2	SUPK
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3	30.3	SUPK
60283	Buffalo	69	WC	Wright	2,074	36.2	31.8	34.1	31.8	SUOP
62936	Mary Lake	69	WC	Wright	2,074	36.0	31.8	34.1	31.8	SUOP
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2	32.6	SUOP
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2	32.6	SUOP
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6	32.6	SUPK
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4	33.4	SUOP
62933	Highland	69	WC	Wright	2,074	38.6	33.4	34.2	33.4	SUOP
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7	33.8	SUOP
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1	34.1	SUOP
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9	34.2	SUOP
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4	34.5	SUOP
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0	34.5	SUOP
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0	34.5	SUOP
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0	34.7	SUOP
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4	35.5	SUOP
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2	35.6	SUOP
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7	35.8	SUOP
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9	35.9	EQUAL
62934	Howard Lake	69	WC	Wright	2,074	37.5	36.7	38.8	36.7	SUOP
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0	37	EQUAL
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2	37.2	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6	37.6	SUPK
62932	Goose Lake	69	WC	Wright	2,074	37.8	43.8	37.6	37.6	SUPK
62944	Goose Tap	69	WC	Wright	2,074	36.7	43.8	37.6	37.6	SUPK
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5	38.5	SUPK
60765	Maple Lake	69	WC	Wright	2,074	36.3	55.0	38.9	38.9	SUPK
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1	39.5	SUOP
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4	39.9	SUOP
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1	40.1	SUPK
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4	40.1	SUOP
60737	Cokato	69	WC	Wright	2,074	37.2	40.3	42.2	40.3	SUOP
60735	Waverly	69	WC	Wright	2,074	36.9	41.0	41.7	41	SUOP
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1	41	SUOP
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5	41.1	SUOP
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7	41.4	SUOP
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9	41.6	SUOP
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9	41.6	SUOP
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7	41.8	SUOP
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7	42.1	SUOP
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4	42.4	EQUAL
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1	42.6	SUOP
60736	Howard Lake	69	WC	Wright	2,074	37.1	42.7	45.6	42.7	SUOP
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
63075	Benton 1 Xfmr Tert	13.8	WC	Benton	0	36.1	42.9	42.9	42.9	EQUAL
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1	43.1	SUOP
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9	43.3	SUOP
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9	43.3	SUOP
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0	43.4	SUOP
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1	43.8	SUOP
60773	Cokato Tap	69	WC	Wright	2,074	37.5	44.0	45.8	44	SUOP
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6	44.8	SUOP
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8	44.8	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1	45.1	SUOP
60734	Montrose	69	WC	Wright	2,074	36.9	45.2	47.6	45.2	SUOP
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9	45.3	SUOP
60738	Winsted Tap	69	WC	Wright	2,074	37.6	45.3	47.3	45.3	SUOP
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9	45.4	SUOP
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0	45.6	SUOP
60872	Victor Tap	69	WC	Wright	2,074	37.5	46.3	49.2	46.3	SUOP
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7	46.3	SUOP
63079	Benton 2 Xfmr Tert	13.8	WC	Benton	0	36.1	46.7	46.7	46.7	EQUAL
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3	46.7	SUOP
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3	47.1	SUOP
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1	47.1	SUOP
63024	Maple Lake	69	WC	Wright	2,074	36.7	47.8	47.8	47.8	EQUAL
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0	48	SUPK
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1	48.5	SUOP
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6	49	SUOP
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0	49.3	SUOP
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2	49.8	SUOP
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2	50.2	SUPK
62955	Oakwood	115	WC	Wright	2,074	36.2	69.8	50.6	50.6	SUPK
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4	50.7	SUOP
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1	51.1	SUPK
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0	51.9	SUOP
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4	52.1	SUOP
60763	Pulaski	69	WC	Wright	2,074	35.8	53.0	53.3	53	SUOP
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2	54.2	SUOP
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2	55.1	SUOP
60764	Linn Street	69	WC	Wright	2,074	36.2	56.5	63.5	56.5	SUOP
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1	57.9	SUOP
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9	57.9	SUPK
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0	58.4	SUOP
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8	58.8	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9	61.3	SUOP
62814	Westwood	115	WC	Stearns	218	32.9	61.3	62.9	61.3	SUOP
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6	62.6	SUPK
62935	Maple Lake	69	WC	Wright	2,074	36.7	79.1	62.8	62.8	SUPK
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9	68	SUOP
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2	68.2	SUOP
60762	Buffalo	69	WC	Wright	2,074	36.5	71.7	81.9	71.7	SUOP
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9	71.9	SUPK
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3	80.7	SUOP
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9	80.7	SUOP
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7	82	SUOP
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9	86.5	SUOP
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5	87	SUOP
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4	88.7	SUOP
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4	88.7	SUOP
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3	89.3	SUPK
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2	91	SUOP
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1	93.1	SUPK
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2	94.3	SUOP
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6	95.6	SUPK
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3	97.3	SUPK
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3	97.3	SUPK
61637	Platte River	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8	104.3	SUOP
62269	Langola	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5	104.5	SUPK
62927	Lake Constance	115	WC	Wright	2,074	36.4	180.1	105.1	105.1	SUPK
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5	105.5	SUPK
62943	Victor	69	WC	Wright	2,074	37.4	114.2	110.1	110.1	SUPK
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3	112.3	SUOP
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1	113.5	SUOP
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9	113.9	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
66554	Morris	230	WC	Stevens	460	39.1	116.9	142.7	116.9	SUOP
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6	125.6	SUPK
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8	126.7	SUOP
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4	127.4	SUPK
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5	129.2	SUOP
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5	131.5	SUPK
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3	132.3	SUPK
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3	132.3	SUPK
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2	133.2	SUPK
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4	133.4	SUPK
60005	Monticello Generator	22	WC	Wright	2,074	36.2	141.0	139.1	139.1	SUPK
60356	Paynesville	230	WC	Stearns	218	38.5	247.0	139.1	139.1	SUPK
63054	Panther	230	WC	Renville	85	37.8	140.7	195.2	140.7	SUOP
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6	141.6	EQUAL
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5	144.4	SUOP
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5	149.7	SUOP
60155	Lake Pulaski	115	WC	Wright	2,074	35.8	201.1	153.8	153.8	SUPK
60153	Monticello	115	WC	Wright	2,074	36.0	201.4	155.8	155.8	SUPK
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7	164.7	SUPK
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2	179.2	SUOP
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9	180.7	SUOP
60151	Monticello	345	WC	Wright	2,074	35.1	200.9	248.2	200.9	SUOP
60160	Sherburne County	345	WC	Sherburne	120	36.0	201.4	655.9	201.4	SUOP
60142	Benton County	345	WC	Benton	0	36.1	203.7	826.1	203.7	SUOP
63045	Benton 4	230	WC	Benton	0	35.2	207.3	618.3	207.3	SUOP
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1	207.7	SUOP
60146	Granite City	115	WC	Stearns	218	33.9	208.0	322.5	208	SUOP
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7	208	SUOP
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9	208	SUOP
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6	208	SUOP
60164	Crossroads	115	WC	Stearns	218	34.2	208.3	262.4	208.3	SUOP
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5	208.3	SUOP
60147	Minnesota Valley	230	WC	Chippewa	0	37.2	215.0	215.0	215	EQUAL
66297	Granite Falls	13.8	WC	Chippewa	0	37.6	269.0	218.4	218.4	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
66296	Granite Falls	230	WC	Chippewa	0	37.6	269.0	218.4	218.4	SUPK
63050	Willmar	230	WC	Kandiyohi	300	37.0	256.4	244.3	244.3	SUPK
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6	266.5	SUOP
60149	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	458.8	266.9	SUOP
60150	Minnesota Valley	230	WC	Chippewa	0	37.2	266.9	585.6	266.9	SUOP
66550	Granite Falls S49	230	WC	Chippewa	0	37.6	268.6	781.3	268.6	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9	2.8	SUOP
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9	2.8	SUOP
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9	2.8	SUOP
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2	2.8	SUOP
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4	2.8	SUOP
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9	2.8	SUOP
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4	2.8	SUOP
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0	2.8	SUOP
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4	2.8	SUOP
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0	5	EQUAL
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8	5	SUOP
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2	5	SUOP
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0	5	EQUAL
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0	5	SUOP
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8	5	SUOP
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1	5	SUOP
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8	5	SUOP
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8	5	SUOP
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7	5	SUOP
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8	5	SUOP
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8	5	SUOP
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8	5	SUOP
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8	5	SUOP
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5	7	SUOP
62024	Artichoke	41.6	WC	Big Stone	571	39.2	7.6	7.6	7.6	EQUAL
62019	Akron	41.6	WC	Big Stone	571	38.1	8.0	7.9	7.9	SUPK
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0	8	SUPK
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0	8	SUPK
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1	8.1	SUPK
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0	8.5	SUOP
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0	8.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1	9.1	SUPK
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1	9.1	SUPK
62020	Artichoke Tap	41.6	WC	Big Stone	571	39.2	9.2	9.1	9.1	SUPK
62042	Akron Tap	41.6	WC	Big Stone	571	38.1	9.2	9.8	9.2	SUOP
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8	9.6	SUOP
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7	9.6	SUOP
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5	9.6	SUOP
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0	9.6	SUOP
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6	9.6	SUOP
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5	9.6	SUOP
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2	10.5	SUOP
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8	10.5	SUOP
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6	10.5	SUOP
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5	10.5	SUOP
62038	Marsh Lake	41.6	WC	Big Stone	571	35.9	10.9	11.4	10.9	SUOP
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7	11.2	SUOP
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6	11.6	SUOP
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6	11.6	SUOP
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5	12.1	SUOP
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2	12.4	SUOP
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8	12.8	SUPK
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3	13.3	EQUAL
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3	13.4	SUOP
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4	13.4	SUPK
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7	13.7	SUOP
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5	14.8	SUOP
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5	14.8	SUOP
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1	14.8	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0	14.8	SUOP
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5	14.8	SUOP
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5	14.8	SUOP
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4	15.2	SUOP
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4	15.2	SUOP
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6	15.2	SUOP
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4	15.2	SUOP
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7	15.7	SUPK
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7	15.7	SUPK
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7	15.7	SUPK
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
63289	Correll 115	115	WC	Big Stone	571	35.9	16.1	23.3	16.1	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
62000	Marsh Lake	115	WC	Big Stone	571	35.9	16.6	22.9	16.6	SUOP
62018	Clinton	41.6	WC	Big Stone	571	38.2	22.5	17.3	17.3	SUPK
8784	Graceville	41.6	WC	Big Stone	571	38.8	22.5	17.3	17.3	SUPK
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3	17.3	SUPK
62017	Graceville	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7476	Clinton	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7477	Graceville	41.6	WC	Big Stone	571	39.2	22.5	17.3	17.3	SUPK
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3	17.3	SUPK
62004	Graceville	115	WC	Big Stone	571	39.3	22.5	17.3	17.3	SUPK
7481	Johnson	41.6	WC	Big Stone	571	39.4	22.5	17.3	17.3	SUPK
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3	17.3	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3	17.3	SUPK
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3	17.3	SUPK
62003	Johnson Junction	115	WC	Big Stone	571	39.8	22.5	17.3	17.3	SUPK
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6	17.6	SUPK
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0	18	EQUAL
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1	18.1	SUPK
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3	18.3	SUPK
63288	Odessa 115	115	WC	Big Stone	571	36.6	18.6	21.7	18.6	SUOP
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6	18.6	SUPK
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6	19.6	SUPK
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7	19.7	SUPK
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9	19.7	SUOP
63287	Ortonville-Cold Spring Quarry	115	WC	Big Stone	571	35.8	20.2	21.0	20.2	SUOP
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2	20.2	SUPK
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9	20.4	SUOP
9562	Ortonville Municipal	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63116	Ortonville	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63216	Ortonville	115	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9495	Burdick	41.6	WC	Big Stone	571	37.1	21.5	20.5	20.5	SUPK
9570	Burdick Junction	41.6	WC	Big Stone	571	37.3	21.5	20.5	20.5	SUPK
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1	20.6	SUOP
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8	20.8	SUPK
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1	21.1	SUPK
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1	21.1	SUPK
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1	21.1	SUPK
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1	21.1	SUPK
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1	21.1	SUPK
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8	21.1	SUOP
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1	21.1	SUPK
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1	21.1	SUPK
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5	21.3	SUOP
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1	21.5	SUOP
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9	21.5	SUOP
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1	21.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1	21.5	SUOP
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8	21.5	SUOP
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7	21.6	SUOP
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7	21.6	SUOP
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9	21.8	SUOP
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2	21.9	SUOP
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0	23	EQUAL
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6	23.1	SUOP
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7	23.2	SUOP
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4	23.4	SUPK
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0	24	EQUAL
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1	24.1	SUPK
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1	24.1	SUPK
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2	24.1	SUOP
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3	24.3	EQUAL
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7	24.4	SUOP
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7	24.6	SUOP
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7	24.7	SUOP
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7	24.7	SUOP
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7	24.7	SUOP
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0	25	SUPK
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1	25	SUOP
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6	25.4	SUOP
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9	25.6	SUOP
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7	26.7	SUPK
62939	Silver Creek	69	WC	Wright	2,074	37.4	40.0	26.9	26.9	SUPK
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3	27.1	SUOP
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2	27.7	SUOP
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9	27.9	SUPK
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6	27.9	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9	27.9	SUPK
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1	28.4	SUOP
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6	28.6	SUPK
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2	30.2	SUPK
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3	30.3	SUPK
62936	Mary Lake	69	WC	Wright	2,074	36.0	31.8	34.1	31.8	SUOP
60283	Buffalo	69	WC	Wright	2,074	36.2	31.8	34.1	31.8	SUOP
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6	32.6	SUPK
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2	32.6	SUOP
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2	32.6	SUOP
62933	Highland	69	WC	Wright	2,074	38.6	33.4	34.2	33.4	SUOP
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4	33.4	SUOP
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7	33.8	SUOP
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1	34.1	SUOP
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9	34.2	SUOP
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4	34.5	SUOP
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0	34.5	SUOP
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0	34.5	SUOP
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0	34.7	SUOP
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4	35.5	SUOP
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2	35.6	SUOP
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7	35.8	SUOP
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9	35.9	EQUAL
62934	Howard Lake	69	WC	Wright	2,074	37.5	36.7	38.8	36.7	SUOP
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0	37	EQUAL
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2	37.2	SUPK
62944	Goose Tap	69	WC	Wright	2,074	36.7	43.8	37.6	37.6	SUPK
62932	Goose Lake	69	WC	Wright	2,074	37.8	43.8	37.6	37.6	SUPK
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6	37.6	SUPK
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5	38.5	SUPK
60765	Maple Lake	69	WC	Wright	2,074	36.3	55.0	38.9	38.9	SUPK
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1	39.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4	39.9	SUOP
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4	40.1	SUOP
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1	40.1	SUPK
60737	Cokato	69	WC	Wright	2,074	37.2	40.3	42.2	40.3	SUOP
60735	Waverly	69	WC	Wright	2,074	36.9	41.0	41.7	41	SUOP
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1	41	SUOP
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5	41.1	SUOP
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7	41.4	SUOP
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9	41.6	SUOP
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9	41.6	SUOP
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7	41.8	SUOP
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7	42.1	SUOP
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4	42.4	EQUAL
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1	42.6	SUOP
60736	Howard Lake	69	WC	Wright	2,074	37.1	42.7	45.6	42.7	SUOP
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1	43.1	SUOP
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9	43.3	SUOP
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9	43.3	SUOP
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0	43.4	SUOP
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1	43.8	SUOP
60773	Cokato Tap	69	WC	Wright	2,074	37.5	44.0	45.8	44	SUOP
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8	44.8	SUPK
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6	44.8	SUOP
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1	45.1	SUOP
60734	Montrose	69	WC	Wright	2,074	36.9	45.2	47.6	45.2	SUOP
60738	Winsted Tap	69	WC	Wright	2,074	37.6	45.3	47.3	45.3	SUOP
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9	45.3	SUOP
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9	45.4	SUOP
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0	45.6	SUOP
60872	Victor Tap	69	WC	Wright	2,074	37.5	46.3	49.2	46.3	SUOP
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7	46.3	SUOP
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3	46.7	SUOP
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1	47.1	SUOP
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3	47.1	SUOP
63024	Maple Lake	69	WC	Wright	2,074	36.7	47.8	47.8	47.8	EQUAL
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0	48	SUPK
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1	48.5	SUOP
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6	49	SUOP
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0	49.3	SUOP
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2	49.8	SUOP
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2	50.2	SUPK
62955	Oakwood	115	WC	Wright	2,074	36.2	69.8	50.6	50.6	SUPK
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4	50.7	SUOP
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1	51.1	SUPK
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0	51.9	SUOP
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4	52.1	SUOP
60763	Pulaski	69	WC	Wright	2,074	35.8	53.0	53.3	53	SUOP
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2	54.2	SUOP
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2	55.1	SUOP
60764	Linn Street	69	WC	Wright	2,074	36.2	56.5	63.5	56.5	SUOP
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1	57.9	SUOP
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9	57.9	SUPK
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0	58.4	SUOP
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8	58.8	SUPK
62814	Westwood	115	WC	Stearns	218	32.9	61.3	62.9	61.3	SUOP
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9	61.3	SUOP
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6	62.6	SUPK
62935	Maple Lake	69	WC	Wright	2,074	36.7	79.1	62.8	62.8	SUPK
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9	68	SUOP
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2	68.2	SUOP
60762	Buffalo	69	WC	Wright	2,074	36.5	71.7	81.9	71.7	SUOP
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9	71.9	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3	80.7	SUOP
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9	80.7	SUOP
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7	82	SUOP
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9	86.5	SUOP
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5	87	SUOP
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4	88.7	SUOP
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4	88.7	SUOP
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3	89.3	SUPK
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2	91	SUOP
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1	93.1	SUPK
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2	94.3	SUOP
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6	95.6	SUPK
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3	97.3	SUPK
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3	97.3	SUPK
61637	Platte River	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
62269	Langola	115	WC	Benton	0	34.8	104.3	107.8	104.3	SUOP
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8	104.3	SUOP
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5	104.5	SUPK
62927	Lake Constance	115	WC	Wright	2,074	36.4	180.1	105.1	105.1	SUPK
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5	105.5	SUPK
62943	Victor	69	WC	Wright	2,074	37.4	114.2	110.1	110.1	SUPK
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3	112.3	SUOP
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1	113.5	SUOP
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9	113.9	SUOP
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6	125.6	SUPK
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8	126.7	SUOP
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4	127.4	SUPK
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5	129.2	SUOP
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5	131.5	SUPK
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3	132.3	SUPK
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3	132.3	SUPK
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2	133.2	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4	133.4	SUPK
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6	141.6	EQUAL
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5	144.4	SUOP
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5	149.7	SUOP
60155	Lake Pulaski	115	WC	Wright	2,074	35.8	201.1	153.8	153.8	SUPK
60153	Monticello	115	WC	Wright	2,074	36.0	201.4	155.8	155.8	SUPK
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7	164.7	SUPK
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2	179.2	SUOP
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9	180.7	SUOP
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1	207.7	SUOP
60146	Granite City	115	WC	Stearns	218	33.9	208.0	322.5	208	SUOP
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7	208	SUOP
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9	208	SUOP
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6	208	SUOP
60164	Crossroads	115	WC	Stearns	218	34.2	208.3	262.4	208.3	SUOP
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5	208.3	SUOP
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6	266.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9	2.8	SUOP
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9	2.8	SUOP
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9	2.8	SUOP
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2	2.8	SUOP
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4	2.8	SUOP
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9	2.8	SUOP
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4	2.8	SUOP
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0	2.8	SUOP
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4	2.8	SUOP
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8	5	SUOP
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8	5	SUOP
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8	5	SUOP
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8	5	SUOP
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8	5	SUOP
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8	5	SUOP
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0	5	EQUAL
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0	5	EQUAL
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2	5	SUOP
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0	5	SUOP
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8	5	SUOP
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1	5	SUOP
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8	5	SUOP
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7	5	SUOP
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5	7	SUOP
62024	Artichoke	41.6	WC	Big Stone	571	39.2	7.6	7.6	7.6	EQUAL
62019	Akron	41.6	WC	Big Stone	571	38.1	8.0	7.9	7.9	SUPK
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0	8	SUPK
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0	8	SUPK
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1	8.1	SUPK
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0	8.5	SUOP
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0	8.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1	9.1	SUPK
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1	9.1	SUPK
62020	Artichoke Tap	41.6	WC	Big Stone	571	39.2	9.2	9.1	9.1	SUPK
62042	Akron Tap	41.6	WC	Big Stone	571	38.1	9.2	9.8	9.2	SUOP
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8	9.6	SUOP
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7	9.6	SUOP
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5	9.6	SUOP
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0	9.6	SUOP
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6	9.6	SUOP
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5	9.6	SUOP
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2	10.5	SUOP
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8	10.5	SUOP
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6	10.5	SUOP
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5	10.5	SUOP
62038	Marsh Lake	41.6	WC	Big Stone	571	35.9	10.9	11.4	10.9	SUOP
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7	11.2	SUOP
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6	11.6	SUOP
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6	11.6	SUOP
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5	12.1	SUOP
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2	12.4	SUOP
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8	12.8	SUPK
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3	13.3	EQUAL
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3	13.4	SUOP
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4	13.4	SUPK
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7	13.7	SUOP
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5	14.8	SUOP
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5	14.8	SUOP
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0	14.8	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5	14.8	SUOP
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5	14.8	SUOP
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1	14.8	SUOP
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4	15.2	SUOP
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4	15.2	SUOP
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6	15.2	SUOP
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4	15.2	SUOP
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7	15.7	SUPK
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7	15.7	SUPK
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7	15.7	SUPK
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
63289	Correll 115	115	WC	Big Stone	571	35.9	16.1	23.3	16.1	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
62000	Marsh Lake	115	WC	Big Stone	571	35.9	16.6	22.9	16.6	SUOP
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3	17.3	SUPK
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3	17.3	SUPK
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3	17.3	SUPK
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3	17.3	SUPK
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3	17.3	SUPK
62018	Clinton	41.6	WC	Big Stone	571	38.2	22.5	17.3	17.3	SUPK
8784	Graceville	41.6	WC	Big Stone	571	38.8	22.5	17.3	17.3	SUPK
62017	Graceville	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7476	Clinton	41.6	WC	Big Stone	571	39.0	22.5	17.3	17.3	SUPK
7477	Graceville	41.6	WC	Big Stone	571	39.2	22.5	17.3	17.3	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62004	Graceville	115	WC	Big Stone	571	39.3	22.5	17.3	17.3	SUPK
7481	Johnson	41.6	WC	Big Stone	571	39.4	22.5	17.3	17.3	SUPK
62003	Johnson Junction	115	WC	Big Stone	571	39.8	22.5	17.3	17.3	SUPK
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6	17.6	SUPK
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0	18	EQUAL
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1	18.1	SUPK
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3	18.3	SUPK
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6	18.6	SUPK
63288	Odessa 115	115	WC	Big Stone	571	36.6	18.6	21.7	18.6	SUOP
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6	19.6	SUPK
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7	19.7	SUPK
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9	19.7	SUOP
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2	20.2	SUPK
63287	Ortonville-Cold Spring Quarry	115	WC	Big Stone	571	35.8	20.2	21.0	20.2	SUOP
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9	20.4	SUOP
9562	Ortonville Municipal	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63116	Ortonville	41.6	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
63216	Ortonville	115	WC	Big Stone	571	36.8	21.5	20.5	20.5	SUPK
9495	Burdick	41.6	WC	Big Stone	571	37.1	21.5	20.5	20.5	SUPK
9570	Burdick Junction	41.6	WC	Big Stone	571	37.3	21.5	20.5	20.5	SUPK
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1	20.6	SUOP
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8	20.8	SUPK
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8	21.1	SUOP
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1	21.1	SUPK
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1	21.1	SUPK
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1	21.1	SUPK
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1	21.1	SUPK
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1	21.1	SUPK
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1	21.1	SUPK
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1	21.1	SUPK
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5	21.3	SUOP
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1	21.5	SUOP
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9	21.5	SUOP
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1	21.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8	21.5	SUOP
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1	21.5	SUOP
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7	21.6	SUOP
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7	21.6	SUOP
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9	21.8	SUOP
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2	21.9	SUOP
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0	23	EQUAL
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6	23.1	SUOP
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7	23.2	SUOP
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4	23.4	SUPK
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0	24	EQUAL
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2	24.1	SUOP
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1	24.1	SUPK
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1	24.1	SUPK
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3	24.3	EQUAL
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7	24.4	SUOP
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7	24.6	SUOP
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7	24.7	SUOP
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7	24.7	SUOP
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7	24.7	SUOP
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1	25	SUOP
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0	25	SUPK
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6	25.4	SUOP
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9	25.6	SUOP
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7	26.7	SUPK
62939	Silver Creek	69	WC	Wright	2,074	37.4	40.0	26.9	26.9	SUPK
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3	27.1	SUOP
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2	27.7	SUOP
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6	27.9	SUOP
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9	27.9	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9	27.9	SUPK
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1	28.4	SUOP
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6	28.6	SUPK
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2	30.2	SUPK
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3	30.3	SUPK
62936	Mary Lake	69	WC	Wright	2,074	36.0	31.8	34.1	31.8	SUOP
60283	Buffalo	69	WC	Wright	2,074	36.2	31.8	34.1	31.8	SUOP
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6	32.6	SUPK
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2	32.6	SUOP
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2	32.6	SUOP
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4	33.4	SUOP
62933	Highland	69	WC	Wright	2,074	38.6	33.4	34.2	33.4	SUOP
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7	33.8	SUOP
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1	34.1	SUOP
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9	34.2	SUOP
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0	34.5	SUOP
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4	34.5	SUOP
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0	34.5	SUOP
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0	34.7	SUOP
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4	35.5	SUOP
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2	35.6	SUOP
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7	35.8	SUOP
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9	35.9	EQUAL
62934	Howard Lake	69	WC	Wright	2,074	37.5	36.7	38.8	36.7	SUOP
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0	37	EQUAL
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2	37.2	SUPK
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6	37.6	SUPK
62944	Goose Tap	69	WC	Wright	2,074	36.7	43.8	37.6	37.6	SUPK
62932	Goose Lake	69	WC	Wright	2,074	37.8	43.8	37.6	37.6	SUPK
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5	38.5	SUPK
60765	Maple Lake	69	WC	Wright	2,074	36.3	55.0	38.9	38.9	SUPK
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1	39.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4	39.9	SUOP
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4	40.1	SUOP
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1	40.1	SUPK
60737	Cokato	69	WC	Wright	2,074	37.2	40.3	42.2	40.3	SUOP
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1	41	SUOP
60735	Waverly	69	WC	Wright	2,074	36.9	41.0	41.7	41	SUOP
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5	41.1	SUOP
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7	41.4	SUOP
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9	41.6	SUOP
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9	41.6	SUOP
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7	41.8	SUOP
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7	42.1	SUOP
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4	42.4	EQUAL
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1	42.6	SUOP
60736	Howard Lake	69	WC	Wright	2,074	37.1	42.7	45.6	42.7	SUOP
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1	43.1	SUOP
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9	43.3	SUOP
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9	43.3	SUOP
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0	43.4	SUOP
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1	43.8	SUOP
60773	Cokato Tap	69	WC	Wright	2,074	37.5	44.0	45.8	44	SUOP
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6	44.8	SUOP
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8	44.8	SUPK
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1	45.1	SUOP
60734	Montrose	69	WC	Wright	2,074	36.9	45.2	47.6	45.2	SUOP
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9	45.3	SUOP
60738	Winsted Tap	69	WC	Wright	2,074	37.6	45.3	47.3	45.3	SUOP
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9	45.4	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0	45.6	SUOP
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7	46.3	SUOP
60872	Victor Tap	69	WC	Wright	2,074	37.5	46.3	49.2	46.3	SUOP
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3	46.7	SUOP
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1	47.1	SUOP
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3	47.1	SUOP
63024	Maple Lake	69	WC	Wright	2,074	36.7	47.8	47.8	47.8	EQUAL
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0	48	SUPK
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1	48.5	SUOP
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6	49	SUOP
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0	49.3	SUOP
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2	49.8	SUOP
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2	50.2	SUPK
62955	Oakwood	115	WC	Wright	2,074	36.2	69.8	50.6	50.6	SUPK
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4	50.7	SUOP
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1	51.1	SUPK
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0	51.9	SUOP
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4	52.1	SUOP
60763	Pulaski	69	WC	Wright	2,074	35.8	53.0	53.3	53	SUOP
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2	54.2	SUOP
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2	55.1	SUOP
60764	Linn Street	69	WC	Wright	2,074	36.2	56.5	63.5	56.5	SUOP
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1	57.9	SUOP
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9	57.9	SUPK
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0	58.4	SUOP
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8	58.8	SUPK
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9	61.3	SUOP
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6	62.6	SUPK
62935	Maple Lake	69	WC	Wright	2,074	36.7	79.1	62.8	62.8	SUPK
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9	68	SUOP
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2	68.2	SUOP
60762	Buffalo	69	WC	Wright	2,074	36.5	71.7	81.9	71.7	SUOP
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9	71.9	SUPK
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3	80.7	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9	80.7	SUOP
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7	82	SUOP
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9	86.5	SUOP
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5	87	SUOP
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4	88.7	SUOP
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4	88.7	SUOP
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3	89.3	SUPK
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2	91	SUOP
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1	93.1	SUPK
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2	94.3	SUOP
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6	95.6	SUPK
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3	97.3	SUPK
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3	97.3	SUPK
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8	104.3	SUOP
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5	104.5	SUPK
62927	Lake Constance	115	WC	Wright	2,074	36.4	180.1	105.1	105.1	SUPK
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5	105.5	SUPK
62943	Victor	69	WC	Wright	2,074	37.4	114.2	110.1	110.1	SUPK
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3	112.3	SUOP
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1	113.5	SUOP
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9	113.9	SUOP
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6	125.6	SUPK
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8	126.7	SUOP
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4	127.4	SUPK
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5	129.2	SUOP
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5	131.5	SUPK
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3	132.3	SUPK
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3	132.3	SUPK
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2	133.2	SUPK
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4	133.4	SUPK
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6	141.6	EQUAL
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5	144.4	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5	149.7	SUOP
60155	Lake Pulaski	115	WC	Wright	2,074	35.8	201.1	153.8	153.8	SUPK
60153	Monticello	115	WC	Wright	2,074	36.0	201.4	155.8	155.8	SUPK
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7	164.7	SUPK
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2	179.2	SUOP
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9	180.7	SUOP
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1	207.7	SUOP
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7	208	SUOP
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9	208	SUOP
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6	208	SUOP
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5	208.3	SUOP
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6	266.5	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7438	Morris SE	41.6	WC	Stevens	460	39.1	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7462	Hancock	41.6	WC	Stevens	460	38.4	2.8	16.4	2.8	SUOP
7459	Danvers	41.6	WC	Swift	117	37.7	2.8	21.2	2.8	SUOP
62034	Cashel Tap	41.6	WC	Swift	117	37.6	2.8	18.0	2.8	SUOP
62035	Cashel	41.6	WC	Swift	117	37.6	2.8	18.4	2.8	SUOP
62030	Dome	41.6	WC	Swift	117	37.5	2.8	22.9	2.8	SUOP
7460	Speedco	41.6	WC	Swift	117	37.4	2.8	14.4	2.8	SUOP
62033	Moyer	41.6	WC	Swift	117	37.4	2.8	21.2	2.8	SUOP
7461	Clontarf	41.6	WC	Swift	117	37.3	2.8	14.9	2.8	SUOP
62013	Benson	41.6	WC	Swift	117	37.0	2.8	22.9	2.8	SUOP
9547	Benson	41.6	WC	Swift	117	36.8	2.8	22.9	2.8	SUOP
7443	Kensington	41.6	WC	Douglas	100	40.3	5.0	17.8	5	SUOP
62760	Holmes City	41.6	WC	Douglas	100	40.2	5.0	17.8	5	SUOP
60352	Watkins	34.5	WC	Meeker	240	38.8	5.0	5.0	5	EQUAL
60351	Eden Valley	34.5	WC	Meeker	240	38.3	5.0	5.0	5	EQUAL
62764	Holmes City Tap	41.6	WC	Pope	80	39.9	5.0	17.8	5	SUOP
7442	Farwell	41.6	WC	Pope	80	39.8	5.0	17.8	5	SUOP
62765	White Bear	41.6	WC	Pope	80	39.1	5.0	17.8	5	SUOP
7441	Cyrus	41.6	WC	Pope	80	38.6	5.0	17.8	5	SUOP
62029	Walden	41.6	WC	Stevens	460	39.2	5.0	22.7	5	SUOP
62766	Frammas	41.6	WC	Stevens	460	39.1	5.0	12.8	5	SUOP
62002	Walden	115	WC	Stevens	460	39.1	5.0	89.1	5	SUOP
62767	Framnas	41.6	WC	Stevens	460	39.0	5.0	12.8	5	SUOP
7440	Cyrus Junction	41.6	WC	Stevens	460	39.0	5.0	10.0	5	SUOP
7434	Morris NE	41.6	WC	Stevens	460	38.8	5.0	13.2	5	SUOP
63218	Morris South	115	WC	Stevens	460	38.9	7.0	78.5	7	SUOP
62590	Melvile Tap	69	WC	Renville	85	37.8	24.2	8.0	8	SUPK
62589	Melville	69	WC	Renville	85	37.7	24.2	8.0	8	SUPK
60742	Panther	69	WC	Renville	85	37.6	30.7	8.1	8.1	SUPK
62629	Paynesville	34.5	WC	Meeker	240	38.1	8.5	10.0	8.5	SUOP
60391	Paynesville	115	WC	Stearns	218	38.5	8.5	10.0	8.5	SUOP
62021	Fairfield SS	41.6	WC	Swift	117	39.0	9.2	9.1	9.1	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62022	Fairfield	41.6	WC	Swift	117	38.9	9.2	9.1	9.1	SUPK
7464	Murdock	41.6	WC	Swift	117	37.8	9.6	14.5	9.6	SUOP
62036	Kildare	41.6	WC	Swift	117	37.7	9.6	15.6	9.6	SUOP
62006	Kerkhoven	115	WC	Swift	117	37.6	9.6	72.0	9.6	SUOP
62026	Kerkhoven	41.6	WC	Swift	117	37.6	9.6	12.5	9.6	SUOP
7463	DeGraff	41.6	WC	Swift	117	37.5	9.6	15.7	9.6	SUOP
7465	Kerkhoven	41.6	WC	Swift	117	37.5	9.6	14.8	9.6	SUOP
62023	Alberta	41.6	WC	Stevens	460	39.6	10.5	14.5	10.5	SUOP
62028	Donnelly	41.6	WC	Stevens	460	39.3	10.5	22.6	10.5	SUOP
62037	Alberta Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
7439	Morris NW	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66318	Morris	41.6	WC	Stevens	460	39.1	10.5	13.2	10.5	SUOP
66555	Morris	115	WC	Stevens	460	39.1	10.5	71.8	10.5	SUOP
7447	Five Mile Junction	41.6	WC	Stevens	460	39.1	10.5	20.0	10.5	SUOP
7435	Steel	41.6	WC	Stevens	460	39.0	10.5	13.2	10.5	SUOP
63113	Marietta	41.6	WC	Lac Qui Parle	0	37.1	11.2	11.7	11.2	SUOP
63173	Dawson Tap	115	WC	Lac Qui Parle	0	37.8	11.6	29.6	11.6	SUOP
63174	Dawson	115	WC	Lac Qui Parle	0	37.4	11.6	29.6	11.6	SUOP
62621	Dassel	69	WC	Meeker	240	38.6	12.1	13.5	12.1	SUOP
62428	Pennock	69	WC	Kandiyohi	300	37.7	12.4	13.2	12.4	SUOP
60732	West St. Cloud	69	WC	Stearns	218	35.8	62.5	12.8	12.8	SUPK
62429	Pennock Tap	69	WC	Kandiyohi	300	37.9	13.3	13.3	13.3	EQUAL
60741	Lake Lilian	69	WC	Kandiyohi	300	37.9	16.9	13.4	13.4	SUPK
63206	Louisburg	115	WC	Lac Qui Parle	0	37.6	13.4	26.3	13.4	SUOP
63213	Marietta	115	WC	Lac Qui Parle	0	36.9	13.7	29.7	13.7	SUOP
62833	St. Stephens	69	WC	Stearns	218	37.1	14.8	16.1	14.8	SUOP
7458	Holloway	41.6	WC	Swift	117	37.4	14.8	24.5	14.8	SUOP
7456	Milan Rural	41.6	WC	Swift	117	37.3	14.8	24.5	14.8	SUOP
7457	Milan Junction	41.6	WC	Swift	117	37.2	14.8	17.0	14.8	SUOP
62040	Shible Lake	41.6	WC	Swift	117	37.0	14.8	24.5	14.8	SUOP
62025	Shible Lake Tap	41.6	WC	Swift	117	36.8	14.8	24.5	14.8	SUOP
7452	Appleton	41.6	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP
63217	Appleton	115	WC	Swift	117	35.9	14.8	24.5	14.8	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62624	Atwater	69	WC	Kandiyohi	300	39.2	15.2	33.4	15.2	SUOP
62625	Rosendale SS	69	WC	Meeker	240	38.5	15.2	28.6	15.2	SUOP
62626	Cosmos	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
60766	Cosmos Tap	69	WC	Meeker	240	37.8	15.2	25.3	15.2	SUOP
62618	Cedar Mills	69	WC	Meeker	240	37.6	15.2	27.4	15.2	SUOP
62619	Cedar Mills Tap	69	WC	Meeker	240	37.5	15.2	27.4	15.2	SUOP
60698	Stewart	69	WC	McLeod	0	37.4	22.8	15.7	15.7	SUPK
60678	Brownton	69	WC	McLeod	0	37.1	22.8	15.7	15.7	SUPK
60699	Brownton	69	WC	McLeod	0	37.0	22.8	15.7	15.7	SUPK
60718	Bird Island	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62591	Yellowstone	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
60696	Hector	69	WC	Renville	85	37.8	22.8	15.7	15.7	SUPK
62592	Hector	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
60697	Buffalo Lake	69	WC	Renville	85	37.7	22.8	15.7	15.7	SUPK
62594	Brookfield Tap	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62600	Preston Lake	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
62593	Brookfield	69	WC	Renville	85	37.6	22.8	15.7	15.7	SUPK
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
60390	Grove City	69	WC	Meeker	240	39.1	16.3	34.7	16.3	SUOP
8781	Dumont	41.6	WC	Stevens	460	39.7	22.5	17.3	17.3	SUPK
7482	Chokio	41.6	WC	Stevens	460	39.5	19.0	17.3	17.3	SUPK
7475	Chokio Tap	41.6	WC	Stevens	460	39.5	22.5	17.3	17.3	SUPK
7474	Alberta	41.6	WC	Stevens	460	39.3	22.3	17.3	17.3	SUPK
8782	Dumont	41.6	WC	Stevens	460	38.9	22.5	17.3	17.3	SUPK
60682	Kingman	69	WC	Renville	85	37.8	33.9	17.6	17.6	SUPK
9530	ElbowM	41.6	WC	Grant	60	39.0	18.0	18.0	18	EQUAL
60869	City of Olivia	69	WC	Renville	85	37.9	37.4	18.1	18.1	SUPK
60875	Beaver Creek	69	WC	Renville	85	37.9	39.6	18.3	18.3	SUPK
60870	Olivia West	69	WC	Renville	85	37.6	42.0	18.6	18.6	SUPK
60676	Troy	69	WC	Renville	85	37.7	55.6	19.6	19.6	SUPK
7190	Garfield	41.6	WC	Douglas	100	40.1	19.7	19.9	19.7	SUOP
60681	Troy	69	WC	Renville	85	37.6	41.6	19.7	19.7	SUPK
60733	Henryville	69	WC	Renville	85	37.5	41.7	20.2	20.2	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
38838	Rice	34.5	WC	Benton	0	35.8	20.4	21.9	20.4	SUOP
9529	ElbowM	41.6	WC	Grant	60	38.9	20.6	21.1	20.6	SUOP
60683	Minnesota Valley	69	WC	Chippewa	0	36.3	86.0	20.8	20.8	SUPK
62780	La Grande SS	41.6	WC	Douglas	100	39.3	36.7	21.1	21.1	SUPK
62782	Leaf Valley	41.6	WC	Douglas	100	39.1	36.7	21.1	21.1	SUPK
62776	La Grande	41.6	WC	Douglas	100	39.0	31.3	21.1	21.1	SUPK
62777	Belle River	41.6	WC	Douglas	100	38.6	29.3	21.1	21.1	SUPK
62752	Miltona Tap	115	WC	Douglas	100	37.7	128.3	21.1	21.1	SUPK
62753	Miltona	115	WC	Douglas	100	37.4	30.0	21.1	21.1	SUPK
62773	Miltona	41.6	WC	Douglas	100	37.1	36.7	21.1	21.1	SUPK
62769	Roseville	41.6	WC	Grant	60	39.1	21.1	21.8	21.1	SUOP
7204	Nashua Tintah Junction	41.6	WC	Grant	60	38.0	21.3	21.5	21.3	SUOP
62779	Brandon	41.6	WC	Douglas	100	39.8	21.5	21.8	21.5	SUOP
7198	Cats Eye	41.6	WC	Grant	60	39.0	21.5	23.1	21.5	SUOP
7199	Wendell	41.6	WC	Grant	60	38.8	21.5	21.9	21.5	SUOP
7449	Herman Norcross	41.6	WC	Grant	60	38.7	21.5	23.1	21.5	SUOP
7448	Donnelly	41.6	WC	Stevens	460	39.4	21.5	23.1	21.5	SUOP
7193	Brandon Junction	41.6	WC	Douglas	100	39.8	21.6	21.7	21.6	SUOP
7194	Millerville	41.6	WC	Douglas	100	38.4	21.6	21.7	21.6	SUOP
7200	Ashby Junction	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
7201	Elbow Lake	41.6	WC	Grant	60	38.9	21.7	23.5	21.7	SUOP
62759	Amoco	41.6	WC	Douglas	100	39.9	21.8	21.9	21.8	SUOP
62763	Sanford	41.6	WC	Grant	60	38.9	21.9	22.2	21.9	SUOP
7191	Brandon Tap	41.6	WC	Douglas	100	39.8	23.0	23.0	23	EQUAL
7446	Barrett	41.6	WC	Grant	60	38.9	23.1	23.6	23.1	SUOP
62433	Svea	69	WC	Kandiyohi	300	37.8	23.2	24.7	23.2	SUOP
7135	Alexandria	41.6	WC	Douglas	100	38.5	23.6	23.4	23.4	SUPK
62762	Sanford Tap	41.6	WC	Grant	60	39.0	24.0	24.0	24	EQUAL
7202	Pomme De Terre	41.6	WC	Grant	60	38.8	24.1	24.2	24.1	SUOP
62842	Le Sauk	69	WC	Stearns	218	35.9	51.4	24.1	24.1	SUPK
62841	Westwood Bank 2	69	WC	Stearns	218	35.8	55.1	24.1	24.1	SUPK
62435	Prairie Woods	69	WC	Kandiyohi	300	37.7	24.3	24.3	24.3	EQUAL
62775	Lake Mary	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62770	Lake Mary Tap	41.6	WC	Douglas	100	39.6	25.3	24.4	24.4	SUPK
9539	Elbow Lake Muni	41.6	WC	Grant	60	39.0	24.4	26.7	24.4	SUOP
62761	Amoco Tap	41.6	WC	Douglas	100	40.1	24.6	24.7	24.6	SUOP
7445	Hoffman	41.6	WC	Grant	60	39.6	24.7	25.7	24.7	SUOP
62768	Roseville SS	41.6	WC	Grant	60	39.2	24.7	25.7	24.7	SUOP
7444	Hoffman Jct	41.6	WC	Grant	60	39.0	24.7	25.7	24.7	SUOP
7192	Evansville	41.6	WC	Douglas	100	39.3	25.0	25.1	25	SUOP
62843	Le Sauk Tap	69	WC	Stearns	218	35.9	52.9	25.0	25	SUPK
7203	Erdahl	41.6	WC	Grant	60	40.3	25.4	25.6	25.4	SUOP
62778	Brandon Tap	41.6	WC	Douglas	100	39.8	25.6	25.9	25.6	SUOP
60693	Scared Heart	69	WC	Renville	85	37.5	43.4	26.7	26.7	SUPK
62434	Prairie Woods	69	WC	Kandiyohi	300	37.7	27.1	28.3	27.1	SUOP
62431	Hawick/Gravgard	69	WC	Kandiyohi	300	38.2	27.7	29.2	27.7	SUOP
62771	Hudson Tap	41.6	WC	Douglas	100	39.2	29.9	27.9	27.9	SUPK
62774	Hudson	41.6	WC	Douglas	100	39.1	29.9	27.9	27.9	SUPK
7215	Elbow Lake	41.6	WC	Grant	60	39.2	27.9	29.6	27.9	SUOP
62430	Sunburg	69	WC	Kandiyohi	300	38.8	28.4	30.1	28.4	SUOP
7206	Carlos	41.6	WC	Douglas	100	38.1	28.9	28.6	28.6	SUPK
62781	Le Homme Dieu SS	41.6	WC	Douglas	100	39.2	31.2	30.2	30.2	SUPK
62772	Carlos SS/Cap Bank	41.6	WC	Douglas	100	37.6	31.2	30.3	30.3	SUPK
62442	Spicer	69	WC	Kandiyohi	300	39.0	32.6	36.2	32.6	SUOP
62441	Spicer	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62432	Kandiyohi	69	WC	Kandiyohi	300	38.8	32.6	36.2	32.6	SUOP
62436	Green Lake	69	WC	Kandiyohi	300	38.5	32.6	36.2	32.6	SUOP
62838	Farming	69	WC	Stearns	218	37.9	47.0	32.6	32.6	SUPK
60744	Brooton	69	WC	Stearns	218	39.2	33.4	43.4	33.4	SUOP
62823	Elrosa	69	WC	Stearns	218	39.0	33.8	34.7	33.8	SUOP
62832	Brockway	69	WC	Stearns	218	37.9	34.1	35.1	34.1	SUOP
62987	Hutchinson City Tap	69	WC	McLeod	0	37.3	34.2	35.9	34.2	SUOP
62826	Bangor Tap	69	WC	Pope	80	39.2	34.5	41.0	34.5	SUOP
62825	Bangor	69	WC	Stearns	218	39.3	34.5	41.0	34.5	SUOP
60743	Belgrade	69	WC	Stearns	218	38.4	34.5	41.4	34.5	SUOP
62827	Crow Lake	69	WC	Stearns	218	38.6	34.7	46.0	34.7	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62757	Glenwood	69	WC	Pope	80	39.5	35.5	36.4	35.5	SUOP
60767	Williams Tap	69	WC	Pope	80	39.5	35.6	39.2	35.6	SUOP
60740	Litchfield	69	WC	Meeker	240	37.9	35.8	43.7	35.8	SUOP
62439	Hutchinson Tap	69	WC	McLeod	0	37.3	35.9	35.9	35.9	EQUAL
60933	Millerbernd MFG Co	69	WC	McLeod	0	36.7	37.0	37.0	37	EQUAL
60694	Renville	69	WC	Renville	85	37.7	44.1	37.2	37.2	SUPK
60702	Paynesville	34.5	WC	Stearns	218	38.5	38.8	37.6	37.6	SUPK
60680	Emmet	69	WC	Renville	85	37.6	42.0	38.5	38.5	SUPK
60745	Sedan	69	WC	Pope	80	39.2	39.5	41.1	39.5	SUOP
60376	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
60375	Lowry	69	WC	Pope	80	38.7	39.7	43.4	39.7	SUOP
62437	Svea Tap	69	WC	Kandiyohi	300	37.9	39.9	41.4	39.9	SUOP
60690	Maynard Tap	69	WC	Chippewa	0	37.4	40.9	40.1	40.1	SUPK
60932	Winsted	69	WC	McLeod	0	37.0	40.1	41.4	40.1	SUOP
60748	Westport	69	WC	Pope	80	39.5	41.0	41.1	41	SUOP
62623	Litchfield	69	WC	Meeker	240	37.8	41.1	51.5	41.1	SUOP
60695	Danube	69	WC	Renville	85	37.8	41.4	41.7	41.4	SUOP
62596	Sherman Tap	69	WC	McLeod	0	37.6	41.6	42.9	41.6	SUOP
62595	Sherman	69	WC	McLeod	0	37.5	41.6	42.9	41.6	SUOP
60691	Granite Falls	69	WC	Chippewa	0	37.6	41.8	42.7	41.8	SUOP
60378	Maynard 69 kV	69	WC	Chippewa	0	37.4	42.1	42.7	42.1	SUOP
60679	Crooks	69	WC	Renville	85	37.7	42.4	42.4	42.4	EQUAL
61837	Platte River	34.5	WC	Benton	0	35.7	42.6	44.1	42.6	SUOP
62829	Milwood Tap	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
62828	Millwood	69	WC	Stearns	218	38.2	42.8	43.8	42.8	SUOP
60750	Osakis	69	WC	Douglas	100	39.0	43.1	44.1	43.1	SUOP
62822	Kand Tap	69	WC	Stearns	218	38.4	43.3	44.9	43.3	SUOP
62821	Kandota	69	WC	Stearns	218	38.0	43.3	44.9	43.3	SUOP
67455	Brandon	41.6	WC	Douglas	100	39.7	43.4	56.0	43.4	SUOP
62755	Ommen	69	WC	Pope	80	39.5	43.8	45.1	43.8	SUOP
60747	Villard	69	WC	Pope	80	39.3	44.8	46.6	44.8	SUOP
60759	St. Joseph	69	WC	Stearns	218	36.5	56.5	44.8	44.8	SUPK
60755	Freeport	69	WC	Stearns	218	38.5	45.1	47.1	45.1	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60379	Clara City	69	WC	Chippewa	0	37.6	45.3	48.9	45.3	SUOP
60739	Dassel	69	WC	Meeker	240	37.4	45.4	47.9	45.4	SUOP
60686	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
60754	East Melrose	69	WC	Stearns	218	37.6	45.4	47.4	45.4	SUOP
62847	Grove	69	WC	Stearns	218	39.0	45.6	48.0	45.6	SUOP
62848	Zion	69	WC	Stearns	218	39.0	46.3	46.7	46.3	SUOP
62756	Leven	69	WC	Pope	80	39.8	46.7	49.3	46.7	SUOP
62830	Albany	69	WC	Stearns	218	38.7	47.1	48.3	47.1	SUOP
62851	Albany Tap	69	WC	Stearns	218	38.5	47.1	50.1	47.1	SUOP
60758	St. Johns University	69	WC	Stearns	218	35.0	54.9	48.0	48	SUPK
60688	Montevideo	69	WC	Chippewa	0	36.8	48.5	52.1	48.5	SUOP
60377	Maynard	69	WC	Chippewa	0	37.3	49.0	52.6	49	SUOP
60746	Glenwood	69	WC	Pope	80	39.5	49.3	53.0	49.3	SUOP
60751	Saulk Centre	69	WC	Stearns	218	38.4	49.8	54.2	49.8	SUOP
60753	Meire Grove	69	WC	Stearns	218	38.9	54.2	50.2	50.2	SUPK
61912	Litchfield	69	WC	Meeker	240	38.0	50.7	61.4	50.7	SUOP
61189	Watab River	69	WC	Stearns	218	36.5	54.3	51.1	51.1	SUPK
60689	Fiesta	69	WC	Chippewa	0	37.4	51.9	57.0	51.9	SUOP
62438	Litchfield Tap Switches SS	69	WC	Meeker	240	38.5	52.1	56.4	52.1	SUOP
62824	Zion Tap	69	WC	Stearns	218	39.1	54.2	55.2	54.2	SUOP
60768	Elrosa Tap	69	WC	Stearns	218	38.8	55.1	56.2	55.1	SUOP
62617	Big Swan	69	WC	Meeker	240	38.7	61.0	57.9	57.9	SUPK
60757	Avon	69	WC	Stearns	218	36.2	57.9	60.1	57.9	SUOP
62831	Brockway Tap	69	WC	Stearns	218	37.3	58.4	61.0	58.4	SUOP
60749	Douglas County	69	WC	Douglas	100	39.3	61.1	58.8	58.8	SUPK
60163	West St. Cloud	115	WC	Stearns	218	35.4	61.3	62.9	61.3	SUOP
60002	Sherburne Cty Gen 3	26	WC	Sherburne	120	36.0	201.4	62.6	62.6	SUPK
62005	Kerkhoven Tap	115	WC	Chippewa	0	38.3	68.0	124.9	68	SUOP
62984	Hutchinson Plant 1 Tap	69	WC	McLeod	0	37.3	68.2	88.2	68.2	SUOP
60752	Black Oak	69	WC	Stearns	218	38.2	72.0	71.9	71.9	SUPK
62995	Willmar E	69	WC	Kandiyohi	300	37.6	80.7	87.9	80.7	SUOP
62992	Willmar S	69	WC	Kandiyohi	300	36.7	80.7	87.3	80.7	SUOP
62994	Willmar Tap	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62991	Willmar SW	69	WC	Kandiyohi	300	37.5	82.0	87.7	82	SUOP
62993	Willmar SW	69	WC	Kandiyohi	300	37.2	82.0	87.7	82	SUOP
62425	Willmar	115	WC	Kandiyohi	300	37.0	86.5	86.9	86.5	SUOP
60000	Sherburne Cty Gen 1	24	WC	Sherburne	120	36.0	87.0	89.5	87	SUOP
62812	Sartell Tap	115	WC	Stearns	218	35.6	88.7	103.4	88.7	SUOP
62813	Sartell	115	WC	Stearns	218	35.4	88.7	103.4	88.7	SUOP
60756	Albany	69	WC	Stearns	218	38.3	92.1	89.3	89.3	SUPK
60357	Maynard	115	WC	Chippewa	0	37.3	91.0	97.2	91	SUOP
62990	Willmar N	69	WC	Kandiyohi	300	37.8	103.1	93.1	93.1	SUPK
62819	Fischer Hill	115	WC	Stearns	218	36.3	94.3	103.2	94.3	SUOP
60144	Douglas County	115	WC	Douglas	100	39.2	96.9	95.6	95.6	SUPK
62858	Rockville	115	WC	Stearns	218	36.8	122.6	97.3	97.3	SUPK
60154	Sauk River	115	WC	Stearns	218	35.8	175.2	97.3	97.3	SUPK
62268	Langola Tap	115	WC	Benton	0	35.5	104.3	107.8	104.3	SUOP
63219	Grant County	115	WC	Grant	60	38.9	137.2	104.5	104.5	SUPK
60156	Paynesville	115	WC	Stearns	218	38.5	229.3	105.5	105.5	SUPK
62297	Benton County	69	WC	Benton	0	35.2	112.3	120.3	112.3	SUOP
61954	Redwood Falls Tap	115	WC	Renville	85	36.2	113.5	127.1	113.5	SUOP
62751	Lake Mina	115	WC	Douglas	100	39.6	113.9	145.9	113.9	SUOP
60001	Sherburne Cty Gen 2	24	WC	Sherburne	120	36.0	201.4	125.6	125.6	SUPK
62427	Willmar	69	WC	Kandiyohi	300	37.0	126.7	133.8	126.7	SUOP
63222	Alexandria S66	115	WC	Douglas	100	37.9	128.6	127.4	127.4	SUPK
63221	Brandon	115	WC	Douglas	100	39.8	129.2	161.5	129.2	SUOP
67461	Alexandria South Municipal	115	WC	Douglas	100	39.2	132.6	131.5	131.5	SUPK
67452	Alexandria 115kV	115	WC	Douglas	100	39.6	133.4	132.3	132.3	SUPK
67453	Alexandria Southwest	115	WC	Douglas	100	39.2	133.4	132.3	132.3	SUPK
67454	Alexandria	115	WC	Douglas	100	38.8	134.3	133.2	133.2	SUPK
67471	Alexandria Tap	115	WC	Douglas	100	38.9	134.5	133.4	133.4	SUPK
62615	Swan Lake	115	WC	Meeker	240	36.8	141.6	141.6	141.6	EQUAL
60760	Paynesville	69	WC	Stearns	218	38.5	144.4	148.5	144.4	SUOP
63220	Elbow Lake	115	WC	Grant	60	39.0	149.7	180.5	149.7	SUOP
62616	Big Swan	115	WC	Meeker	240	36.7	214.5	164.7	164.7	SUPK
62982	Hutch MN	115	WC	McLeod	0	37.2	179.2	195.2	179.2	SUOP

Appendix C - Screening Steps

WC Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62983	Hutchinson 3M	115	WC	McLeod	0	37.1	180.7	185.9	180.7	SUOP
60143	Benton County	115	WC	Benton	0	35.4	207.7	313.1	207.7	SUOP
60348	Benton County Tap	115	WC	Benton	0	36.1	208.0	335.6	208	SUOP
60347	Mayhew Lake 115 kV	115	WC	Benton	0	35.9	208.0	240.9	208	SUOP
60161	St Regis 115 kV	115	WC	Benton	0	35.8	208.0	282.7	208	SUOP
60165	M.E. International	115	WC	Stearns	218	35.1	208.3	235.5	208.3	SUOP
60148	Minnesota Valley	115	WC	Chippewa	0	37.2	266.5	352.6	266.5	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
61942	10thStreet	69	SW	Martin	188	37.5	-646.8	93.7
34216	Adrian	69	SW	Nobles	278	40.1	-101.8	25.4
62719	Adrian	69	SW	Nobles	278	40.1	-105.1	26.2
34269	Adrian T	69	SW	Nobles	278	39.9	-105.1	26.2
62068	Albin	69	SW	Brown	50	37.3	-373.0	-120.7
62069	Albion Junction	69	SW	Brown	50	37.1	-494.4	-117.6
34232	Bat Lake	69	SW	Cottonwood	451	41.4	-279.0	41.1
34276	Bingham Lake	69	SW	Cottonwood	451	41.4	-302.7	44.6
62797	Bingham Lake	69	SW	Cottonwood	451	41.2	-302.7	44.0
62724	Bloom	24	SW	Nobles	278	42.1	-463.4	-3.1
62709	Brewster Plant 1	161	SW	Jackson	630	40.2	-444.2	-9.0
62733	Brookville	69	SW	Redwood	120	37.4	-502.3	11.4
62354	Buffalo Lake Tap	69	SW	Martin	188	37.8	-652.5	72.9
60279	Buffalo Ridge	115	SW	Lincoln	320	44.3	-39.5	184.9
60708	Buffalo Ridge	34.5	SW	Lincoln	320	44.5	-88.7	123.0
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1
60935	Butterfield	69	SW	Watonwan	225	39.4	-619.9	20.0
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4
62358	Ceylon	69	SW	Martin	188	37.9	-252.9	36.9
62367	Ceylon Tap	69	SW	Martin	188	38.3	-252.9	42.8
60362	Chanarambie	115	SW	Pipestone	20	41.6	-399.3	-14.2
60715	Chanarambie	34.5	SW	Pipestone	20	41.7	-399.3	-14.2
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
62377	Christopher Wind	69	SW	Jackson	630	40.0	-903.1	41.4
61936	City of Fairmont	69	SW	Martin	188	37.2	-646.8	56.0
34235	City of Lakefield	69	SW	Jackson	630	41.1	-933.8	73.1
60701	City of Madelia	69	SW	Watonwan	225	37.4	-275.5	-104.7
60722	City of Sleepy Eye	69	SW	Brown	50	37.1	-35.1	-42.1
34248	City of Truman	69	SW	Martin	188	38.0	-676.2	-126.7
62074	Cobden	69	SW	Brown	50	37.0	-478.5	11.4
62063	Cobden Ethanol	69	SW	Brown	50	37.4	-478.5	11.4
34230	Comfrey	69	SW	Cottonwood	451	39.3	-472.5	37.4
62734	Cottonwood	69	SW	Redwood	120	38.1	-615.4	0.2
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5
60067	Dan Juhl	34.5	SW	Rock	80	38.3	-332.7	13.3
60370	Dan Juhl	161	SW	Rock	80	38.3	-332.7	190.1
60860	Dell Rapids	69	SW	Pipestone	20	41.8	-39.0	27.4
62065	Dotson	69	SW	Brown	50	37.7	-465.4	37.0
34240	Dotson Corners	69	SW	Brown	50	38.0	-460.8	39.0
34221	Dovary	69	SW	Murray	200	42.0	-903.1	49.9
62362	Dunnell	69	SW	Martin	188	38.9	-449.6	37.1
62356	East Chain	69	SW	Martin	188	37.6	-252.9	42.8
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6
62806	Echols	69	SW	Watonwan	225	39.3	-280.3	17.7
62083	Eden	69	SW	Brown	50	37.5	-37.2	-29.9
62073	Eden Tap	69	SW	Redwood	120	37.7	-37.2	-29.9
34223	Elk	69	SW	Nobles	278	40.9	-183.5	-3.1
34004	Elk S113	161	SW	Nobles	278	40.9	-183.5	-7.3
62712	Ellsborough	115	SW	Murray	200	42.6	-37.2	204.2
62366	Enterprise	69	SW	Jackson	630	40.3	-903.1	38.2
62365	Enterprise SS	69	SW	Jackson	630	39.5	-903.1	36.2
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1
60721	Essig	69	SW	Brown	50	37.3	-33.6	31.9
60369	Fenton	115	SW	Murray	200	43.0	-330.8	754.5
60393	Fenton	34.5	SW	Murray	200	43.3	-330.8	138.0
34008	Fox Lake	161	SW	Martin	188	38.3	-286.6	315.1
34012	Fox Lake	69	SW	Martin	188	38.3	-252.9	81.2

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
34271	Fox Lake Generator 1	13.8	SW	Martin	188	38.5	-252.9	9.3
34272	Fox Lake Generator 2	13.8	SW	Martin	188	38.3	-252.9	9.3
34011	Fox Lake Generator 3	13.8	SW	Martin	188	38.3	-286.6	54.1
34283	Fox Lake Generator 4	13.8	SW	Martin	188	38.6	-252.9	21.4
62359	Fox Lake SS	69	SW	Martin	188	38.4	-252.9	41.2
34219	Fulda	69	SW	Nobles	278	40.4	-463.4	-3.1
34220	Fulda	69	SW	Murray	200	40.6	-903.1	49.9
34297	Fulda	24	SW	Nobles	278	40.4	-463.4	-3.1
62717	Fulda	69	SW	Nobles	278	40.4	-462.3	-3.1
63459	G375_WF8	69	SW	Cottonwood	451	40.1	-264.9	39.0
63460	G375_WF9 _1	34.5	SW	Cottonwood	451	40.4	-264.9	20.0
63461	G375_WFG _1	0.80	SW	Cottonwood	451	40.4	-264.9	20.0
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0
34252	Hanska	69	SW	Watonwan	225	37.5	-273.1	-113.5
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4
62372	Harvest States Bank 1	69	SW	Martin	188	38.3	-656.5	72.9
62375	Harvest States Tap	69	SW	Martin	188	38.4	-663.1	90.2
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2
33973	Heron Lake	69	SW	Jackson	630	39.8	-872.9	60.2
34005	Heron Lake	161	SW	Jackson	630	39.2	-375.1	211.0
34225	Heron Lake	69	SW	Jackson	630	39.6	-903.1	98.7
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6
62082	Home	69	SW	Brown	50	37.4	-34.2	31.7
62080	Home Tap	69	SW	Brown	50	37.4	-34.2	31.7
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0
67470	Jackson	161	SW	Jackson	630	40.1	-165.3	327.4
34246	Jackson City #1	69	SW	Jackson	630	39.6	-903.1	11.7
34242	Jackson City #2	69	SW	Jackson	630	39.7	-903.1	36.2
62790	Jeffers	69	SW	Cottonwood	451	42.4	-711.8	-0.7
62791	Jeffers	69	SW	Cottonwood	451	42.4	-711.8	-0.7
62730	Johnsonville	69	SW	Redwood	120	37.9	-609.9	0.2
34274	Johnsonville Tap	69	SW	Redwood	120	37.9	-609.9	0.2
34247	Kenneth	24	SW	Rock	80	39.4	-133.8	8.6
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9
60119	Lake Yankton	115	SW	Lyon	500	41.9	-39.1	447.0
60853	Lake Yankton	69	SW	Lyon	500	42.1	-39.1	16.0
34007	Lakefield	161	SW	Jackson	630	41.3	-151.0	326.0
34241	Lakefield	69	SW	Jackson	630	41.1	-1089.4	73.2
60331	Lakefield Generation	345	SW	Martin	188	39.7	-305.6	-101.4
63011	Lakefield Generator Station 31G	13.8	SW	Martin	188	39.3	-305.6	-101.4
63012	Lakefield Generator Station 32G	13.8	SW	Martin	188	39.4	-305.6	-101.4
63013	Lakefield Generator Station 33G	13.8	SW	Martin	188	39.4	-305.6	-101.4
63014	Lakefield Generator Station 34G	13.8	SW	Martin	188	39.4	-305.6	-101.4
63015	Lakefield Generator Station 35G	13.8	SW	Martin	188	39.7	-305.6	-101.4
63016	Lakefield Generator Station 36G	13.8	SW	Martin	188	39.7	-305.6	-101.4
34006	Lakefield Junction	345	SW	Jackson	630	41.3	-261.1	490.9
62788	Lakeside Ethanol Plant	69	SW	Cottonwood	451	40.7	-345.5	51.0
62798	Lakeside Tap	69	SW	Cottonwood	451	41.0	-345.5	51.0
34227	Lamberton	69	SW	Redwood	120	38.3	-632.0	0.2
62066	Leavenworth	69	SW	Brown	50	37.6	-988.8	-125.0
34250	Lewisville	69	SW	Watonwan	225	38.0	-726.3	-119.8
62789	Lewisville (Truman)	69	SW	Watonwan	225	38.1	-705.2	-122.5
62799	Lewisville Tap	69	SW	Watonwan	225	38.1	-705.2	-122.5

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All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
62084	Linden	69	SW	Brown	50	37.4	-711.8	-114.8
34304	Lismore	24	SW	Nobles	278	41.2	-133.8	7.4
62723	Lismore	24	SW	Nobles	278	41.0	-133.8	9.4
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9
34251	Madelia	69	SW	Watonwan	225	37.4	-268.5	-112.1
62802	Madelia	69	SW	Watonwan	225	37.4	-268.5	-112.1
34003	Magnolia	161	SW	Rock	80	38.6	-216.4	32.1
34215	Magnolia	69	SW	Rock	80	38.2	-133.8	23.4
34239	Magnolia	24	SW	Rock	80	38.7	-133.8	8.6
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2
62364	Middletown	69	SW	Jackson	630	39.4	-455.2	41.0
62363	Middletown Tap	69	SW	Jackson	630	39.3	-455.2	37.1
34268	Midway	69	SW	Cottonwood	451	40.4	-609.6	31.8
62355	Miloma	69	SW	Jackson	630	39.4	-903.1	42.8
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6
62357	Minneota	69	SW	Jackson	630	39.4	-903.1	37.4
62376	Minneota Tap	69	SW	Jackson	630	39.7	-903.1	37.4
60723	Morgan	69	SW	Redwood	120	37.6	-37.0	-30.5
34231	Mountain Lake	69	SW	Cottonwood	451	39.7	-619.9	31.3
34281	Mountain Lake	69	SW	Cottonwood	451	40.3	-609.6	31.8
62796	Mountain Lake	69	SW	Cottonwood	451	39.9	-609.6	31.8
60284	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2

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All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
60720	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2
60939	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2
60940	New Ulm	69	SW	Brown	50	36.6	-33.1	51.4
60941	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2
62081	New Ulm	69	SW	Brown	50	36.6	-33.0	49.1
60286	Nobles	345	SW	Nobles	278	42.3	-299.3	673.3
60287	Nobles	115	SW	Nobles	278	41.7	-308.1	695.9
62800	North Storden	69	SW	Cottonwood	451	40.7	-681.4	-0.7
62792	Odin	69	SW	Watonwan	225	39.7	-273.4	12.3
62793	Odin Tap	69	SW	Watonwan	225	39.1	-273.4	14.6
60123	Pipestone	115	SW	Pipestone	20	41.7	-38.0	-6.7
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3
60065	Pipestone West	34.5	SW	Pipestone	20	41.7	-39.0	27.4
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8
62735	Redwood	69	SW	Redwood	120	37.7	-489.0	-37.7
61958	Redwood Falls	69	SW	Redwood	120	37.1	-487.2	-36.3
60771	Redwood Falls Tap	69	SW	Redwood	120	37.6	-487.2	-36.3
62727	RIVER 8 _1 Not in Model	69	SW	Murray	200	40.7	-903.1	49.5
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8
62369	Round Lake	69	SW	Jackson	630	40.2	-903.1	40.7
62368	Round Lake SS	69	SW	Jackson	630	40.3	-903.1	40.7
62718	Rushmore SS	69	SW	Nobles	278	41.2	-79.0	6.8
34273	Rushmore T	69	SW	Nobles	278	41.6	-87.6	21.7
61932	Rutland	161	SW	Martin	188	37.8	-718.6	231.4
61934	Rutland	69	SW	Martin	188	37.8	-624.4	86.5
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7
62064	Searles	69	SW	Brown	50	36.8	-494.4	-117.6
62067	Searles Junction	69	SW	Brown	50	36.8	-33.0	48.9
60937	Searles Junction doesn't match 1lines	115	SW	Brown	50	36.8	-397.8	98.0
62070	Searles Tap	69	SW	Brown	50	37.0	-494.4	-117.6
34244	Sherburn	69	SW	Martin	188	38.6	-255.1	20.9
62795	Sherburn (Fox Lake)	69	SW	Martin	188	38.9	-258.4	18.6

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All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
62736	Sheridan	69	SW	Redwood	120	37.8	-39.7	31.3
62737	Sheridan Tap	69	SW	Redwood	120	38.0	-491.0	26.1
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8
62072	Sleepy Eye	69	SW	Brown	50	37.4	-34.8	-40.1
62071	Sleepy Eye Junction	69	SW	Brown	50	37.3	-35.1	-42.1
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8
62801	South Storden	69	SW	Cottonwood	451	41.4	-771.2	0.3
34229	Springfield	69	SW	Brown	50	37.6	-478.5	11.4
60716	St James East	69	SW	Watonwan	225	37.8	-279.5	-119.3
60709	St. James	69	SW	Watonwan	225	38.0	-282.2	-121.2
62805	St. James Mun	69	SW	Watonwan	225	38.2	-284.3	-122.6
60809	St. James SW	69	SW	Watonwan	225	38.2	-282.6	-121.4
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8
34226	Storden Junction	69	SW	Cottonwood	451	42.3	-721.2	-0.7
62732	Sundown	69	SW	Redwood	120	37.5	-529.8	11.4
62803	Sveadahl	69	SW	Watonwan	225	38.6	-488.7	18.8
62804	Sveadahl Tap	69	SW	Watonwan	225	39.0	-488.7	18.8
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7
34243	Trimont	69	SW	Martin	188	38.8	-266.1	16.9
62794	Trimont	69	SW	Martin	188	39.0	-265.8	14.6
63090	Trimont Wind	34.5	SW	Martin	188	39.6	-305.6	-101.4
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4
34249	Truman	69	SW	Martin	188	37.8	-685.3	-125.3
62373	Truman	69	SW	Martin	188	38.1	-649.6	38.7
34280	Truman Tap	69	SW	Martin	188	38.1	-649.6	38.7
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0
34228	Walbaso	69	SW	Redwood	120	38.1	-609.9	0.2
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1
62731	Wanda	69	SW	Redwood	120	38.0	-573.2	1.2
60934	Watonwan Junction	69	SW	Watonwan	225	38.6	-290.4	17.7
34275	Welcome	69	SW	Martin	188	38.7	-698.0	66.8
62374	Welcome	69	SW	Martin	188	38.7	-698.0	48.5

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All SW Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC
62370	West Lakefield	69	SW	Jackson	630	39.9	-903.1	41.4
62371	West Lakefield Tap	69	SW	Jackson	630	40.0	-903.1	41.4
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1
34222	Westbrook	69	SW	Cottonwood	451	41.0	-903.1	28.9
34224	Westbrook	69	SW	Cottonwood	451	41.1	-903.1	37.4
34236	Westbrook	69	SW	Cottonwood	451	41.1	-903.1	39.5
62726	Westside	69	SW	Cottonwood	451	41.1	-903.1	37.4
62361	Wilbert	69	SW	Martin	188	38.1	-252.9	42.8
34234	Wilder	69	SW	Jackson	630	40.3	-632.4	53.2
62360	Wilder	69	SW	Jackson	630	40.3	-632.4	33.1
33972	Wilder Junction	69	SW	Jackson	630	40.7	-574.6	69.0
34282	Wilmont	24	SW	Nobles	278	42.4	-133.8	6.8
34237	Windom	69	SW	Jackson	630	39.9	-402.4	51.0
34233	Windom Mun	69	SW	Jackson	630	39.9	-492.7	70.6
34238	Windom SW	69	SW	Jackson	630	40.1	-492.7	72.8
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8
62721	Wirthington Tap	69	SW	Nobles	278	40.4	-183.5	-3.1
62722	Wirthington Tap	69	SW	Nobles	278	40.9	-183.5	36.1
60396	Wolf Wind	69	SW	Nobles	278	41.1	-79.9	6.9
34218	Worthington	69	SW	Nobles	278	40.8	-183.5	66.3
34245	Worthington	69	SW	Nobles	278	40.7	-183.5	-3.1
62720	Worthington	69	SW	Nobles	278	40.5	-183.5	-3.1
34217	Worthington #1	69	SW	Nobles	278	41.0	-183.5	36.1
62725	Worthington East Tap	69	SW	Nobles	278	40.4	-183.5	-3.1
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
34241	Lakefield	69	SW	Jackson	630	41.1	-1089.4	73.2	-1089.4	SUOP
62066	Leavenworth	69	SW	Brown	50	37.6	-988.8	-125.0	-988.8	SUOP
34235	City of Lakefield	69	SW	Jackson	630	41.1	-933.8	73.1	-933.8	SUOP
34220	Fulda	69	SW	Murray	200	40.6	-903.1	49.9	-903.1	SUOP
34221	Dovary	69	SW	Murray	200	42.0	-903.1	49.9	-903.1	SUOP
34222	Westbrook	69	SW	Cottonwood	451	41.0	-903.1	28.9	-903.1	SUOP
34224	Westbrook	69	SW	Cottonwood	451	41.1	-903.1	37.4	-903.1	SUOP
34225	Heron Lake	69	SW	Jackson	630	39.6	-903.1	98.7	-903.1	SUOP
34236	Westbrook	69	SW	Cottonwood	451	41.1	-903.1	39.5	-903.1	SUOP
34242	Jackson City #2	69	SW	Jackson	630	39.7	-903.1	36.2	-903.1	SUOP
34246	Jackson City #1	69	SW	Jackson	630	39.6	-903.1	11.7	-903.1	SUOP
62355	Miloma	69	SW	Jackson	630	39.4	-903.1	42.8	-903.1	SUOP
62357	Minneota	69	SW	Jackson	630	39.4	-903.1	37.4	-903.1	SUOP
62365	Enterprise SS	69	SW	Jackson	630	39.5	-903.1	36.2	-903.1	SUOP
62366	Enterprise	69	SW	Jackson	630	40.3	-903.1	38.2	-903.1	SUOP
62368	Round Lake SS	69	SW	Jackson	630	40.3	-903.1	40.7	-903.1	SUOP
62369	Round Lake	69	SW	Jackson	630	40.2	-903.1	40.7	-903.1	SUOP
62370	West Lakefield	69	SW	Jackson	630	39.9	-903.1	41.4	-903.1	SUOP
62371	West Lakefield Tap	69	SW	Jackson	630	40.0	-903.1	41.4	-903.1	SUOP
62376	Minneota Tap	69	SW	Jackson	630	39.7	-903.1	37.4	-903.1	SUOP
62377	Christopher Wind	69	SW	Jackson	630	40.0	-903.1	41.4	-903.1	SUOP
62726	Westside	69	SW	Cottonwood	451	41.1	-903.1	37.4	-903.1	SUOP
62727	RIVER 8 _1 Not in Model	69	SW	Murray	200	40.7	-903.1	49.5	-903.1	SUOP
33973	Heron Lake	69	SW	Jackson	630	39.8	-872.9	60.2	-872.9	SUOP
62801	South Storden	69	SW	Cottonwood	451	41.4	-771.2	0.3	-771.2	SUOP
34250	Lewisville	69	SW	Watonwan	225	38.0	-726.3	-119.8	-726.3	SUOP
34226	Storden Junction	69	SW	Cottonwood	451	42.3	-721.2	-0.7	-721.2	SUOP
61932	Rutland	161	SW	Martin	188	37.8	-718.6	231.4	-718.6	SUOP
62084	Linden	69	SW	Brown	50	37.4	-711.8	-114.8	-711.8	SUOP
62790	Jeffers	69	SW	Cottonwood	451	42.4	-711.8	-0.7	-711.8	SUOP
62791	Jeffers	69	SW	Cottonwood	451	42.4	-711.8	-0.7	-711.8	SUOP
62789	Lewisville (Truman)	69	SW	Watonwan	225	38.1	-705.2	-122.5	-705.2	SUOP
62799	Lewisville Tap	69	SW	Watonwan	225	38.1	-705.2	-122.5	-705.2	SUOP
34275	Welcome	69	SW	Martin	188	38.7	-698.0	66.8	-698	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62374	Welcome	69	SW	Martin	188	38.7	-698.0	48.5	-698	SUOP
34249	Truman	69	SW	Martin	188	37.8	-685.3	-125.3	-685.3	SUOP
62800	North Storden	69	SW	Cottonwood	451	40.7	-681.4	-0.7	-681.4	SUOP
34248	City of Truman	69	SW	Martin	188	38.0	-676.2	-126.7	-676.2	SUOP
62375	Harvest States Tap	69	SW	Martin	188	38.4	-663.1	90.2	-663.1	SUOP
62372	Harvest States Bank 1	69	SW	Martin	188	38.3	-656.5	72.9	-656.5	SUOP
62354	Buffalo Lake Tap	69	SW	Martin	188	37.8	-652.5	72.9	-652.5	SUOP
34280	Truman Tap	69	SW	Martin	188	38.1	-649.6	38.7	-649.6	SUOP
62373	Truman	69	SW	Martin	188	38.1	-649.6	38.7	-649.6	SUOP
61936	City of Fairmont	69	SW	Martin	188	37.2	-646.8	56.0	-646.8	SUOP
61942	10thStreet	69	SW	Martin	188	37.5	-646.8	93.7	-646.8	SUOP
34234	Wilder	69	SW	Jackson	630	40.3	-632.4	53.2	-632.4	SUOP
62360	Wilder	69	SW	Jackson	630	40.3	-632.4	33.1	-632.4	SUOP
34227	Lamberton	69	SW	Redwood	120	38.3	-632.0	0.2	-632	SUOP
61934	Rutland	69	SW	Martin	188	37.8	-624.4	86.5	-624.4	SUOP
34231	Mountain Lake	69	SW	Cottonwood	451	39.7	-619.9	31.3	-619.9	SUOP
60935	Butterfield	69	SW	Watonwan	225	39.4	-619.9	20.0	-619.9	SUOP
62734	Cottonwood	69	SW	Redwood	120	38.1	-615.4	0.2	-615.4	SUOP
34228	Walbaso	69	SW	Redwood	120	38.1	-609.9	0.2	-609.9	SUOP
34274	Johnsonville Tap	69	SW	Redwood	120	37.9	-609.9	0.2	-609.9	SUOP
62730	Johnsonville	69	SW	Redwood	120	37.9	-609.9	0.2	-609.9	SUOP
34268	Midway	69	SW	Cottonwood	451	40.4	-609.6	31.8	-609.6	SUOP
34281	Mountain Lake	69	SW	Cottonwood	451	40.3	-609.6	31.8	-609.6	SUOP
62796	Mountain Lake	69	SW	Cottonwood	451	39.9	-609.6	31.8	-609.6	SUOP
33972	Wilder Junction	69	SW	Jackson	630	40.7	-574.6	69.0	-574.6	SUOP
62731	Wanda	69	SW	Redwood	120	38.0	-573.2	1.2	-573.2	SUOP
62732	Sundown	69	SW	Redwood	120	37.5	-529.8	11.4	-529.8	SUOP
62733	Brookville	69	SW	Redwood	120	37.4	-502.3	11.4	-502.3	SUOP
62064	Searles	69	SW	Brown	50	36.8	-494.4	-117.6	-494.4	SUOP
62069	Albion Junction	69	SW	Brown	50	37.1	-494.4	-117.6	-494.4	SUOP
62070	Searles Tap	69	SW	Brown	50	37.0	-494.4	-117.6	-494.4	SUOP
34233	Windom Mun	69	SW	Jackson	630	39.9	-492.7	70.6	-492.7	SUOP
34238	Windom SW	69	SW	Jackson	630	40.1	-492.7	72.8	-492.7	SUOP
62737	Sheridan Tap	69	SW	Redwood	120	38.0	-491.0	26.1	-491	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62735	Redwood	69	SW	Redwood	120	37.7	-489.0	-37.7	-489	SUOP
62803	Sveadahl	69	SW	Watonwan	225	38.6	-488.7	18.8	-488.7	SUOP
62804	Sveadahl Tap	69	SW	Watonwan	225	39.0	-488.7	18.8	-488.7	SUOP
60771	Redwood Falls Tap	69	SW	Redwood	120	37.6	-487.2	-36.3	-487.2	SUOP
61958	Redwood Falls	69	SW	Redwood	120	37.1	-487.2	-36.3	-487.2	SUOP
34229	Springfield	69	SW	Brown	50	37.6	-478.5	11.4	-478.5	SUOP
62063	Cobden Ethanol	69	SW	Brown	50	37.4	-478.5	11.4	-478.5	SUOP
62074	Cobden	69	SW	Brown	50	37.0	-478.5	11.4	-478.5	SUOP
34230	Comfrey	69	SW	Cottonwood	451	39.3	-472.5	37.4	-472.5	SUOP
62065	Dotson	69	SW	Brown	50	37.7	-465.4	37.0	-465.4	SUOP
34219	Fulda	69	SW	Nobles	278	40.4	-463.4	-3.1	-463.4	SUOP
34297	Fulda	24	SW	Nobles	278	40.4	-463.4	-3.1	-463.4	SUOP
62724	Bloom	24	SW	Nobles	278	42.1	-463.4	-3.1	-463.4	SUOP
62717	Fulda	69	SW	Nobles	278	40.4	-462.3	-3.1	-462.3	SUOP
34240	Dotson Corners	69	SW	Brown	50	38.0	-460.8	39.0	-460.8	SUOP
62363	Middletown Tap	69	SW	Jackson	630	39.3	-455.2	37.1	-455.2	SUOP
62364	Middletown	69	SW	Jackson	630	39.4	-455.2	41.0	-455.2	SUOP
62362	Dunnell	69	SW	Martin	188	38.9	-449.6	37.1	-449.6	SUOP
62709	Brewster Plant 1	161	SW	Jackson	630	40.2	-444.2	-9.0	-444.2	SUOP
34237	Windom	69	SW	Jackson	630	39.9	-402.4	51.0	-402.4	SUOP
60362	Chanarambie	115	SW	Pipestone	20	41.6	-399.3	-14.2	-399.3	SUOP
60715	Chanarambie	34.5	SW	Pipestone	20	41.7	-399.3	-14.2	-399.3	SUOP
60937	Searles Junction doesn't match 1lines	115	SW	Brown	50	36.8	-397.8	98.0	-397.8	SUOP
34005	Heron Lake	161	SW	Jackson	630	39.2	-375.1	211.0	-375.1	SUOP
62068	Albin	69	SW	Brown	50	37.3	-373.0	-120.7	-373	SUOP
62788	Lakeside Ethanol Plant	69	SW	Cottonwood	451	40.7	-345.5	51.0	-345.5	SUOP
62798	Lakeside Tap	69	SW	Cottonwood	451	41.0	-345.5	51.0	-345.5	SUOP
60067	Dan Juhl	34.5	SW	Rock	80	38.3	-332.7	13.3	-332.7	SUOP
60370	Dan Juhl	161	SW	Rock	80	38.3	-332.7	190.1	-332.7	SUOP
60369	Fenton	115	SW	Murray	200	43.0	-330.8	754.5	-330.8	SUOP
60393	Fenton	34.5	SW	Murray	200	43.3	-330.8	138.0	-330.8	SUOP
60287	Nobles	115	SW	Nobles	278	41.7	-308.1	695.9	-308.1	SUOP
60331	Lakefield Generation	345	SW	Martin	188	39.7	-305.6	-101.4	-305.6	SUOP
63011	Lakefield Generator Station 31G	13.8	SW	Martin	188	39.3	-305.6	-101.4	-305.6	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
63012	Lakefield Generator Station 32G	13.8	SW	Martin	188	39.4	-305.6	-101.4	-305.6	SUOP
63013	Lakefield Generator Station 33G	13.8	SW	Martin	188	39.4	-305.6	-101.4	-305.6	SUOP
63014	Lakefield Generator Station 34G	13.8	SW	Martin	188	39.4	-305.6	-101.4	-305.6	SUOP
63015	Lakefield Generator Station 35G	13.8	SW	Martin	188	39.7	-305.6	-101.4	-305.6	SUOP
63016	Lakefield Generator Station 36G	13.8	SW	Martin	188	39.7	-305.6	-101.4	-305.6	SUOP
63090	Trimont Wind	34.5	SW	Martin	188	39.6	-305.6	-101.4	-305.6	SUOP
34276	Bingham Lake	69	SW	Cottonwood	451	41.4	-302.7	44.6	-302.7	SUOP
62797	Bingham Lake	69	SW	Cottonwood	451	41.2	-302.7	44.0	-302.7	SUOP
60286	Nobles	345	SW	Nobles	278	42.3	-299.3	673.3	-299.3	SUOP
60934	Watonwan Junction	69	SW	Watonwan	225	38.6	-290.4	17.7	-290.4	SUOP
34008	Fox Lake	161	SW	Martin	188	38.3	-286.6	315.1	-286.6	SUOP
34011	Fox Lake Generator 3	13.8	SW	Martin	188	38.3	-286.6	54.1	-286.6	SUOP
62805	St. James Mun	69	SW	Watonwan	225	38.2	-284.3	-122.6	-284.3	SUOP
60809	St. James SW	69	SW	Watonwan	225	38.2	-282.6	-121.4	-282.6	SUOP
60709	St. James	69	SW	Watonwan	225	38.0	-282.2	-121.2	-282.2	SUOP
62806	Echols	69	SW	Watonwan	225	39.3	-280.3	17.7	-280.3	SUOP
60716	St James East	69	SW	Watonwan	225	37.8	-279.5	-119.3	-279.5	SUOP
34232	Bat Lake	69	SW	Cottonwood	451	41.4	-279.0	41.1	-279	SUOP
60701	City of Madelia	69	SW	Watonwan	225	37.4	-275.5	-104.7	-275.5	SUOP
62792	Odin	69	SW	Watonwan	225	39.7	-273.4	12.3	-273.4	SUOP
62793	Odin Tap	69	SW	Watonwan	225	39.1	-273.4	14.6	-273.4	SUOP
34252	Hanska	69	SW	Watonwan	225	37.5	-273.1	-113.5	-273.1	SUOP
34251	Madelia	69	SW	Watonwan	225	37.4	-268.5	-112.1	-268.5	SUOP
62802	Madelia	69	SW	Watonwan	225	37.4	-268.5	-112.1	-268.5	SUOP
34243	Trimont	69	SW	Martin	188	38.8	-266.1	16.9	-266.1	SUOP
62794	Trimont	69	SW	Martin	188	39.0	-265.8	14.6	-265.8	SUOP
63459	G375_WF8	69	SW	Cottonwood	451	40.1	-264.9	39.0	-264.9	SUOP
63460	G375_WF9 _1	34.5	SW	Cottonwood	451	40.4	-264.9	20.0	-264.9	SUOP
63461	G375_WFG _1	0.80	SW	Cottonwood	451	40.4	-264.9	20.0	-264.9	SUOP
34006	Lakefield Junction	345	SW	Jackson	630	41.3	-261.1	490.9	-261.1	SUOP
62795	Sherburn (Fox Lake)	69	SW	Martin	188	38.9	-258.4	18.6	-258.4	SUOP
34244	Sherburn	69	SW	Martin	188	38.6	-255.1	20.9	-255.1	SUOP
34012	Fox Lake	69	SW	Martin	188	38.3	-252.9	81.2	-252.9	SUOP
34271	Fox Lake Generator 1	13.8	SW	Martin	188	38.5	-252.9	9.3	-252.9	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
34272	Fox Lake Generator 2	13.8	SW	Martin	188	38.3	-252.9	9.3	-252.9	SUOP
34283	Fox Lake Generator 4	13.8	SW	Martin	188	38.6	-252.9	21.4	-252.9	SUOP
62356	East Chain	69	SW	Martin	188	37.6	-252.9	42.8	-252.9	SUOP
62358	Ceylon	69	SW	Martin	188	37.9	-252.9	36.9	-252.9	SUOP
62359	Fox Lake SS	69	SW	Martin	188	38.4	-252.9	41.2	-252.9	SUOP
62361	Wilbert	69	SW	Martin	188	38.1	-252.9	42.8	-252.9	SUOP
62367	Ceylon Tap	69	SW	Martin	188	38.3	-252.9	42.8	-252.9	SUOP
34003	Magnolia	161	SW	Rock	80	38.6	-216.4	32.1	-216.4	SUOP
34004	Elk S113	161	SW	Nobles	278	40.9	-183.5	-7.3	-183.5	SUOP
34217	Worthington #1	69	SW	Nobles	278	41.0	-183.5	36.1	-183.5	SUOP
34218	Worthington	69	SW	Nobles	278	40.8	-183.5	66.3	-183.5	SUOP
34223	Elk	69	SW	Nobles	278	40.9	-183.5	-3.1	-183.5	SUOP
34245	Worthington	69	SW	Nobles	278	40.7	-183.5	-3.1	-183.5	SUOP
62720	Worthington	69	SW	Nobles	278	40.5	-183.5	-3.1	-183.5	SUOP
62721	Wirthington Tap	69	SW	Nobles	278	40.4	-183.5	-3.1	-183.5	SUOP
62722	Wirthington Tap	69	SW	Nobles	278	40.9	-183.5	36.1	-183.5	SUOP
62725	Worthington East Tap	69	SW	Nobles	278	40.4	-183.5	-3.1	-183.5	SUOP
67470	Jackson	161	SW	Jackson	630	40.1	-165.3	327.4	-165.3	SUOP
34007	Lakefield	161	SW	Jackson	630	41.3	-151.0	326.0	-151	SUOP
34215	Magnolia	69	SW	Rock	80	38.2	-133.8	23.4	-133.8	SUOP
34239	Magnolia	24	SW	Rock	80	38.7	-133.8	8.6	-133.8	SUOP
34247	Kenneth	24	SW	Rock	80	39.4	-133.8	8.6	-133.8	SUOP
34282	Wilmont	24	SW	Nobles	278	42.4	-133.8	6.8	-133.8	SUOP
34304	Lismore	24	SW	Nobles	278	41.2	-133.8	7.4	-133.8	SUOP
62723	Lismore	24	SW	Nobles	278	41.0	-133.8	9.4	-133.8	SUOP
34269	Adrian T	69	SW	Nobles	278	39.9	-105.1	26.2	-105.1	SUOP
62719	Adrian	69	SW	Nobles	278	40.1	-105.1	26.2	-105.1	SUOP
34216	Adrian	69	SW	Nobles	278	40.1	-101.8	25.4	-101.8	SUOP
60708	Buffalo Ridge	34.5	SW	Lincoln	320	44.5	-88.7	123.0	-88.7	SUOP
34273	Rushmore T	69	SW	Nobles	278	41.6	-87.6	21.7	-87.6	SUOP
60396	Wolf Wind	69	SW	Nobles	278	41.1	-79.9	6.9	-79.9	SUOP
62718	Rushmore SS	69	SW	Nobles	278	41.2	-79.0	6.8	-79	SUOP
60722	City of Sleepy Eye	69	SW	Brown	50	37.1	-35.1	-42.1	-42.1	SUPK
62071	Sleepy Eye Junction	69	SW	Brown	50	37.3	-35.1	-42.1	-42.1	SUPK

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62072	Sleepy Eye	69	SW	Brown	50	37.4	-34.8	-40.1	-40.1	SUPK
62736	Sheridan	69	SW	Redwood	120	37.8	-39.7	31.3	-39.7	SUOP
60279	Buffalo Ridge	115	SW	Lincoln	320	44.3	-39.5	184.9	-39.5	SUOP
60119	Lake Yankton	115	SW	Lyon	500	41.9	-39.1	447.0	-39.1	SUOP
60853	Lake Yankton	69	SW	Lyon	500	42.1	-39.1	16.0	-39.1	SUOP
60065	Pipestone West	34.5	SW	Pipestone	20	41.7	-39.0	27.4	-39	SUOP
60860	Dell Rapids	69	SW	Pipestone	20	41.8	-39.0	27.4	-39	SUOP
60123	Pipestone	115	SW	Pipestone	20	41.7	-38.0	-6.7	-38	SUOP
62073	Eden Tap	69	SW	Redwood	120	37.7	-37.2	-29.9	-37.2	SUOP
62083	Eden	69	SW	Brown	50	37.5	-37.2	-29.9	-37.2	SUOP
62712	Ellsborough	115	SW	Murray	200	42.6	-37.2	204.2	-37.2	SUOP
60723	Morgan	69	SW	Redwood	120	37.6	-37.0	-30.5	-37	SUOP
62080	Home Tap	69	SW	Brown	50	37.4	-34.2	31.7	-34.2	SUOP
62082	Home	69	SW	Brown	50	37.4	-34.2	31.7	-34.2	SUOP
60721	Essig	69	SW	Brown	50	37.3	-33.6	31.9	-33.6	SUOP
60284	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2	-33.2	SUOP
60720	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2	-33.2	SUOP
60939	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2	-33.2	SUOP
60941	New Ulm	69	SW	Brown	50	36.6	-33.2	53.2	-33.2	SUOP
60940	New Ulm	69	SW	Brown	50	36.6	-33.1	51.4	-33.1	SUOP
62067	Searles Junction	69	SW	Brown	50	36.8	-33.0	48.9	-33	SUOP
62081	New Ulm	69	SW	Brown	50	36.6	-33.0	49.1	-33	SUOP
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8	7.8	EQUAL
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8	7.9	SUOP
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6	7.9	SUOP
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8	7.9	SUOP
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8	7.9	SUOP
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8	7.9	SUOP
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8	7.9	SUOP
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6	7.9	SUOP
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2	8.1	SUOP
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3	8.6	SUOP
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9	9	SUOP
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4	9.5	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4	9.5	SUOP
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4	9.5	SUOP
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4	9.5	SUOP
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5	9.5	SUOP
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9	9.5	SUOP
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8	9.5	SUOP
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3	9.5	SUOP
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6	9.5	SUOP
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5	9.5	SUOP
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2	9.5	SUOP
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0	9.5	SUOP
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6	9.5	SUOP
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2	9.5	SUOP
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5	9.5	SUOP
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0	9.5	SUOP
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1	9.5	SUOP
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0	9.5	SUOP
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7	10.2	SUOP
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8	24.8	SUOP
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9	25.7	SUOP
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0	26.5	SUOP
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8	28.5	SUOP
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5	28.5	SUOP
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6	30.3	SUOP
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5	31.4	SUOP
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7	34.8	SUOP
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7	34.8	SUOP
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1	35.1	SUPK
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6	39.5	SUOP
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9	39.6	SUOP
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7	39.7	SUOP
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1	40.6	SUOP

Appendix C - Screening Steps

All SW Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1	40.6	SUOP
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1	40.7	SUOP
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4	42	SUOP
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5	45.5	SUPK
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0	56	EQUAL
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8	56.2	SUOP
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6	56.6	EQUAL
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3	59.8	SUOP
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3	59.8	SUOP
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4	59.8	SUOP
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4	59.8	SUOP
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3	59.8	SUOP
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9	75.4	SUOP
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0	81.4	SUOP
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0	86	EQUAL
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2	95.5	SUOP
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9	95.9	EQUAL
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7	105.5	SUOP
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0	107.3	SUOP
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1	111.1	SUOP
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1	113.5	SUOP
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1	113.5	SUOP
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8	130.3	SUOP
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9	147.9	EQUAL
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6	158.4	SUOP
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1	162	SUOP
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2	245.2	SUPK
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8	245.4	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8	7.8	EQUAL
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8	7.9	SUOP
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6	7.9	SUOP
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8	7.9	SUOP
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8	7.9	SUOP
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8	7.9	SUOP
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8	7.9	SUOP
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6	7.9	SUOP
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2	8.1	SUOP
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3	8.6	SUOP
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9	9	SUOP
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4	9.5	SUOP
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4	9.5	SUOP
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4	9.5	SUOP
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4	9.5	SUOP
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5	9.5	SUOP
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9	9.5	SUOP
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8	9.5	SUOP
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3	9.5	SUOP
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6	9.5	SUOP
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5	9.5	SUOP
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2	9.5	SUOP
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0	9.5	SUOP
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6	9.5	SUOP
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2	9.5	SUOP
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5	9.5	SUOP
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0	9.5	SUOP
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1	9.5	SUOP
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0	9.5	SUOP
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7	10.2	SUOP
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8	24.8	SUOP
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9	25.7	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0	26.5	SUOP
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8	28.5	SUOP
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5	28.5	SUOP
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6	30.3	SUOP
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5	31.4	SUOP
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7	34.8	SUOP
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7	34.8	SUOP
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1	35.1	SUPK
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6	39.5	SUOP
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9	39.6	SUOP
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7	39.7	SUOP
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1	40.6	SUOP
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1	40.6	SUOP
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1	40.7	SUOP
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4	42	SUOP
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5	45.5	SUPK
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0	56	EQUAL
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8	56.2	SUOP
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6	56.6	EQUAL
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3	59.8	SUOP
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3	59.8	SUOP
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4	59.8	SUOP
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4	59.8	SUOP
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3	59.8	SUOP
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9	75.4	SUOP
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0	81.4	SUOP
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0	86	EQUAL
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2	95.5	SUOP
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9	95.9	EQUAL
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7	105.5	SUOP
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0	107.3	SUOP
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1	111.1	SUOP
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1	113.5	SUOP
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1	113.5	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8	130.3	SUOP
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9	147.9	EQUAL
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6	158.4	SUOP
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1	162	SUOP
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2	245.2	SUPK
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8	245.4	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8	7.8	EQUAL
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8	7.9	SUOP
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8	7.9	SUOP
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8	7.9	SUOP
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6	7.9	SUOP
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8	7.9	SUOP
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8	7.9	SUOP
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6	7.9	SUOP
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2	8.1	SUOP
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3	8.6	SUOP
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9	9	SUOP
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0	9.5	SUOP
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4	9.5	SUOP
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6	9.5	SUOP
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1	9.5	SUOP
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4	9.5	SUOP
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9	9.5	SUOP
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5	9.5	SUOP
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6	9.5	SUOP
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3	9.5	SUOP
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8	9.5	SUOP
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5	9.5	SUOP
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5	9.5	SUOP
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4	9.5	SUOP
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0	9.5	SUOP
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4	9.5	SUOP
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2	9.5	SUOP
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2	9.5	SUOP
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0	9.5	SUOP
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7	10.2	SUOP
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8	24.8	SUOP
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9	25.7	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0	26.5	SUOP
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8	28.5	SUOP
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5	28.5	SUOP
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6	30.3	SUOP
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5	31.4	SUOP
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7	34.8	SUOP
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7	34.8	SUOP
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1	35.1	SUPK
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6	39.5	SUOP
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9	39.6	SUOP
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7	39.7	SUOP
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1	40.6	SUOP
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1	40.6	SUOP
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1	40.7	SUOP
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4	42	SUOP
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5	45.5	SUPK
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0	56	EQUAL
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8	56.2	SUOP
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6	56.6	EQUAL
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3	59.8	SUOP
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3	59.8	SUOP
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4	59.8	SUOP
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4	59.8	SUOP
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3	59.8	SUOP
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9	75.4	SUOP
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0	81.4	SUOP
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0	86	EQUAL
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2	95.5	SUOP
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9	95.9	EQUAL
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7	105.5	SUOP
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0	107.3	SUOP
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1	111.1	SUOP
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1	113.5	SUOP
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1	113.5	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8	130.3	SUOP
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9	147.9	EQUAL
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6	158.4	SUOP
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1	162	SUOP
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2	245.2	SUPK
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8	245.4	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8	7.8	EQUAL
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8	7.9	SUOP
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8	7.9	SUOP
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8	7.9	SUOP
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8	7.9	SUOP
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6	7.9	SUOP
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8	7.9	SUOP
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6	7.9	SUOP
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2	8.1	SUOP
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3	8.6	SUOP
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9	9	SUOP
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0	9.5	SUOP
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4	9.5	SUOP
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6	9.5	SUOP
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1	9.5	SUOP
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4	9.5	SUOP
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5	9.5	SUOP
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5	9.5	SUOP
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5	9.5	SUOP
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4	9.5	SUOP
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0	9.5	SUOP
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4	9.5	SUOP
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9	9.5	SUOP
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2	9.5	SUOP
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2	9.5	SUOP
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0	9.5	SUOP
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6	9.5	SUOP
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3	9.5	SUOP
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8	9.5	SUOP
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7	10.2	SUOP
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8	24.8	SUOP
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9	25.7	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0	26.5	SUOP
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8	28.5	SUOP
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5	28.5	SUOP
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6	30.3	SUOP
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5	31.4	SUOP
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7	34.8	SUOP
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7	34.8	SUOP
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1	35.1	SUPK
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6	39.5	SUOP
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9	39.6	SUOP
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7	39.7	SUOP
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1	40.6	SUOP
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1	40.6	SUOP
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1	40.7	SUOP
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4	42	SUOP
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5	45.5	SUPK
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0	56	EQUAL
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8	56.2	SUOP
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6	56.6	EQUAL
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4	59.8	SUOP
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3	59.8	SUOP
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3	59.8	SUOP
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3	59.8	SUOP
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4	59.8	SUOP
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9	75.4	SUOP
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0	81.4	SUOP
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0	86	EQUAL
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2	95.5	SUOP
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9	95.9	EQUAL
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7	105.5	SUOP
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0	107.3	SUOP
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1	111.1	SUOP
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1	113.5	SUOP
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1	113.5	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8	130.3	SUOP
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9	147.9	EQUAL
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6	158.4	SUOP
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1	162	SUOP
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2	245.2	SUPK
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8	245.4	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
7852	Green Valley #2	41.6	SW	Lyon	500	37.3	7.8	7.8	7.8	EQUAL
62710	Chandler	69	SW	Murray	200	43.4	7.9	25.6	7.9	SUOP
61191	South Ridge	69	SW	Murray	200	42.9	7.9	29.8	7.9	SUOP
60395	East Ridge	69	SW	Murray	200	42.8	7.9	25.6	7.9	SUOP
61190	Windstock Windfarm	69	SW	Pipestone	20	42.9	7.9	29.8	7.9	SUOP
60392	West Ridge	69	SW	Pipestone	20	41.6	7.9	29.8	7.9	SUOP
60859	Rock River	69	SW	Pipestone	20	40.2	7.9	29.8	7.9	SUOP
60852	Rock River	69	SW	Pipestone	20	40.1	7.9	29.8	7.9	SUOP
7853	Green Valley #1	41.6	SW	Lyon	500	37.2	8.1	8.2	8.1	SUOP
7854	Ghent	41.6	SW	Lyon	500	38.3	8.6	9.3	8.6	SUOP
7837	Mineast	41.6	SW	Lyon	500	38.4	9.0	9.9	9	SUOP
7849	Lake Benton Tap	41.6	SW	Lincoln	320	44.3	9.5	17.0	9.5	SUOP
7850	Ivanhoe	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7848	Ivanhoe Tap	41.6	SW	Lincoln	320	43.0	9.5	17.0	9.5	SUOP
7856	Hendricks	41.6	SW	Lincoln	320	42.6	9.5	16.2	9.5	SUOP
7847	Hendricks Tap	41.6	SW	Lincoln	320	42.5	9.5	16.2	9.5	SUOP
7842	Sam Jones	41.6	SW	Lincoln	320	37.9	9.5	13.9	9.5	SUOP
7832	Burr Junction Old	41.6	SW	Yellow Medicine	158	41.8	9.5	14.4	9.5	SUOP
7879	Verdi	41.6	SW	Yellow Medicine	158	40.1	9.5	17.0	9.5	SUOP
7835	Burr Junction	41.6	SW	Yellow Medicine	158	40.1	9.5	14.4	9.5	SUOP
7841	Canby Junction	41.6	SW	Yellow Medicine	158	39.6	9.5	20.5	9.5	SUOP
7866	Burr	41.6	SW	Yellow Medicine	158	39.5	9.5	14.5	9.5	SUOP
7846	Canby South Rural	41.6	SW	Yellow Medicine	158	38.0	9.5	14.5	9.5	SUOP
7834	Canby	41.6	SW	Yellow Medicine	158	37.8	9.5	21.4	9.5	SUOP
63111	Canby	41.6	SW	Yellow Medicine	158	37.7	9.5	23.1	9.5	SUOP
7845	Canby Northeast	41.6	SW	Yellow Medicine	158	37.6	9.5	22.6	9.5	SUOP
7840	Canby West Rural	41.6	SW	Yellow Medicine	158	37.4	9.5	14.4	9.5	SUOP
63211	Canby	115	SW	Yellow Medicine	158	37.4	9.5	38.0	9.5	SUOP
7855	Minneota	41.6	SW	Lyon	500	38.2	9.5	12.6	9.5	SUOP
7844	Taunton	41.6	SW	Lyon	500	38.6	9.5	13.3	9.5	SUOP
7843	Porter	41.6	SW	Lyon	500	38.8	9.5	13.8	9.5	SUOP
63212	Burr Junction	115	SW	Yellow Medicine	158	39.6	10.2	35.7	10.2	SUOP
60835	Chandler SS	69	SW	Murray	200	42.1	24.8	26.8	24.8	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62715	Lake Wilson	69	SW	Murray	200	43.0	25.7	27.9	25.7	SUOP
60858	Hadley	69	SW	Murray	200	43.2	26.5	29.0	26.5	SUOP
62714	Currie	69	SW	Murray	200	41.8	28.5	38.5	28.5	SUOP
60857	Slayton	69	SW	Murray	200	41.5	28.5	36.8	28.5	SUOP
62738	Milroy	69	SW	Redwood	120	37.4	30.3	32.6	30.3	SUOP
60684	Yellow Medicine	69	SW	Lyon	500	37.6	31.4	38.5	31.4	SUOP
62713	Lk Sarah Tap	69	SW	Murray	200	42.5	34.8	40.7	34.8	SUOP
62711	Lake Sarah	69	SW	Murray	200	42.3	34.8	40.7	34.8	SUOP
60687	Bush Park	69	SW	Yellow Medicine	158	37.6	42.8	35.1	35.1	SUPK
66006	Holland Tap	69	SW	Pipestone	20	40.4	39.5	45.6	39.5	SUOP
62739	Milroy Tap	69	SW	Lyon	500	37.5	39.6	41.9	39.6	SUOP
60855	Tracy	69	SW	Lyon	500	42.1	39.7	47.7	39.7	SUOP
62740	Walnut Grove	69	SW	Redwood	120	39.1	40.6	49.1	40.6	SUOP
62741	Walnut Tap	69	SW	Lyon	500	41.0	40.6	49.1	40.6	SUOP
60685	Green Valley	69	SW	Lyon	500	37.8	40.7	43.1	40.7	SUOP
66008	Holland	69	SW	Pipestone	20	41.0	42.0	45.4	42	SUOP
66007	Holland	115	SW	Pipestone	20	40.5	45.6	45.5	45.5	SUPK
66295	Ivanhoe	69	SW	Lincoln	320	43.0	56.0	56.0	56	EQUAL
66000	Steen	69	SW	Rock	80	38.1	56.2	70.8	56.2	SUOP
66298	Granite Falls	69	SW	Yellow Medicine	158	37.8	56.6	56.6	56.6	EQUAL
66005	Pipestone Tap	69	SW	Pipestone	20	41.6	59.8	79.3	59.8	SUOP
66004	Trotsky	69	SW	Pipestone	20	41.6	59.8	83.4	59.8	SUOP
66003	Hardwick	69	SW	Rock	80	40.7	59.8	83.4	59.8	SUOP
66001	Luverne	69	SW	Rock	80	38.6	59.8	83.3	59.8	SUOP
66002	Luverne	69	SW	Rock	80	38.6	59.8	76.3	59.8	SUOP
60903	Lyon County	69	SW	Lyon	500	37.8	75.4	96.9	75.4	SUOP
60394	Yankee	34.5	SW	Lincoln	320	43.2	81.4	114.0	81.4	SUOP
66294	Ivanhoe	115	SW	Lincoln	320	43.0	86.0	86.0	86	EQUAL
60373	Marshall SE	115	SW	Lyon	500	37.7	95.5	139.2	95.5	SUOP
66552	Marshall ER	115	SW	Lyon	500	37.5	95.9	95.9	95.9	EQUAL
60372	Saratoga	115	SW	Lyon	500	37.3	105.5	142.7	105.5	SUOP
60171	Lyon County	115	SW	Lyon	500	37.8	107.3	276.0	107.3	SUOP
67473	Marshall Muni Southwest	115	SW	Lyon	500	37.7	111.1	162.1	111.1	SUOP

Appendix C - Screening Steps

SW Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61956	West Side	115	SW	Redwood	120	37.1	113.5	127.1	113.5	SUOP
60333	Honner	115	SW	Redwood	120	36.3	113.5	127.1	113.5	SUOP
60170	Marshall	115	SW	Lyon	500	37.4	130.3	210.8	130.3	SUOP
66508	Marshall S3	115	SW	Lyon	500	37.8	147.9	147.9	147.9	EQUAL
67472	Marshall Muni North	115	SW	Lyon	500	37.5	158.4	182.6	158.4	SUOP
60371	Erie Road	115	SW	Lyon	500	37.6	162.0	196.1	162	SUOP
66551	Granite Falls	115	SW	Yellow Medicine	158	37.6	268.9	245.2	245.2	SUPK
60381	Yankee	115	SW	Lincoln	320	43.1	245.4	576.8	245.4	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
34014	Adams	161	SE	Mower	1,647	37.0	-682.1	156.1
34306	Adams	69	SE	Mower	1,647	37.7	-753.1	71.4
60102	Adams	345	SE	Mower	1,647	37.7	-683.9	810.3
34570	Adams North	161	SE	Mower	1,647	37.1	-680.7	156.2
34572	Adams South	161	SE	Mower	1,647	37.1	-683.4	155.9
69190	Airport	69	SE	Olmsted	1,800	37.0	-708.9	27.5
69188	Airport Tap	69	SE	Olmsted	1,800	37.3	-708.9	30.5
62865	Airtech Park	115	SE	Rice	80	36.2	-159.5	-47.7
34286	Albert Lea	69	SE	Freeborn	652	37.6	-270.6	97.8
34288	Albert Lea	69	SE	Freeborn	652	36.3	-270.6	41.0
34292	Albert Lea 19th Street	69	SE	Freeborn	652	36.9	-270.6	54.5
34291	Albert Lea East	69	SE	Freeborn	652	37.2	-208.3	-329.3
62867	Al-Corn	161	SE	Dodge	2,461	37.7	-53.3	200.6
34285	Alden	69	SE	Freeborn	652	38.7	-294.9	40.3
68984	Alden	69	SE	Freeborn	652	38.9	-294.9	27.2
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4
34266	Amboy	69	SE	Blue Earth	126	37.1	-548.4	48.2
60730	Arlington	69	SE	Sibley	0	36.4	-35.9	32.3
62675	Assumption	69	SE	Sibley	0	36.4	34.7	-273.4
61985	Austin	69	SE	Mower	1,647	36.5	-306.0	40.5
61986	Austin	69	SE	Mower	1,647	36.6	-306.0	39.8
61988	Austin	69	SE	Mower	1,647	36.5	-306.0	95.9
69100	Austin Tap	69	SE	Mower	1,647	37.5	-306.0	51.9
60812	Ballard	69	SE	Blue Earth	126	36.0	-312.0	-68.2
63435	Bamber Valley	161	SE	Olmsted	1,800	35.2	-751.6	234.7
69199	Bancroft	69	SE	Freeborn	652	37.4	-270.6	39.7
69526	Beaver Creek	161	SE	Fillmore	400	37.4	-605.7	183.3
62383	Belvidere Mills	69	SE	Goodhue	650	36.6	-134.2	-245.3
62384	Belvidere Mills Tap	69	SE	Goodhue	650	37.7	-134.2	-245.3
62883	Bixby	69	SE	Steele	35	38.1	-186.4	-69.3
61990	Blooming Prairie	69	SE	Dodge	2,461	37.3	-306.0	22.2
34261	Blue Earth	69	SE	Faribault	200	36.7	-607.7	36.6
34307	Blue Earth	69	SE	Faribault	200	36.7	-645.4	36.0
60651	Blue Earth	69	SE	Faribault	200	36.7	-507.2	21.1

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61085	Blue Earth	69	SE	Faribault	200	37.5	-507.2	20.7
62325	Blue Earth	69	SE	Faribault	200	36.7	-252.9	42.8
60120	Blue Earth Tap	161	SE	Faribault	200	37.5	-507.2	190.3
34264	Bricelyn	69	SE	Faribault	200	37.6	-484.3	24.8
62330	Bricelyn	69	SE	Faribault	200	37.3	-484.4	22.5
34262	Bricelyn Tap	69	SE	Faribault	200	37.6	-484.4	22.5
69042	Bricelyn Tap	69	SE	Faribault	200	37.6	-680.3	19.9
69052	Brownsdale	69	SE	Mower	1,647	37.7	-306.0	50.6
68739	Brownsville	69	SE	Houston	0	33.3	-347.0	0.8
68737	Brownsville Tap	69	SE	Houston	0	32.9	-347.0	0.8
60817	Burnside	69	SE	Goodhue	650	29.0	-156.9	-357.6
62386	Burnside Tap	69	SE	Goodhue	650	32.4	-110.5	-252.6
62335	Butternut	69	SE	Blue Earth	126	36.9	-352.8	-89.0
60816	Butternut SS	69	SE	Blue Earth	126	36.9	-352.8	-89.0
62260	Byllesby	69	SE	Goodhue	650	33.7	-49.9	-118.5
60646	Byllesbye	12.5	SE	Goodhue	650	35.3	-75.7	-106.0
61948	Byron	161	SE	Olmsted	1,800	37.5	-751.6	258.6
61950	Byron	345	SE	Olmsted	1,800	37.5	-118.4	763.0
68727	Caledonia	69	SE	Houston	0	35.0	-347.2	43.7
68791	Caledonia	69	SE	Houston	0	34.7	-448.6	54.6
68728	Caledonia Municipal	69	SE	Houston	0	35.6	-544.2	59.4
69166	Canisteo	69	SE	Dodge	2,461	37.8	-757.3	19.8
60802	Cannon Falls	69	SE	Goodhue	650	34.3	-78.1	-111.8
69150	Canton	69	SE	Fillmore	400	36.9	-102.4	64.6
69137	Canton City	69	SE	Fillmore	400	37.5	-102.4	26.1
63430	Cascade Creek	161	SE	Olmsted	1,800	34.6	-736.0	324.3
62348	Century SS	69	SE	Blue Earth	126	36.4	-624.8	-79.5
34315	Chatfield	69	SE	Fillmore	400	35.4	-600.9	38.8
68712	Chatfield	69	SE	Olmsted	1,800	37.4	47.8	48.1
62381	Cherry Grove	69	SE	Goodhue	650	37.7	-146.6	-372.1
69134	Cherry Grove	69	SE	Fillmore	400	37.4	-708.3	70.3
60819	Cherry Tap	69	SE	Goodhue	650	37.3	-146.6	-372.1
62871	Circle Lake	69	SE	Rice	80	37.0	-188.3	-365.3
60789	Circle Tap	69	SE	Rice	80	37.4	-188.3	-365.3

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60866	City of Le Sueur	69	SE	Le Sueur	0	34.2	-380.4	21.3
61938	City of Wells	69	SE	Faribault	200	38.0	-392.4	33.1
62874	Claremont Junction	69	SE	Dodge	2,461	38.0	-249.3	-435.1
62873	Claremont SS	69	SE	Dodge	2,461	38.0	-94.2	-55.2
62332	Clark	69	SE	Faribault	200	37.8	-397.3	34.8
60780	Clarks Grove	69	SE	Freeborn	652	38.7	-270.6	43.9
62681	Cleveland	69	SE	Le Sueur	0	37.1	-343.0	-103.3
34961	Corn Plus	69	SE	Faribault	200	37.2	-420.2	30.0
69084	Corning	69	SE	Freeborn	652	37.8	-306.0	20.0
62075	Cornish	69	SE	Sibley	0	37.2	-36.9	43.0
34295	County Line	69	SE	Steele	35	37.7	-270.6	38.9
63405	Crosstown	161	SE	Olmsted	1,800	31.4	-737.2	378.4
60692	Crystal Foods	69	SE	Sibley	0	36.6	-36.3	43.5
62879	Danville	69	SE	Blue Earth	126	36.8	-312.0	-68.2
62344	Decoria	69	SE	Blue Earth	126	36.4	-312.0	-68.2
34260	Delavan-Easton	69	SE	Faribault	200	37.1	-395.1	33.1
60798	Dodge Center	69	SE	Dodge	2,461	38.0	-751.6	60.0
60113	Dome Pipeline	115	SE	Blue Earth	126	36.2	-311.5	-62.7
34316	Dover	69	SE	Olmsted	1,800	37.0	48.6	49.3
60786	Dundas	69	SE	Rice	80	37.4	-218.5	-264.5
60808	Eagle Lake	69	SE	Blue Earth	126	36.6	-338.8	-388.6
62347	Eagle Lake	69	SE	Blue Earth	126	36.6	-333.7	-465.7
60775	East Winona	69	SE	Winona	0	31.3	-551.8	104.7
62333	Easton	69	SE	Faribault	200	37.1	-377.3	33.1
60830	Eastwood	115	SE	Blue Earth	126	36.3	-314.1	-65.7
60831	Eastwood	69	SE	Blue Earth	126	36.3	-328.5	-589.8
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0
34263	Elmore	69	SE	Faribault	200	36.9	-680.0	36.0
62678	Elysian	69	SE	Le Sueur	0	36.9	-372.4	-550.1
62679	Elysian Tap	69	SE	Le Sueur	0	37.3	-372.4	-550.1
69326	Exol	69	SE	Freeborn	652	37.0	-292.5	16.6
34317	Eyota	69	SE	Olmsted	1,800	37.8	49.5	50.6
69159	Eyota	69	SE	Olmsted	1,800	37.1	47.6	47.8
60790	Fair Park	69	SE	Rice	80	37.3	-204.9	-465.3

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60791	Faribault	69	SE	Rice	80	36.2	-229.2	-519.5
62872	Faribault	69	SE	Rice	80	36.9	-188.3	-365.3
60070	Faribault Energy Park	13.8	SE	Rice	80	36.2	-171.3	-47.7
60384	Faribault Energy Park Tap	115	SE	Rice	80	36.2	-171.3	-47.7
34254	Farmland	69	SE	Blue Earth	126	36.8	-548.4	44.6
60112	Fort Ridgely	115	SE	Nicollet	0	35.2	-395.0	105.1
60938	Fort Ridgely	69	SE	Nicollet	0	35.2	-33.2	53.2
68724	Fountain	69	SE	Fillmore	400	37.1	-716.4	89.4
68988	Freeborn	69	SE	Freeborn	652	38.6	-294.9	27.2
62877	French Lake	69	SE	Rice	80	36.9	-130.2	36.7
62876	French Lake Tap	69	SE	Rice	80	37.1	-130.2	36.7
60824	Frontenac	69	SE	Goodhue	650	36.0	-193.9	-387.5
907	G330	69	SE	Mower	1,647	37.7	-753.1	71.4
34253	Garden City	69	SE	Blue Earth	126	36.9	-548.4	44.6
60815	Garden City	69	SE	Blue Earth	126	36.6	-451.8	-84.0
62328	Garden City	69	SE	Blue Earth	126	36.9	-548.4	12.9
60916	Garwin Mcneilus	69	SE	Dodge	2,461	38.2	-751.6	46.1
60066	Garwin Meneilus Wind	34.5	SE	Dodge	2,461	38.2	-751.6	35.0
60729	Gaylord	69	SE	Sibley	0	36.6	-36.3	46.7
69172	Genoa	69	SE	Olmsted	1,800	37.7	-757.3	27.7
60726	Gibbon	69	SE	Sibley	0	37.4	-37.4	31.8
34305	Glenville	69	SE	Freeborn	652	36.8	-208.3	-40.4
68976	Glenville	69	SE	Freeborn	652	37.5	-255.8	15.6
68978	Glenville	69	SE	Freeborn	652	37.2	-280.7	16.3
62385	Goodhue	69	SE	Goodhue	650	38.1	-133.5	-236.5
60777	Goodview	69	SE	Winona	0	32.2	-551.8	83.8
60778	Goodview	69	SE	Winona	0	28.0	-551.8	83.9
69140	Granger	69	SE	Fillmore	400	37.4	-16.2	73.6
60731	Green Isle	69	SE	Sibley	0	36.4	-38.8	-29.8
62391	Hader	69	SE	Goodhue	650	38.0	-96.1	-164.9
60503	Hampton Corners	345	SE	Goodhue	650	37.0	-39.3	1384.1
68726	Harmony	69	SE	Fillmore	400	37.8	-15.3	84.9
69527	Harmony	161	SE	Fillmore	400	37.8	-38.3	101.4
69304	Harmoy City	69	SE	Fillmore	400	37.7	-15.6	72.5

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
34010	Hayward	161	SE	Freeborn	652	37.3	-176.3	58.1
34293	Hayward #18	69	SE	Freeborn	652	37.4	-208.3	-40.4
34294	Hayward #28	69	SE	Freeborn	652	37.4	-270.6	38.9
62078	Heartland	69	SE	Sibley	0	36.9	-36.7	69.5
60724	Henderson	69	SE	Sibley	0	36.6	-33.3	16.7
68822	Henerytown	69	SE	Fillmore	400	36.1	-102.8	49.0
68725	Henry TP	69	SE	Fillmore	400	37.2	-102.8	63.6
62588	High Island	69	SE	Sibley	0	36.9	47.6	-330.0
62878	Highway 30 SS	69	SE	Blue Earth	126	36.5	-312.0	-68.2
68729	Houston	69	SE	Houston	0	31.0	-478.7	-48.2
60925	Hungry Hollow	115	SE	Blue Earth	126	35.9	-306.1	-68.2
62338	Hungry Hollow	69	SE	Blue Earth	126	35.4	-313.3	-266.5
63420	IBM	161	SE	Olmsted	1,800	35.6	-582.9	251.6
62337	Jamestown	69	SE	Blue Earth	126	37.0	-339.9	-264.3
61250	Jamestown Tap	69	SE	Blue Earth	126	37.1	-338.8	-388.0
62351	Jamestown Tap	69	SE	Blue Earth	126	37.0	-339.9	-264.3
60644	Janesville	24	SE	Waseca	105	37.5	-116.2	17.4
62674	Jessenland	69	SE	Sibley	0	36.6	-34.6	15.1
62692	Jessenland	69	SE	Sibley	0	36.4	-34.6	15.1
61155	Johnson	69	SE	Blue Earth	126	35.0	-318.2	-266.5
62324	Johnson SS	69	SE	Nicollet	0	34.0	-318.2	-266.5
62336	Johnson Tap	69	SE	Nicollet	0	33.8	-322.1	-175.4
69350	Jordan	69	SE	Fillmore	400	37.4	-600.9	38.8
34324	Jordan-NNG	69	SE	Fillmore	400	37.3	-600.9	38.8
69168	Kalmar	69	SE	Olmsted	1,800	36.6	-757.3	30.1
60799	Kassan	69	SE	Dodge	2,461	37.7	-751.6	67.0
60795	Kenyon	69	SE	Goodhue	650	37.7	-234.1	-455.2
60796	Kenyon	69	SE	Goodhue	650	37.8	-249.3	-435.1
62389	Kenyon	69	SE	Goodhue	650	37.7	-213.8	-490.3
60797	Kenyon Village	69	SE	Goodhue	650	37.5	-234.1	-455.2
60647	Key City Generator 2	13.8	SE	Nicollet	0	34.3	-318.2	-266.5
60648	Key City Generator 4	13.8	SE	Nicollet	0	34.3	-318.2	-266.5
60828	La Crescent	69	SE	Houston	0	31.8	-390.8	-40.2
68730	LAC Tap	69	SE	Houston	0	30.2	-455.6	-46.1

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60719	Lafayette	69	SE	Nicollet	0	37.0	-35.1	34.8
62079	Lafayette	69	SE	Nicollet	0	37.2	-34.9	36.9
61960	Lake City	69	SE	Wabasha	0	36.1	-216.0	-380.2
60700	Lake Crystal	69	SE	Blue Earth	126	36.9	-389.9	-86.7
60827	Lake Emily	69	SE	Le Sueur	0	36.9	-344.6	-110.3
60364	Lakefield	345	SE	Nicollet	0	36.1	-321.6	-72.9
60365	Lakefield	345	SE	Nicollet	0	36.2	-291.3	-110.0
68704	Lanesboro	69	SE	Fillmore	400	34.2	-22.2	18.1
34302	Le Center	69	SE	Le Sueur	0	36.7	-343.0	-103.3
34303	Le Center	69	SE	Le Sueur	0	37.1	-343.0	-103.3
60867	Le Sueur	69	SE	Le Sueur	0	34.3	-380.4	21.3
60868	Le Sueur Tap	69	SE	Sibley	0	36.2	-380.4	21.3
62392	Lena	69	SE	Goodhue	650	36.2	-137.8	-412.0
60820	Lena Tap	69	SE	Goodhue	650	36.8	-128.0	-338.4
62382	Lena Tap	69	SE	Goodhue	650	36.8	-137.8	-412.0
69076	Lerdal	69	SE	Freeborn	652	38.0	-208.3	-40.4
69009	Lerdal Tap	69	SE	Freeborn	652	38.2	-208.3	-40.4
34321	Lewiston	69	SE	Winona	0	36.2	-35.9	42.9
68720	Lewiston	69	SE	Winona	0	36.5	-29.0	18.7
68773	Lewiston	69	SE	Winona	0	36.7	-29.0	87.7
69160	Little Valley	69	SE	Olmsted	1,800	37.8	42.5	48.0
68936	London	69	SE	Mower	1,647	36.4	-753.1	26.8
60264	Loon Lake	115	SE	Waseca	105	37.5	-131.3	112.0
61976	Loon Lake	69	SE	Waseca	105	37.5	-116.5	-119.4
60265	Loon Lake Tap	115	SE	Waseca	105	37.2	-156.8	185.3
68982	Mansfield	69	SE	Freeborn	652	38.5	-402.8	19.0
61906	Maple Leaf	161	SE	Olmsted	1,800	37.0	-757.3	270.5
69170	Maple Leaf	69	SE	Olmsted	1,800	36.7	-757.3	34.7
60811	Mapleton	69	SE	Blue Earth	126	36.5	-312.0	-68.2
69194	Marion	69	SE	Olmsted	1,800	37.1	-708.9	21.9
69186	Marvale	69	SE	Olmsted	1,800	36.4	-708.9	21.4
69187	Marvale Tap	69	SE	Olmsted	1,800	36.4	-708.9	32.4
62880	Matawan	69	SE	Waseca	105	37.8	-270.6	34.1
60821	Mazeppa	69	SE	Wabasha	0	36.1	-157.4	-472.1

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
69098	McNeilus	69	SE	Mower	1,647	36.9	-753.1	49.8
60603	MEC	345	SE	Blue Earth	126	33.9	-301.2	-77.2
60063	MEC CT Gen	15	SE	Blue Earth	126	34.8	-309.8	-60.8
60360	MEC CT Gen	115	SE	Blue Earth	126	34.8	-309.8	-60.8
60062	MEC Station	20	SE	Blue Earth	126	33.9	-301.2	-77.2
34298	Medford Junction SS	69	SE	Steele	35	36.8	-94.2	-55.2
61160	Merdian	69	SE	Waseca	105	37.1	-108.7	43.8
62882	Merton	69	SE	Steele	35	38.2	-94.2	-55.2
60803	Miesville Tap	69	SE	Goodhue	650	34.5	-56.0	-143.4
34284	Minnesota Lake	69	SE	Faribault	200	37.1	-381.7	33.1
60781	Minnesota Lake	69	SE	Blue Earth	126	36.8	-312.0	-68.2
34300	Montgomery	69	SE	Le Sueur	0	37.4	-159.3	-362.7
62682	Montgomery	69	SE	Le Sueur	0	36.9	-343.0	-103.3
34310	Montgomery Generator	13.8	SE	Le Sueur	0	37.4	-159.3	-362.7
60793	Morristown	69	SE	Rice	80	37.0	-370.1	-975.8
68731	Mound Prairie	69	SE	Houston	0	32.4	-436.4	-44.4
61994	N Preston	69	SE	Fillmore	400	34.8	-16.7	54.9
69305	N Preston T	69	SE	Fillmore	400	34.1	-16.7	92.4
60794	Nerstrand	69	SE	Rice	80	37.8	-207.8	-503.4
34301	New Prague	69	SE	Le Sueur	0	36.6	-179.1	-308.6
60785	New Prague	69	SE	Le Sueur	0	36.2	-185.1	-297.0
60936	New Prague	69	SE	Le Sueur	0	36.6	-185.1	-297.0
61978	New Prague	69	SE	Le Sueur	0	36.2	-185.1	-297.0
61979	New Prague	69	SE	Le Sueur	0	36.8	-231.8	-242.3
62340	New Sweden	69	SE	Nicollet	0	36.8	-359.4	-22.8
61984	North Austin	161	SE	Mower	1,647	36.6	-306.0	95.9
34289	North Bridge	69	SE	Freeborn	652	37.7	-270.6	36.3
63415	Northern Hills	161	SE	Olmsted	1,800	36.7	-590.3	420.4
60787	Northfield	69	SE	Rice	80	36.4	-233.4	-238.3
62807	Northstar Ethanol	69	SE	Blue Earth	126	37.0	-337.0	-90.2
62808	Northstar Ethanol North	69	SE	Blue Earth	126	36.9	-337.0	-90.2
62341	NW Sweden Tap	69	SE	Nicollet	0	36.6	-359.4	-22.8
69185	Orono Tap	69	SE	Olmsted	1,800	36.3	-708.9	28.0
69176	Oronoco	69	SE	Olmsted	1,800	36.1	-708.9	22.8

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61968	Owatana	69	SE	Steele	35	37.2	-91.8	-68.9
62886	Owatonna	69	SE	Steele	35	37.5	-94.2	-55.2
62343	Penelope East	69	SE	Nicollet	0	36.0	-325.4	-136.5
62323	Penelope Tap	69	SE	Nicollet	0	36.0	-336.7	-98.8
62342	Penelope West	69	SE	Nicollet	0	35.4	-329.0	-84.6
68721	Peterson	69	SE	Fillmore	400	34.0	-22.2	90.8
68722	Peterson Tap	69	SE	Fillmore	400	35.0	-16.7	17.0
68868	Pine Creek	69	SE	Houston	0	31.0	-403.7	-41.4
60800	Pine Island	69	SE	Goodhue	650	36.9	-751.6	58.7
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3
63032	Pleasant Valley	345	SE	Mower	1,647	38.5	-702.1	650.1
63070	Pleasant Valley	161	SE	Mower	1,647	38.5	-632.5	650.1
63073	Pleasant Valley	13.8	SE	Mower	1,647	38.5	-609.9	93.3
69161	Pleasant Valley	69	SE	Mower	1,647	38.3	-757.3	19.0
63006	Pleasant Valley Station 51G	16	SE	Mower	1,647	38.5	-632.5	51.3
63007	Pleasant Valley Station 52G	16	SE	Mower	1,647	38.5	-632.5	50.6
63008	Pleasant Valley Station 53G	13.8	SE	Mower	1,647	38.5	-632.5	34.3
69162	Pleasant Valley Tap	69	SE	Olmsted	1,800	37.4	-757.3	27.0
36239	Pohl Road	115	SE	Blue Earth	126	36.0	-310.0	-66.9
60810	Pohl Road Tap	69	SE	Blue Earth	126	35.9	-312.0	-68.2
62339	Pohl SS	69	SE	Blue Earth	126	35.6	-328.5	-589.8
60105	Prairie Island	345	SE	Goodhue	650	31.9	-237.6	942.6
60106	Prairie Island	161	SE	Goodhue	650	31.9	31.8	-169.0
60667	Prairie Island	4	SE	Goodhue	650	34.0	-237.6	61.6
60668	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0
60669	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0
60670	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	58.3
60671	Prairie Island	4	SE	Goodhue	650	33.3	-237.6	54.0
60672	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0
60003	Prairie Island Generator 1	20	SE	Goodhue	650	31.9	-237.6	62.2
60004	Prairie Island Generator 2	20	SE	Goodhue	650	31.9	-237.6	58.3
62885	Pratt	69	SE	Steele	35	37.4	-91.8	-69.3

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
34279	Pratt Tap	69	SE	Steele	35	37.1	-91.8	-69.3
61992	Preston	69	SE	Fillmore	400	34.1	-16.7	30.6
68700	Preston Tap	69	SE	Fillmore	400	36.2	-16.7	85.7
69322	Quincy	69	SE	Olmsted	1,800	36.5	47.4	47.6
60814	Rapidan	69	SE	Blue Earth	126	36.5	-580.5	-80.4
62224	Ravenna	161	SE	Goodhue	650	34.0	-275.1	-164.6
60823	Red Wing	69	SE	Goodhue	650	32.9	-174.6	-395.6
69141	Riceford	69	SE	Fillmore	400	35.9	-393.8	25.9
69177	Riceford Tap	69	SE	Fillmore	400	36.7	-393.8	61.5
69074	Riceland	69	SE	Freeborn	652	38.1	-208.3	-40.4
69178	Ringe	69	SE	Olmsted	1,800	35.7	-708.9	33.9
69180	Ringe Tap	69	SE	Olmsted	1,800	37.2	-708.9	28.0
62884	River Point	69	SE	Steele	35	37.3	-91.8	-69.3
63445	Rochester	161	SE	Olmsted	1,800	35.6	-709.0	579.2
69182	Rochester	69	SE	Olmsted	1,800	37.5	-708.9	64.6
69547	Rochester	161	SE	Olmsted	1,800	37.5	-708.9	470.3
34311	Rochester Tap	69	SE	Fillmore	400	37.4	-701.9	69.0
69164	Rock Dell	69	SE	Olmsted	1,800	37.3	-757.3	31.7
69078	Rose Creek	69	SE	Mower	1,647	36.4	-753.1	32.4
68930	Rose Creek Tap	69	SE	Mower	1,647	36.3	-753.1	32.4
62349	Rush River	69	SE	Nicollet	0	36.4	-371.8	1.1
68735	Rushford	69	SE	Fillmore	400	32.7	-35.9	48.8
34322	Rushford Municipal	69	SE	Fillmore	400	29.1	-35.9	42.7
68718	Rushford Villiage	69	SE	Fillmore	400	29.3	-35.9	42.7
68713	Saint Charles	69	SE	Winona	0	36.9	-39.9	48.4
69077	Sargent	69	SE	Mower	1,647	38.2	-306.0	48.5
62076	Schilling	69	SE	Nicollet	0	36.7	-33.3	40.7
62077	Schilling Tap	69	SE	Nicollet	0	36.7	-33.3	40.7
60813	Sibley Park	69	SE	Blue Earth	126	34.5	-312.0	-68.2
63440	Silver Lake	161	SE	Olmsted	1,800	35.5	-737.6	327.4
60402	South Benco	69	SE	Blue Earth	126	35.7	-502.5	-76.9
60109	South Bend	161	SE	Blue Earth	126	34.8	-666.1	-82.6
34287	South Broadway	69	SE	Freeborn	652	37.4	-270.6	62.6
62390	South Cannon Falls	69	SE	Goodhue	650	37.1	-83.1	-124.6

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
61952	South Faribault	161	SE	Rice	80	34.3	-103.3	146.1
69054	South Shore	69	SE	Freeborn	652	37.1	-270.6	58.1
62387	Spring Creek	69	SE	Goodhue	650	29.0	-159.0	-362.2
63071	Spring Creek	161	SE	Goodhue	650	29.0	-218.4	-564.6
60833	Spring Creek Tap	69	SE	Goodhue	650	29.0	-138.0	-307.4
62393	Spring Creek Transformer 1	13.8	SE	Goodhue	650	29.2	-152.8	-348.3
62394	Spring Creek Transformer 2	13.8	SE	Goodhue	650	29.0	-149.3	-340.5
69142	Spring Grove	69	SE	Houston	0	36.8	-369.4	52.8
69139	Spring Grove Municipal	69	SE	Houston	0	36.9	-369.4	29.7
69138	Spring Val	69	SE	Fillmore	400	37.4	-680.9	88.3
34314	Spring Valley	69	SE	Fillmore	400	37.7	-671.9	106.4
61940	Spring Valley	69	SE	Fillmore	400	37.6	-671.9	28.8
61974	St Peter	69	SE	Nicollet	0	35.7	-345.5	-114.9
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1
62345	St. Clair	69	SE	Blue Earth	126	36.2	-312.0	-68.2
62346	St. Clair Tap	69	SE	Blue Earth	126	36.1	-312.0	-68.2
62881	St. Olaf Lake	69	SE	Waseca	105	38.1	-270.6	33.4
62887	St. Olaf Lake SS	69	SE	Steele	35	38.2	-270.6	43.9
62673	St. Thomas	69	SE	Le Sueur	0	36.7	-343.0	-103.3
62691	St. Thomas	69	SE	Le Sueur	0	36.5	-343.0	-103.3
34296	Steele Center	69	SE	Steele	35	37.6	-91.8	-69.3
62327	Sterling Center	69	SE	Blue Earth	126	37.0	-548.4	13.7
34277	Sterling Center Tap	69	SE	Blue Earth	126	37.2	-548.4	47.4
68717	Stockton	69	SE	Winona	0	35.2	-39.4	20.2
68716	Stockton Tap	69	SE	Winona	0	36.2	-39.4	89.3
34312	Stwertville	69	SE	Olmsted	1,800	37.0	-572.6	37.8
34313	Stwertville Jct.	69	SE	Fillmore	400	37.6	-600.9	38.8
60380	Summit Avenue	115	SE	Blue Earth	126	34.8	-309.8	-60.9
60111	Swan Lake	115	SE	Nicollet	0	36.3	-351.6	114.3
69086	T Blooming Prairie	69	SE	Dodge	2,461	38.0	-306.0	22.0
69122	Taopi Tap	69	SE	Mower	1,647	37.9	-753.1	27.3
69130	Taopi Tap	69	SE	Mower	1,647	37.7	-753.1	27.3
60826	Traverse	69	SE	Nicollet	0	36.5	-347.9	-39.1

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
62350	Traverse	69	SE	Nicollet	0	36.7	-351.2	-36.0
68980	Twin Lakes	69	SE	Freeborn	652	37.9	-402.8	19.0
68774	Utica	69	SE	Winona	0	36.2	-35.9	113.2
62870	Valley Grove	69	SE	Rice	80	38.2	-190.9	-352.3
60788	Valley Tap	69	SE	Rice	80	37.5	-190.9	-352.3
62388	Vasa	69	SE	Goodhue	650	36.9	-83.5	-191.2
60804	Vasa Tap	69	SE	Goodhue	650	36.1	-83.5	-191.2
34255	Vernon Center	69	SE	Blue Earth	126	37.1	-548.4	45.4
60782	Veseli	69	SE	Rice	80	37.4	-185.1	-297.0
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9
60825	Wabasha	69	SE	Wabasha	0	33.9	47.2	-406.4
62868	Walcott	69	SE	Rice	80	37.5	-276.1	-623.8
62869	Walcott Tap	69	SE	Rice	80	37.2	-276.1	-623.8
34265	Walters	69	SE	Faribault	200	38.5	-344.3	38.1
62875	Warsaw	69	SE	Rice	80	37.3	-299.6	-675.4
60806	Waseca	69	SE	Waseca	105	37.2	-116.2	72.8
60829	Waseca	69	SE	Waseca	105	37.2	-116.1	42.0
34299	Waseca Junction	69	SE	Steele	35	37.2	-107.3	49.2
34308	Waseca Tap	69	SE	Waseca	105	37.3	-111.0	42.0
60805	Waterville	69	SE	Le Sueur	0	36.9	-388.1	-662.5
68719	Weaver	69	SE	Wabasha	0	32.1	86.4	86.6
62380	Wells Creek	69	SE	Goodhue	650	37.6	-133.3	-233.2
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0
61161	West Byron	69	SE	Olmsted	1,800	37.5	-751.6	76.0
60107	West Faribault	115	SE	Rice	80	35.4	-143.2	-47.7
60792	West Faribault	69	SE	Rice	80	34.3	-258.2	-584.0
61964	West Owatonna	161	SE	Steele	35	36.7	-81.5	183.5
61972	West Owatonna	69	SE	Steele	35	37.1	-91.8	-69.3
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3
68706	Whitewater Tap	69	SE	Olmsted	1,800	37.9	18.9	17.5
62326	Willow Creek	69	SE	Blue Earth	126	37.6	-548.4	13.5
63410	Willow Creek	161	SE	Olmsted	1,800	36.5	-743.1	181.4
34278	Willow Creek Tap	69	SE	Blue Earth	126	37.3	-548.4	47.7

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Substation Name)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC
60108	Wilmarth	345	SE	Blue Earth	126	34.8	-301.2	-77.2
60110	Wilmarth	115	SE	Blue Earth	126	34.8	-309.8	-60.8
60650	Wilmarth	69	SE	Nicollet	0	34.8	-318.2	-266.5
63082	Wilmarth Tertitary	12.5	SE	Blue Earth	126	34.8	-307.5	-64.3
68734	Wilson	69	SE	Winona	0	36.4	-35.9	48.8
34009	Winnebago	161	SE	Faribault	200	37.1	-496.7	305.3
34256	Winnebago	69	SE	Faribault	200	37.3	-548.4	53.9
62334	Winnebago	69	SE	Faribault	200	37.2	-415.8	32.0
34013	Winnebago Junction	161	SE	Faribault	200	36.9	-496.1	239.0
34258	Winnebago Junction North	69	SE	Faribault	200	37.3	-427.6	30.0
34257	Winnebago Junction south	69	SE	Faribault	200	37.2	-548.4	53.9
34259	Winnebago Tap	69	SE	Faribault	200	37.3	-422.4	30.0
62329	Winnebago Tap	69	SE	Faribault	200	37.2	-415.8	32.0
60776	Winona	69	SE	Winona	0	29.7	-551.8	104.7
60942	Winona Tap	69	SE	Winona	0	32.8	-551.8	104.7
60725	Winthrop	69	SE	Sibley	0	37.0	-36.7	76.0
68733	Witoka	69	SE	Winona	0	36.0	-35.9	28.9
68732	Witoka Tap	69	SE	Winona	0	36.4	-35.9	48.8
34323	Wolf Creek	69	SE	Mower	1,647	37.4	-306.0	51.9
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1
60822	Zumbro Falls	69	SE	Wabasha	0	34.8	-161.5	-247.0
63425	Zumbro River	161	SE	Olmsted	1,800	35.0	-586.6	295.5
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9
60818	Zumbrota	69	SE	Goodhue	650	37.3	-128.0	-338.4

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60793	Morristown	69	SE	Rice	80	37.0	-370.1	-975.8	-975.8	SUPK
61906	Maple Leaf	161	SE	Olmsted	1,800	37.0	-757.3	270.5	-757.3	SUOP
69161	Pleasant Valley	69	SE	Mower	1,647	38.3	-757.3	19.0	-757.3	SUOP
69162	Pleasant Valley Tap	69	SE	Olmsted	1,800	37.4	-757.3	27.0	-757.3	SUOP
69164	Rock Dell	69	SE	Olmsted	1,800	37.3	-757.3	31.7	-757.3	SUOP
69166	Canisteo	69	SE	Dodge	2,461	37.8	-757.3	19.8	-757.3	SUOP
69168	Kalmar	69	SE	Olmsted	1,800	36.6	-757.3	30.1	-757.3	SUOP
69170	Maple Leaf	69	SE	Olmsted	1,800	36.7	-757.3	34.7	-757.3	SUOP
69172	Genoa	69	SE	Olmsted	1,800	37.7	-757.3	27.7	-757.3	SUOP
907	G330	69	SE	Mower	1,647	37.7	-753.1	71.4	-753.1	SUOP
34306	Adams	69	SE	Mower	1,647	37.7	-753.1	71.4	-753.1	SUOP
68930	Rose Creek Tap	69	SE	Mower	1,647	36.3	-753.1	32.4	-753.1	SUOP
68936	London	69	SE	Mower	1,647	36.4	-753.1	26.8	-753.1	SUOP
69078	Rose Creek	69	SE	Mower	1,647	36.4	-753.1	32.4	-753.1	SUOP
69098	McNeilus	69	SE	Mower	1,647	36.9	-753.1	49.8	-753.1	SUOP
69122	Taopi Tap	69	SE	Mower	1,647	37.9	-753.1	27.3	-753.1	SUOP
69130	Taopi Tap	69	SE	Mower	1,647	37.7	-753.1	27.3	-753.1	SUOP
60066	Garwin Meneilus Wind	34.5	SE	Dodge	2,461	38.2	-751.6	35.0	-751.6	SUOP
60798	Dodge Center	69	SE	Dodge	2,461	38.0	-751.6	60.0	-751.6	SUOP
60799	Kassan	69	SE	Dodge	2,461	37.7	-751.6	67.0	-751.6	SUOP
60800	Pine Island	69	SE	Goodhue	650	36.9	-751.6	58.7	-751.6	SUOP
60916	Garwin Mcneilus	69	SE	Dodge	2,461	38.2	-751.6	46.1	-751.6	SUOP
61161	West Byron	69	SE	Olmsted	1,800	37.5	-751.6	76.0	-751.6	SUOP
61948	Byron	161	SE	Olmsted	1,800	37.5	-751.6	258.6	-751.6	SUOP
63435	Bamber Valley	161	SE	Olmsted	1,800	35.2	-751.6	234.7	-751.6	SUOP
63410	Willow Creek	161	SE	Olmsted	1,800	36.5	-743.1	181.4	-743.1	SUOP
63440	Silver Lake	161	SE	Olmsted	1,800	35.5	-737.6	327.4	-737.6	SUOP
63405	Crosstown	161	SE	Olmsted	1,800	31.4	-737.2	378.4	-737.2	SUOP
63430	Cascade Creek	161	SE	Olmsted	1,800	34.6	-736.0	324.3	-736	SUOP
68724	Fountain	69	SE	Fillmore	400	37.1	-716.4	89.4	-716.4	SUOP
63445	Rochester	161	SE	Olmsted	1,800	35.6	-709.0	579.2	-709	SUOP
69176	Oronoco	69	SE	Olmsted	1,800	36.1	-708.9	22.8	-708.9	SUOP
69178	Ringe	69	SE	Olmsted	1,800	35.7	-708.9	33.9	-708.9	SUOP
69180	Ringe Tap	69	SE	Olmsted	1,800	37.2	-708.9	28.0	-708.9	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
69182	Rochester	69	SE	Olmsted	1,800	37.5	-708.9	64.6	-708.9	SUOP
69185	Orono Tap	69	SE	Olmsted	1,800	36.3	-708.9	28.0	-708.9	SUOP
69186	Marvale	69	SE	Olmsted	1,800	36.4	-708.9	21.4	-708.9	SUOP
69187	Marvale Tap	69	SE	Olmsted	1,800	36.4	-708.9	32.4	-708.9	SUOP
69188	Airport Tap	69	SE	Olmsted	1,800	37.3	-708.9	30.5	-708.9	SUOP
69190	Airport	69	SE	Olmsted	1,800	37.0	-708.9	27.5	-708.9	SUOP
69194	Marion	69	SE	Olmsted	1,800	37.1	-708.9	21.9	-708.9	SUOP
69547	Rochester	161	SE	Olmsted	1,800	37.5	-708.9	470.3	-708.9	SUOP
69134	Cherry Grove	69	SE	Fillmore	400	37.4	-708.3	70.3	-708.3	SUOP
63032	Pleasant Valley	345	SE	Mower	1,647	38.5	-702.1	650.1	-702.1	SUOP
34311	Rochester Tap	69	SE	Fillmore	400	37.4	-701.9	69.0	-701.9	SUOP
60102	Adams	345	SE	Mower	1,647	37.7	-683.9	810.3	-683.9	SUOP
34572	Adams South	161	SE	Mower	1,647	37.1	-683.4	155.9	-683.4	SUOP
34014	Adams	161	SE	Mower	1,647	37.0	-682.1	156.1	-682.1	SUOP
69138	Spring Val	69	SE	Fillmore	400	37.4	-680.9	88.3	-680.9	SUOP
34570	Adams North	161	SE	Mower	1,647	37.1	-680.7	156.2	-680.7	SUOP
69042	Bricelyn Tap	69	SE	Faribault	200	37.6	-680.3	19.9	-680.3	SUOP
34263	Elmore	69	SE	Faribault	200	36.9	-680.0	36.0	-680	SUOP
62875	Warsaw	69	SE	Rice	80	37.3	-299.6	-675.4	-675.4	SUPK
34314	Spring Valley	69	SE	Fillmore	400	37.7	-671.9	106.4	-671.9	SUOP
61940	Spring Valley	69	SE	Fillmore	400	37.6	-671.9	28.8	-671.9	SUOP
60109	South Bend	161	SE	Blue Earth	126	34.8	-666.1	-82.6	-666.1	SUOP
60805	Waterville	69	SE	Le Sueur	0	36.9	-388.1	-662.5	-662.5	SUPK
34307	Blue Earth	69	SE	Faribault	200	36.7	-645.4	36.0	-645.4	SUOP
63006	Pleasant Valley Station 51G	16	SE	Mower	1,647	38.5	-632.5	51.3	-632.5	SUOP
63007	Pleasant Valley Station 52G	16	SE	Mower	1,647	38.5	-632.5	50.6	-632.5	SUOP
63008	Pleasant Valley Station 53G	13.8	SE	Mower	1,647	38.5	-632.5	34.3	-632.5	SUOP
63070	Pleasant Valley	161	SE	Mower	1,647	38.5	-632.5	650.1	-632.5	SUOP
62348	Century SS	69	SE	Blue Earth	126	36.4	-624.8	-79.5	-624.8	SUOP
62868	Walcott	69	SE	Rice	80	37.5	-276.1	-623.8	-623.8	SUPK
62869	Walcott Tap	69	SE	Rice	80	37.2	-276.1	-623.8	-623.8	SUPK
63073	Pleasant Valley	13.8	SE	Mower	1,647	38.5	-609.9	93.3	-609.9	SUOP
34261	Blue Earth	69	SE	Faribault	200	36.7	-607.7	36.6	-607.7	SUOP
69526	Beaver Creek	161	SE	Fillmore	400	37.4	-605.7	183.3	-605.7	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
34313	Stwertville Jct.	69	SE	Fillmore	400	37.6	-600.9	38.8	-600.9	SUOP
34315	Chatfield	69	SE	Fillmore	400	35.4	-600.9	38.8	-600.9	SUOP
34324	Jordan-NNG	69	SE	Fillmore	400	37.3	-600.9	38.8	-600.9	SUOP
69350	Jordan	69	SE	Fillmore	400	37.4	-600.9	38.8	-600.9	SUOP
63415	Northern Hills	161	SE	Olmsted	1,800	36.7	-590.3	420.4	-590.3	SUOP
60831	Eastwood	69	SE	Blue Earth	126	36.3	-328.5	-589.8	-589.8	SUPK
62339	Pohl SS	69	SE	Blue Earth	126	35.6	-328.5	-589.8	-589.8	SUPK
63425	Zumbro River	161	SE	Olmsted	1,800	35.0	-586.6	295.5	-586.6	SUOP
60792	West Faribault	69	SE	Rice	80	34.3	-258.2	-584.0	-584	SUPK
63420	IBM	161	SE	Olmsted	1,800	35.6	-582.9	251.6	-582.9	SUOP
60814	Rapidan	69	SE	Blue Earth	126	36.5	-580.5	-80.4	-580.5	SUOP
34312	Stwertville	69	SE	Olmsted	1,800	37.0	-572.6	37.8	-572.6	SUOP
63071	Spring Creek	161	SE	Goodhue	650	29.0	-218.4	-564.6	-564.6	SUPK
60775	East Winona	69	SE	Winona	0	31.3	-551.8	104.7	-551.8	SUOP
60776	Winona	69	SE	Winona	0	29.7	-551.8	104.7	-551.8	SUOP
60777	Goodview	69	SE	Winona	0	32.2	-551.8	83.8	-551.8	SUOP
60778	Goodview	69	SE	Winona	0	28.0	-551.8	83.9	-551.8	SUOP
60942	Winona Tap	69	SE	Winona	0	32.8	-551.8	104.7	-551.8	SUOP
62678	Elysian	69	SE	Le Sueur	0	36.9	-372.4	-550.1	-550.1	SUPK
62679	Elysian Tap	69	SE	Le Sueur	0	37.3	-372.4	-550.1	-550.1	SUPK
34253	Garden City	69	SE	Blue Earth	126	36.9	-548.4	44.6	-548.4	SUOP
34254	Farmland	69	SE	Blue Earth	126	36.8	-548.4	44.6	-548.4	SUOP
34255	Vernon Center	69	SE	Blue Earth	126	37.1	-548.4	45.4	-548.4	SUOP
34256	Winnebago	69	SE	Faribault	200	37.3	-548.4	53.9	-548.4	SUOP
34257	Winnebago Junction south	69	SE	Faribault	200	37.2	-548.4	53.9	-548.4	SUOP
34266	Amboy	69	SE	Blue Earth	126	37.1	-548.4	48.2	-548.4	SUOP
34277	Sterling Center Tap	69	SE	Blue Earth	126	37.2	-548.4	47.4	-548.4	SUOP
34278	Willow Creek Tap	69	SE	Blue Earth	126	37.3	-548.4	47.7	-548.4	SUOP
62326	Willow Creek	69	SE	Blue Earth	126	37.6	-548.4	13.5	-548.4	SUOP
62327	Sterling Center	69	SE	Blue Earth	126	37.0	-548.4	13.7	-548.4	SUOP
62328	Garden City	69	SE	Blue Earth	126	36.9	-548.4	12.9	-548.4	SUOP
68728	Caledonia Municipal	69	SE	Houston	0	35.6	-544.2	59.4	-544.2	SUOP
60791	Faribault	69	SE	Rice	80	36.2	-229.2	-519.5	-519.5	SUPK
60120	Blue Earth Tap	161	SE	Faribault	200	37.5	-507.2	190.3	-507.2	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60651	Blue Earth	69	SE	Faribault	200	36.7	-507.2	21.1	-507.2	SUOP
61085	Blue Earth	69	SE	Faribault	200	37.5	-507.2	20.7	-507.2	SUOP
60794	Nerstrand	69	SE	Rice	80	37.8	-207.8	-503.4	-503.4	SUPK
60402	South Benco	69	SE	Blue Earth	126	35.7	-502.5	-76.9	-502.5	SUOP
34009	Winnebago	161	SE	Faribault	200	37.1	-496.7	305.3	-496.7	SUOP
34013	Winnebago Junction	161	SE	Faribault	200	36.9	-496.1	239.0	-496.1	SUOP
62389	Kenyon	69	SE	Goodhue	650	37.7	-213.8	-490.3	-490.3	SUPK
34262	Bricelyn Tap	69	SE	Faribault	200	37.6	-484.4	22.5	-484.4	SUOP
62330	Bricelyn	69	SE	Faribault	200	37.3	-484.4	22.5	-484.4	SUOP
34264	Bricelyn	69	SE	Faribault	200	37.6	-484.3	24.8	-484.3	SUOP
68729	Houston	69	SE	Houston	0	31.0	-478.7	-48.2	-478.7	SUOP
60821	Mazeppa	69	SE	Wabasha	0	36.1	-157.4	-472.1	-472.1	SUPK
62347	Eagle Lake	69	SE	Blue Earth	126	36.6	-333.7	-465.7	-465.7	SUPK
60790	Fair Park	69	SE	Rice	80	37.3	-204.9	-465.3	-465.3	SUPK
68730	LAC Tap	69	SE	Houston	0	30.2	-455.6	-46.1	-455.6	SUOP
60795	Kenyon	69	SE	Goodhue	650	37.7	-234.1	-455.2	-455.2	SUPK
60797	Kenyon Village	69	SE	Goodhue	650	37.5	-234.1	-455.2	-455.2	SUPK
60815	Garden City	69	SE	Blue Earth	126	36.6	-451.8	-84.0	-451.8	SUOP
68791	Caledonia	69	SE	Houston	0	34.7	-448.6	54.6	-448.6	SUOP
68731	Mound Prairie	69	SE	Houston	0	32.4	-436.4	-44.4	-436.4	SUOP
60796	Kenyon	69	SE	Goodhue	650	37.8	-249.3	-435.1	-435.1	SUPK
62874	Claremont Junction	69	SE	Dodge	2,461	38.0	-249.3	-435.1	-435.1	SUPK
34258	Winnebago Junction North	69	SE	Faribault	200	37.3	-427.6	30.0	-427.6	SUOP
34259	Winnebago Tap	69	SE	Faribault	200	37.3	-422.4	30.0	-422.4	SUOP
34961	Corn Plus	69	SE	Faribault	200	37.2	-420.2	30.0	-420.2	SUOP
62329	Winnebago Tap	69	SE	Faribault	200	37.2	-415.8	32.0	-415.8	SUOP
62334	Winnebago	69	SE	Faribault	200	37.2	-415.8	32.0	-415.8	SUOP
62382	Lena Tap	69	SE	Goodhue	650	36.8	-137.8	-412.0	-412	SUPK
62392	Lena	69	SE	Goodhue	650	36.2	-137.8	-412.0	-412	SUPK
60825	Wabasha	69	SE	Wabasha	0	33.9	47.2	-406.4	-406.4	SUPK
68868	Pine Creek	69	SE	Houston	0	31.0	-403.7	-41.4	-403.7	SUOP
68980	Twin Lakes	69	SE	Freeborn	652	37.9	-402.8	19.0	-402.8	SUOP
68982	Mansfield	69	SE	Freeborn	652	38.5	-402.8	19.0	-402.8	SUOP
62332	Clark	69	SE	Faribault	200	37.8	-397.3	34.8	-397.3	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60823	Red Wing	69	SE	Goodhue	650	32.9	-174.6	-395.6	-395.6	SUPK
34260	Delavan-Easton	69	SE	Faribault	200	37.1	-395.1	33.1	-395.1	SUOP
60112	Fort Ridgely	115	SE	Nicollet	0	35.2	-395.0	105.1	-395	SUOP
69141	Riceford	69	SE	Fillmore	400	35.9	-393.8	25.9	-393.8	SUOP
69177	Riceford Tap	69	SE	Fillmore	400	36.7	-393.8	61.5	-393.8	SUOP
61938	City of Wells	69	SE	Faribault	200	38.0	-392.4	33.1	-392.4	SUOP
60828	La Crescent	69	SE	Houston	0	31.8	-390.8	-40.2	-390.8	SUOP
60700	Lake Crystal	69	SE	Blue Earth	126	36.9	-389.9	-86.7	-389.9	SUOP
60808	Eagle Lake	69	SE	Blue Earth	126	36.6	-338.8	-388.6	-388.6	SUPK
61250	Jamestown Tap	69	SE	Blue Earth	126	37.1	-338.8	-388.0	-388	SUPK
60824	Frontenac	69	SE	Goodhue	650	36.0	-193.9	-387.5	-387.5	SUPK
34284	Minnesota Lake	69	SE	Faribault	200	37.1	-381.7	33.1	-381.7	SUOP
60866	City of Le Sueur	69	SE	Le Sueur	0	34.2	-380.4	21.3	-380.4	SUOP
60867	Le Sueur	69	SE	Le Sueur	0	34.3	-380.4	21.3	-380.4	SUOP
60868	Le Sueur Tap	69	SE	Sibley	0	36.2	-380.4	21.3	-380.4	SUOP
61960	Lake City	69	SE	Wabasha	0	36.1	-216.0	-380.2	-380.2	SUPK
62333	Easton	69	SE	Faribault	200	37.1	-377.3	33.1	-377.3	SUOP
60819	Cherry Tap	69	SE	Goodhue	650	37.3	-146.6	-372.1	-372.1	SUPK
62381	Cherry Grove	69	SE	Goodhue	650	37.7	-146.6	-372.1	-372.1	SUPK
62349	Rush River	69	SE	Nicollet	0	36.4	-371.8	1.1	-371.8	SUOP
69139	Spring Grove Municipal	69	SE	Houston	0	36.9	-369.4	29.7	-369.4	SUOP
69142	Spring Grove	69	SE	Houston	0	36.8	-369.4	52.8	-369.4	SUOP
60789	Circle Tap	69	SE	Rice	80	37.4	-188.3	-365.3	-365.3	SUPK
62871	Circle Lake	69	SE	Rice	80	37.0	-188.3	-365.3	-365.3	SUPK
62872	Faribault	69	SE	Rice	80	36.9	-188.3	-365.3	-365.3	SUPK
34300	Montgomery	69	SE	Le Sueur	0	37.4	-159.3	-362.7	-362.7	SUPK
34310	Montgomery Generator	13.8	SE	Le Sueur	0	37.4	-159.3	-362.7	-362.7	SUPK
62387	Spring Creek	69	SE	Goodhue	650	29.0	-159.0	-362.2	-362.2	SUPK
62340	New Sweden	69	SE	Nicollet	0	36.8	-359.4	-22.8	-359.4	SUOP
62341	NW Sweden Tap	69	SE	Nicollet	0	36.6	-359.4	-22.8	-359.4	SUOP
60817	Burnside	69	SE	Goodhue	650	29.0	-156.9	-357.6	-357.6	SUPK
60816	Butternut SS	69	SE	Blue Earth	126	36.9	-352.8	-89.0	-352.8	SUOP
62335	Butternut	69	SE	Blue Earth	126	36.9	-352.8	-89.0	-352.8	SUOP
60788	Valley Tap	69	SE	Rice	80	37.5	-190.9	-352.3	-352.3	SUPK

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62870	Valley Grove	69	SE	Rice	80	38.2	-190.9	-352.3	-352.3	SUPK
60111	Swan Lake	115	SE	Nicollet	0	36.3	-351.6	114.3	-351.6	SUOP
62350	Traverse	69	SE	Nicollet	0	36.7	-351.2	-36.0	-351.2	SUOP
62393	Spring Creek Transformer 1	13.8	SE	Goodhue	650	29.2	-152.8	-348.3	-348.3	SUPK
60826	Traverse	69	SE	Nicollet	0	36.5	-347.9	-39.1	-347.9	SUOP
68727	Caledonia	69	SE	Houston	0	35.0	-347.2	43.7	-347.2	SUOP
68737	Brownsville Tap	69	SE	Houston	0	32.9	-347.0	0.8	-347	SUOP
68739	Brownsville	69	SE	Houston	0	33.3	-347.0	0.8	-347	SUOP
61974	St Peter	69	SE	Nicollet	0	35.7	-345.5	-114.9	-345.5	SUOP
60827	Lake Emily	69	SE	Le Sueur	0	36.9	-344.6	-110.3	-344.6	SUOP
34265	Walters	69	SE	Faribault	200	38.5	-344.3	38.1	-344.3	SUOP
34302	Le Center	69	SE	Le Sueur	0	36.7	-343.0	-103.3	-343	SUOP
34303	Le Center	69	SE	Le Sueur	0	37.1	-343.0	-103.3	-343	SUOP
62673	St. Thomas	69	SE	Le Sueur	0	36.7	-343.0	-103.3	-343	SUOP
62681	Cleveland	69	SE	Le Sueur	0	37.1	-343.0	-103.3	-343	SUOP
62682	Montgomery	69	SE	Le Sueur	0	36.9	-343.0	-103.3	-343	SUOP
62691	St. Thomas	69	SE	Le Sueur	0	36.5	-343.0	-103.3	-343	SUOP
62394	Spring Creek Transformer 2	13.8	SE	Goodhue	650	29.0	-149.3	-340.5	-340.5	SUPK
62337	Jamestown	69	SE	Blue Earth	126	37.0	-339.9	-264.3	-339.9	SUOP
62351	Jamestown Tap	69	SE	Blue Earth	126	37.0	-339.9	-264.3	-339.9	SUOP
60818	Zumbrota	69	SE	Goodhue	650	37.3	-128.0	-338.4	-338.4	SUPK
60820	Lena Tap	69	SE	Goodhue	650	36.8	-128.0	-338.4	-338.4	SUPK
62807	Northstar Ethanol	69	SE	Blue Earth	126	37.0	-337.0	-90.2	-337	SUOP
62808	Northstar Ethanol North	69	SE	Blue Earth	126	36.9	-337.0	-90.2	-337	SUOP
62323	Penelope Tap	69	SE	Nicollet	0	36.0	-336.7	-98.8	-336.7	SUOP
62588	High Island	69	SE	Sibley	0	36.9	47.6	-330.0	-330	SUPK
34291	Albert Lea East	69	SE	Freeborn	652	37.2	-208.3	-329.3	-329.3	SUPK
62342	Penelope West	69	SE	Nicollet	0	35.4	-329.0	-84.6	-329	SUOP
62343	Penelope East	69	SE	Nicollet	0	36.0	-325.4	-136.5	-325.4	SUOP
62336	Johnson Tap	69	SE	Nicollet	0	33.8	-322.1	-175.4	-322.1	SUOP
60364	Lakefield	345	SE	Nicollet	0	36.1	-321.6	-72.9	-321.6	SUOP
60647	Key City Generator 2	13.8	SE	Nicollet	0	34.3	-318.2	-266.5	-318.2	SUOP
60648	Key City Generator 4	13.8	SE	Nicollet	0	34.3	-318.2	-266.5	-318.2	SUOP
60650	Wilmarth	69	SE	Nicollet	0	34.8	-318.2	-266.5	-318.2	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
61155	Johnson	69	SE	Blue Earth	126	35.0	-318.2	-266.5	-318.2	SUOP
62324	Johnson SS	69	SE	Nicollet	0	34.0	-318.2	-266.5	-318.2	SUOP
60830	Eastwood	115	SE	Blue Earth	126	36.3	-314.1	-65.7	-314.1	SUOP
62338	Hungry Hollow	69	SE	Blue Earth	126	35.4	-313.3	-266.5	-313.3	SUOP
60781	Minnesota Lake	69	SE	Blue Earth	126	36.8	-312.0	-68.2	-312	SUOP
60810	Pohl Road Tap	69	SE	Blue Earth	126	35.9	-312.0	-68.2	-312	SUOP
60811	Mapleton	69	SE	Blue Earth	126	36.5	-312.0	-68.2	-312	SUOP
60812	Ballard	69	SE	Blue Earth	126	36.0	-312.0	-68.2	-312	SUOP
60813	Sibley Park	69	SE	Blue Earth	126	34.5	-312.0	-68.2	-312	SUOP
62344	Decoria	69	SE	Blue Earth	126	36.4	-312.0	-68.2	-312	SUOP
62345	St. Clair	69	SE	Blue Earth	126	36.2	-312.0	-68.2	-312	SUOP
62346	St. Clair Tap	69	SE	Blue Earth	126	36.1	-312.0	-68.2	-312	SUOP
62878	Highway 30 SS	69	SE	Blue Earth	126	36.5	-312.0	-68.2	-312	SUOP
62879	Danville	69	SE	Blue Earth	126	36.8	-312.0	-68.2	-312	SUOP
60113	Dome Pipeline	115	SE	Blue Earth	126	36.2	-311.5	-62.7	-311.5	SUOP
36239	Pohl Road	115	SE	Blue Earth	126	36.0	-310.0	-66.9	-310	SUOP
60063	MEC CT Gen	15	SE	Blue Earth	126	34.8	-309.8	-60.8	-309.8	SUOP
60110	Wilmarth	115	SE	Blue Earth	126	34.8	-309.8	-60.8	-309.8	SUOP
60360	MEC CT Gen	115	SE	Blue Earth	126	34.8	-309.8	-60.8	-309.8	SUOP
60380	Summit Avenue	115	SE	Blue Earth	126	34.8	-309.8	-60.9	-309.8	SUOP
34301	New Prague	69	SE	Le Sueur	0	36.6	-179.1	-308.6	-308.6	SUPK
63082	Wilmarth Tertitary	12.5	SE	Blue Earth	126	34.8	-307.5	-64.3	-307.5	SUOP
60833	Spring Creek Tap	69	SE	Goodhue	650	29.0	-138.0	-307.4	-307.4	SUPK
60925	Hungry Hollow	115	SE	Blue Earth	126	35.9	-306.1	-68.2	-306.1	SUOP
34323	Wolf Creek	69	SE	Mower	1,647	37.4	-306.0	51.9	-306	SUOP
61984	North Austin	161	SE	Mower	1,647	36.6	-306.0	95.9	-306	SUOP
61985	Austin	69	SE	Mower	1,647	36.5	-306.0	40.5	-306	SUOP
61986	Austin	69	SE	Mower	1,647	36.6	-306.0	39.8	-306	SUOP
61988	Austin	69	SE	Mower	1,647	36.5	-306.0	95.9	-306	SUOP
61990	Blooming Prairie	69	SE	Dodge	2,461	37.3	-306.0	22.2	-306	SUOP
69052	Brownsdale	69	SE	Mower	1,647	37.7	-306.0	50.6	-306	SUOP
69077	Sargent	69	SE	Mower	1,647	38.2	-306.0	48.5	-306	SUOP
69084	Corning	69	SE	Freeborn	652	37.8	-306.0	20.0	-306	SUOP
69086	T Blooming Prairie	69	SE	Dodge	2,461	38.0	-306.0	22.0	-306	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
69100	Austin Tap	69	SE	Mower	1,647	37.5	-306.0	51.9	-306	SUOP
60062	MEC Station	20	SE	Blue Earth	126	33.9	-301.2	-77.2	-301.2	SUOP
60108	Wilmarth	345	SE	Blue Earth	126	34.8	-301.2	-77.2	-301.2	SUOP
60603	MEC	345	SE	Blue Earth	126	33.9	-301.2	-77.2	-301.2	SUOP
60782	Veseli	69	SE	Rice	80	37.4	-185.1	-297.0	-297	SUPK
60785	New Prague	69	SE	Le Sueur	0	36.2	-185.1	-297.0	-297	SUPK
60936	New Prague	69	SE	Le Sueur	0	36.6	-185.1	-297.0	-297	SUPK
61978	New Prague	69	SE	Le Sueur	0	36.2	-185.1	-297.0	-297	SUPK
34285	Alden	69	SE	Freeborn	652	38.7	-294.9	40.3	-294.9	SUOP
68984	Alden	69	SE	Freeborn	652	38.9	-294.9	27.2	-294.9	SUOP
68988	Freeborn	69	SE	Freeborn	652	38.6	-294.9	27.2	-294.9	SUOP
69326	Exol	69	SE	Freeborn	652	37.0	-292.5	16.6	-292.5	SUOP
60365	Lakefield	345	SE	Nicollet	0	36.2	-291.3	-110.0	-291.3	SUOP
68978	Glenville	69	SE	Freeborn	652	37.2	-280.7	16.3	-280.7	SUOP
62224	Ravenna	161	SE	Goodhue	650	34.0	-275.1	-164.6	-275.1	SUOP
62675	Assumption	69	SE	Sibley	0	36.4	34.7	-273.4	-273.4	SUPK
34286	Albert Lea	69	SE	Freeborn	652	37.6	-270.6	97.8	-270.6	SUOP
34287	South Broadway	69	SE	Freeborn	652	37.4	-270.6	62.6	-270.6	SUOP
34288	Albert Lea	69	SE	Freeborn	652	36.3	-270.6	41.0	-270.6	SUOP
34289	North Bridge	69	SE	Freeborn	652	37.7	-270.6	36.3	-270.6	SUOP
34292	Albert Lea 19th Street	69	SE	Freeborn	652	36.9	-270.6	54.5	-270.6	SUOP
34294	Hayward #28	69	SE	Freeborn	652	37.4	-270.6	38.9	-270.6	SUOP
34295	County Line	69	SE	Steele	35	37.7	-270.6	38.9	-270.6	SUOP
60780	Clarks Grove	69	SE	Freeborn	652	38.7	-270.6	43.9	-270.6	SUOP
62880	Matawan	69	SE	Waseca	105	37.8	-270.6	34.1	-270.6	SUOP
62881	St. Olaf Lake	69	SE	Waseca	105	38.1	-270.6	33.4	-270.6	SUOP
62887	St. Olaf Lake SS	69	SE	Steele	35	38.2	-270.6	43.9	-270.6	SUOP
69054	South Shore	69	SE	Freeborn	652	37.1	-270.6	58.1	-270.6	SUOP
69199	Bancroft	69	SE	Freeborn	652	37.4	-270.6	39.7	-270.6	SUOP
60786	Dundas	69	SE	Rice	80	37.4	-218.5	-264.5	-264.5	SUPK
68976	Glenville	69	SE	Freeborn	652	37.5	-255.8	15.6	-255.8	SUOP
62325	Blue Earth	69	SE	Faribault	200	36.7	-252.9	42.8	-252.9	SUOP
62386	Burnside Tap	69	SE	Goodhue	650	32.4	-110.5	-252.6	-252.6	SUPK
60822	Zumbro Falls	69	SE	Wabasha	0	34.8	-161.5	-247.0	-247	SUPK

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62383	Belvidere Mills	69	SE	Goodhue	650	36.6	-134.2	-245.3	-245.3	SUPK
62384	Belvidere Mills Tap	69	SE	Goodhue	650	37.7	-134.2	-245.3	-245.3	SUPK
61979	New Prague	69	SE	Le Sueur	0	36.8	-231.8	-242.3	-242.3	SUPK
60787	Northfield	69	SE	Rice	80	36.4	-233.4	-238.3	-238.3	SUPK
60003	Prairie Island Generator 1	20	SE	Goodhue	650	31.9	-237.6	62.2	-237.6	SUOP
60004	Prairie Island Generator 2	20	SE	Goodhue	650	31.9	-237.6	58.3	-237.6	SUOP
60105	Prairie Island	345	SE	Goodhue	650	31.9	-237.6	942.6	-237.6	SUOP
60667	Prairie Island	4	SE	Goodhue	650	34.0	-237.6	61.6	-237.6	SUOP
60668	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0	-237.6	SUOP
60669	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0	-237.6	SUOP
60670	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	58.3	-237.6	SUOP
60671	Prairie Island	4	SE	Goodhue	650	33.3	-237.6	54.0	-237.6	SUOP
60672	Prairie Island	4	SE	Goodhue	650	31.9	-237.6	54.0	-237.6	SUOP
62385	Goodhue	69	SE	Goodhue	650	38.1	-133.5	-236.5	-236.5	SUPK
62380	Wells Creek	69	SE	Goodhue	650	37.6	-133.3	-233.2	-233.2	SUPK
34293	Hayward #18	69	SE	Freeborn	652	37.4	-208.3	-40.4	-208.3	SUOP
34305	Glenville	69	SE	Freeborn	652	36.8	-208.3	-40.4	-208.3	SUOP
69009	Lerdal Tap	69	SE	Freeborn	652	38.2	-208.3	-40.4	-208.3	SUOP
69074	Riceland	69	SE	Freeborn	652	38.1	-208.3	-40.4	-208.3	SUOP
69076	Lerdal	69	SE	Freeborn	652	38.0	-208.3	-40.4	-208.3	SUOP
60804	Vasa Tap	69	SE	Goodhue	650	36.1	-83.5	-191.2	-191.2	SUPK
62388	Vasa	69	SE	Goodhue	650	36.9	-83.5	-191.2	-191.2	SUPK
62883	Bixby	69	SE	Steele	35	38.1	-186.4	-69.3	-186.4	SUOP
34010	Hayward	161	SE	Freeborn	652	37.3	-176.3	58.1	-176.3	SUOP
60070	Faribault Energy Park	13.8	SE	Rice	80	36.2	-171.3	-47.7	-171.3	SUOP
60384	Faribault Energy Park Tap	115	SE	Rice	80	36.2	-171.3	-47.7	-171.3	SUOP
60106	Prairie Island	161	SE	Goodhue	650	31.9	31.8	-169.0	-169	SUPK
62391	Hader	69	SE	Goodhue	650	38.0	-96.1	-164.9	-164.9	SUPK
62865	Airtech Park	115	SE	Rice	80	36.2	-159.5	-47.7	-159.5	SUOP
60265	Loon Lake Tap	115	SE	Waseca	105	37.2	-156.8	185.3	-156.8	SUOP
60803	Miesville Tap	69	SE	Goodhue	650	34.5	-56.0	-143.4	-143.4	SUPK
60107	West Faribault	115	SE	Rice	80	35.4	-143.2	-47.7	-143.2	SUOP
60264	Loon Lake	115	SE	Waseca	105	37.5	-131.3	112.0	-131.3	SUOP
62876	French Lake Tap	69	SE	Rice	80	37.1	-130.2	36.7	-130.2	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
62877	French Lake	69	SE	Rice	80	36.9	-130.2	36.7	-130.2	SUOP
62390	South Cannon Falls	69	SE	Goodhue	650	37.1	-83.1	-124.6	-124.6	SUPK
61976	Loon Lake	69	SE	Waseca	105	37.5	-116.5	-119.4	-119.4	SUPK
62260	Byllesby	69	SE	Goodhue	650	33.7	-49.9	-118.5	-118.5	SUPK
61950	Byron	345	SE	Olmsted	1,800	37.5	-118.4	763.0	-118.4	SUOP
60644	Janesville	24	SE	Waseca	105	37.5	-116.2	17.4	-116.2	SUOP
60806	Waseca	69	SE	Waseca	105	37.2	-116.2	72.8	-116.2	SUOP
60829	Waseca	69	SE	Waseca	105	37.2	-116.1	42.0	-116.1	SUOP
60802	Cannon Falls	69	SE	Goodhue	650	34.3	-78.1	-111.8	-111.8	SUPK
34308	Waseca Tap	69	SE	Waseca	105	37.3	-111.0	42.0	-111	SUOP
61160	Merdian	69	SE	Waseca	105	37.1	-108.7	43.8	-108.7	SUOP
34299	Waseca Junction	69	SE	Steele	35	37.2	-107.3	49.2	-107.3	SUOP
60646	Byllesbye	12.5	SE	Goodhue	650	35.3	-75.7	-106.0	-106	SUPK
61952	South Faribault	161	SE	Rice	80	34.3	-103.3	146.1	-103.3	SUOP
68725	Henry TP	69	SE	Fillmore	400	37.2	-102.8	63.6	-102.8	SUOP
68822	Henerytown	69	SE	Fillmore	400	36.1	-102.8	49.0	-102.8	SUOP
69137	Canton City	69	SE	Fillmore	400	37.5	-102.4	26.1	-102.4	SUOP
69150	Canton	69	SE	Fillmore	400	36.9	-102.4	64.6	-102.4	SUOP
34298	Medford Junction SS	69	SE	Steele	35	36.8	-94.2	-55.2	-94.2	SUOP
62873	Claremont SS	69	SE	Dodge	2,461	38.0	-94.2	-55.2	-94.2	SUOP
62882	Merton	69	SE	Steele	35	38.2	-94.2	-55.2	-94.2	SUOP
62886	Owatonna	69	SE	Steele	35	37.5	-94.2	-55.2	-94.2	SUOP
34279	Pratt Tap	69	SE	Steele	35	37.1	-91.8	-69.3	-91.8	SUOP
34296	Steele Center	69	SE	Steele	35	37.6	-91.8	-69.3	-91.8	SUOP
61968	Owatana	69	SE	Steele	35	37.2	-91.8	-68.9	-91.8	SUOP
61972	West Owatonna	69	SE	Steele	35	37.1	-91.8	-69.3	-91.8	SUOP
62884	River Point	69	SE	Steele	35	37.3	-91.8	-69.3	-91.8	SUOP
62885	Pratt	69	SE	Steele	35	37.4	-91.8	-69.3	-91.8	SUOP
61964	West Owatonna	161	SE	Steele	35	36.7	-81.5	183.5	-81.5	SUOP
62867	Al-Corn	161	SE	Dodge	2,461	37.7	-53.3	200.6	-53.3	SUOP
68713	Saint Charles	69	SE	Winona	0	36.9	-39.9	48.4	-39.9	SUOP
68716	Stockton Tap	69	SE	Winona	0	36.2	-39.4	89.3	-39.4	SUOP
68717	Stockton	69	SE	Winona	0	35.2	-39.4	20.2	-39.4	SUOP
60503	Hampton Corners	345	SE	Goodhue	650	37.0	-39.3	1384.1	-39.3	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
60731	Green Isle	69	SE	Sibley	0	36.4	-38.8	-29.8	-38.8	SUOP
69527	Harmony	161	SE	Fillmore	400	37.8	-38.3	101.4	-38.3	SUOP
60726	Gibbon	69	SE	Sibley	0	37.4	-37.4	31.8	-37.4	SUOP
62075	Cornish	69	SE	Sibley	0	37.2	-36.9	43.0	-36.9	SUOP
60725	Winthrop	69	SE	Sibley	0	37.0	-36.7	76.0	-36.7	SUOP
62078	Heartland	69	SE	Sibley	0	36.9	-36.7	69.5	-36.7	SUOP
60692	Crystal Foods	69	SE	Sibley	0	36.6	-36.3	43.5	-36.3	SUOP
60729	Gaylord	69	SE	Sibley	0	36.6	-36.3	46.7	-36.3	SUOP
34321	Lewiston	69	SE	Winona	0	36.2	-35.9	42.9	-35.9	SUOP
34322	Rushford Municipal	69	SE	Fillmore	400	29.1	-35.9	42.7	-35.9	SUOP
60730	Arlington	69	SE	Sibley	0	36.4	-35.9	32.3	-35.9	SUOP
68718	Rushford Villiage	69	SE	Fillmore	400	29.3	-35.9	42.7	-35.9	SUOP
68732	Witoka Tap	69	SE	Winona	0	36.4	-35.9	48.8	-35.9	SUOP
68733	Witoka	69	SE	Winona	0	36.0	-35.9	28.9	-35.9	SUOP
68734	Wilson	69	SE	Winona	0	36.4	-35.9	48.8	-35.9	SUOP
68735	Rushford	69	SE	Fillmore	400	32.7	-35.9	48.8	-35.9	SUOP
68774	Utica	69	SE	Winona	0	36.2	-35.9	113.2	-35.9	SUOP
60719	Lafayette	69	SE	Nicollet	0	37.0	-35.1	34.8	-35.1	SUOP
62079	Lafayette	69	SE	Nicollet	0	37.2	-34.9	36.9	-34.9	SUOP
62674	Jessenland	69	SE	Sibley	0	36.6	-34.6	15.1	-34.6	SUOP
62692	Jessenland	69	SE	Sibley	0	36.4	-34.6	15.1	-34.6	SUOP
60724	Henderson	69	SE	Sibley	0	36.6	-33.3	16.7	-33.3	SUOP
62076	Schilling	69	SE	Nicollet	0	36.7	-33.3	40.7	-33.3	SUOP
62077	Schilling Tap	69	SE	Nicollet	0	36.7	-33.3	40.7	-33.3	SUOP
60938	Fort Ridgely	69	SE	Nicollet	0	35.2	-33.2	53.2	-33.2	SUOP
68720	Lewiston	69	SE	Winona	0	36.5	-29.0	18.7	-29	SUOP
68773	Lewiston	69	SE	Winona	0	36.7	-29.0	87.7	-29	SUOP
68704	Lanesboro	69	SE	Fillmore	400	34.2	-22.2	18.1	-22.2	SUOP
68721	Peterson	69	SE	Fillmore	400	34.0	-22.2	90.8	-22.2	SUOP
61992	Preston	69	SE	Fillmore	400	34.1	-16.7	30.6	-16.7	SUOP
61994	N Preston	69	SE	Fillmore	400	34.8	-16.7	54.9	-16.7	SUOP
68700	Preston Tap	69	SE	Fillmore	400	36.2	-16.7	85.7	-16.7	SUOP
68722	Peterson Tap	69	SE	Fillmore	400	35.0	-16.7	17.0	-16.7	SUOP
69305	N Preston T	69	SE	Fillmore	400	34.1	-16.7	92.4	-16.7	SUOP

Appendix C - Screening Steps

All SE Planning Zone Buses (sorted by Minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
69140	Granger	69	SE	Fillmore	400	37.4	-16.2	73.6	-16.2	SUOP
69304	Harmoy City	69	SE	Fillmore	400	37.7	-15.6	72.5	-15.6	SUOP
68726	Harmony	69	SE	Fillmore	400	37.8	-15.3	84.9	-15.3	SUOP
68706	Whitewater Tap	69	SE	Olmsted	1,800	37.9	18.9	17.5	17.5	SUPK
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1	18.4	SUOP
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0	18.4	SUOP
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3	18.6	SUOP
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9	19.8	SUOP
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0	20	SUOP
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3	22	SUOP
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8	34.4	SUOP
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0	36.3	SUOP
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0	39.8	SUOP
69160	Little Valley	69	SE	Olmsted	1,800	37.8	42.5	48.0	42.5	SUOP
69322	Quincy	69	SE	Olmsted	1,800	36.5	47.4	47.6	47.4	SUOP
69159	Eyota	69	SE	Olmsted	1,800	37.1	47.6	47.8	47.6	SUOP
68712	Chatfield	69	SE	Olmsted	1,800	37.4	47.8	48.1	47.8	SUOP
34316	Dover	69	SE	Olmsted	1,800	37.0	48.6	49.3	48.6	SUOP
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1	49.2	SUOP
34317	Eyota	69	SE	Olmsted	1,800	37.8	49.5	50.6	49.5	SUOP
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5	52.3	SUOP
68719	Weaver	69	SE	Wabasha	0	32.1	86.4	86.6	86.4	SUOP
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4	89.1	SUOP
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9	190	SUOP

Appendix C - Screening Steps

SE Planning Zone - Eliminating all buses with combined FCITC less than zero (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
68706	Whitewater Tap	69	SE	Olmsted	1,800	37.9	18.9	17.5	17.5	SUPK
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1	18.4	SUOP
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0	18.4	SUOP
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3	18.6	SUOP
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9	19.8	SUOP
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0	20	SUOP
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3	22	SUOP
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8	34.4	SUOP
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0	36.3	SUOP
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0	39.8	SUOP
69160	Little Valley	69	SE	Olmsted	1,800	37.8	42.5	48.0	42.5	SUOP
69322	Quincy	69	SE	Olmsted	1,800	36.5	47.4	47.6	47.4	SUOP
69159	Eyota	69	SE	Olmsted	1,800	37.1	47.6	47.8	47.6	SUOP
68712	Chatfield	69	SE	Olmsted	1,800	37.4	47.8	48.1	47.8	SUOP
34316	Dover	69	SE	Olmsted	1,800	37.0	48.6	49.3	48.6	SUOP
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1	49.2	SUOP
34317	Eyota	69	SE	Olmsted	1,800	37.8	49.5	50.6	49.5	SUOP
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5	52.3	SUOP
68719	Weaver	69	SE	Wabasha	0	32.1	86.4	86.6	86.4	SUOP
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4	89.1	SUOP
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9	190	SUOP

Appendix C - Screening Steps

SE Planning Zone - Eliminating all buses with combined FCITC < 0 and bus voltage below 23 kV and above 230 kV (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
68706	Whitewater Tap	69	SE	Olmsted	1,800	37.9	18.9	17.5	17.5	SUPK
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0	18.4	SUOP
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1	18.4	SUOP
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3	18.6	SUOP
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9	19.8	SUOP
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0	20	SUOP
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3	22	SUOP
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8	34.4	SUOP
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0	36.3	SUOP
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0	39.8	SUOP
69160	Little Valley	69	SE	Olmsted	1,800	37.8	42.5	48.0	42.5	SUOP
69322	Quincy	69	SE	Olmsted	1,800	36.5	47.4	47.6	47.4	SUOP
69159	Eyota	69	SE	Olmsted	1,800	37.1	47.6	47.8	47.6	SUOP
68712	Chatfield	69	SE	Olmsted	1,800	37.4	47.8	48.1	47.8	SUOP
34316	Dover	69	SE	Olmsted	1,800	37.0	48.6	49.3	48.6	SUOP
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1	49.2	SUOP
34317	Eyota	69	SE	Olmsted	1,800	37.8	49.5	50.6	49.5	SUOP
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5	52.3	SUOP
68719	Weaver	69	SE	Wabasha	0	32.1	86.4	86.6	86.4	SUOP
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4	89.1	SUOP
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9	190	SUOP

Appendix C - Screening Steps

SE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, and NCF < 35 % (sorted by min. FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC	
									Value	Name
68706	Whitewater Tap	69	SE	Olmsted	1,800	37.9	18.9	17.5	17.5	SUPK
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0	18.4	SUOP
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1	18.4	SUOP
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3	18.6	SUOP
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9	19.8	SUOP
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0	20	SUOP
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3	22	SUOP
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8	34.4	SUOP
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0	36.3	SUOP
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0	39.8	SUOP
69160	Little Valley	69	SE	Olmsted	1,800	37.8	42.5	48.0	42.5	SUOP
69322	Quincy	69	SE	Olmsted	1,800	36.5	47.4	47.6	47.4	SUOP
69159	Eyota	69	SE	Olmsted	1,800	37.1	47.6	47.8	47.6	SUOP
68712	Chatfield	69	SE	Olmsted	1,800	37.4	47.8	48.1	47.8	SUOP
34316	Dover	69	SE	Olmsted	1,800	37.0	48.6	49.3	48.6	SUOP
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1	49.2	SUOP
34317	Eyota	69	SE	Olmsted	1,800	37.8	49.5	50.6	49.5	SUOP
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5	52.3	SUOP
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4	89.1	SUOP
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9	190	SUOP

Appendix C - Screening Steps

SE Planning Zone - Eliminating all buses with combined FCITC < 0, bus voltage below 23 kV and above 230 kV, NCF < 35 %, and MISO Queue Generation < 500 MW (sorted by minimum FCITC)

5 - digit Bus Number	Substation Name	Bus kV	Planning Zone	County	Queue Gen in	Wind Profile 2-mile radius w/o lakes	SUOP FCITC	SUPK FCITC	Minimum FCITC Value	Minimum FCITC Name	
68709	Zumbro	69	SE	Wabasha	0	35.9	18.4	19.1	18.4	SUOP	
68711	West Albany	69	SE	Wabasha	0	35.5	18.4	19.0	18.4	SUOP	
68705	Whitewater	69	SE	Winona	0	35.9	18.6	19.3	18.6	SUOP	
68707	Zumbro Tap	69	SE	Wabasha	0	35.9	19.8	19.9	19.8	SUOP	
68703	Plainview	69	SE	Wabasha	0	36.3	20.0	21.0	20	SUOP	
69158	Plainview Tap	69	SE	Wabasha	0	36.4	22.0	23.3	22	SUOP	
60724	Henderson	69	SE	Sibley	0	42.8	-33.3	16.7	26.2	SUOP	FCITC = -33.2 in initial results
69198	Wabaco	69	SE	Wabasha	0	35.5	34.4	38.8	34.4	SUOP	
34319	Plainview	69	SE	Wabasha	0	36.5	36.3	41.0	36.3	SUOP	
34318	Elgin	69	SE	Wabasha	0	36.9	39.8	45.0	39.8	SUOP	
34325	St. Charles	69	SE	Winona	0	37.1	49.2	50.1	49.2	SUOP	
34320	St. Charles	69	SE	Winona	0	37.1	52.3	54.5	52.3	SUOP	
68726	Harmony	69	SE	Fillmore	400	44.3	-15.3	84.9	73.3	SUOP	FCITC = -15.3 in initial results
60938	Fort Ridgely	69	SE	Nicollet	0	41.5	-33.2	53.2	83.6	SUOP	FCITC = -33.2 in initial results
60779	Altura	69	SE	Winona	0	35.9	89.1	90.4	89.1	SUOP	
69549	Wabaco	161	SE	Wabasha	0	35.3	190.0	266.9	190	SUOP	

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Stafford		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Stafford 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9241 STAFFORD 6 9244 MALUNG 6 1	41	2.3	1	79.9	32.76	SYSTEM INTACT		NOT SAF
		0.2	0.1	116.3	47.68	9241 STAFFORD 6 9243 POLARIS8 6 1		SAF
		4.8	2	113.8	46.66	9242 ROSEAU 8 6 9243 POLARIS8 6 1		SAF
		4.8	2	113.9	46.71	9242 ROSEAU 8 6 9484 SALOL 8 6 1		SAF
		7.7	3.2	108.1	44.32	9483 SALOLTAP 6 9484 SALOL 8 6 1		SAF
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	22.8	9.11	SYSTEM INTACT		NOT SAF
		96.9	38.7	106.9	42.75	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1	40	19	7.6	20.8	8.33	SYSTEM INTACT		NOT SAF
		95.1	38	105	42.01	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6 67017 RUNNING8 1	40	17.7	7.1	19.6	7.84	SYSTEM INTACT		NOT SAF
		93.9	37.6	103.8	41.53	66753 RUNNING4 66760 LUND 4 1		SAF
9483 SALOLTAP 6 9484 SALOL 8 6 1	40.6	6.8	2.8	28.1	11.39	SYSTEM INTACT		NOT SAF
		7.9	3.2	115.8	47.03	9241 STAFFORD 6 9244 MALUNG 6 1		SAF
		11.6	4.7	111.2	45.15	9244 MALUNG 6 9245 PENCER 6 1		SAF
		11.7	4.8	111	45.07	9245 PENCER 6 9483 SALOLTAP 6 1		SAF

Appendix D - AC Analysis

Stafford 35MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9241 STAFFORD 6	9244 MALUNG 6	1	41	2.3	1	68.8	28.22	SYSTEM INTACT		NOT SAF
				0.2	0.1	100.1	41.05	9241 STAFFORD 6 9243 POLARIS8 6 1		SAF
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22.6	9.03	SYSTEM INTACT		NOT SAF
				96.9	38.7	105.8	42.3	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	20.6	8.25	SYSTEM INTACT		NOT SAF
				95.1	38	103.9	41.57	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	19.4	7.75	SYSTEM INTACT		NOT SAF
				93.9	37.6	102.7	41.08	66753 RUNNING4 66760 LUND 4 1		SAF

Stafford 30MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_STAFF				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22.1	8.83	SYSTEM INTACT		NOT SAF
				96.9	38.7	105.2	42.08	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	20.1	8.05	SYSTEM INTACT		NOT SAF
				95.1	38	103.4	41.35	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	18.9	7.57	SYSTEM INTACT		NOT SAF
				93.9	37.6	102.1	40.86	66753 RUNNING4 66760 LUND 4 1		SAF

Stafford 25MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_25MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	21.9	8.75	SYSTEM INTACT		NOT SAF
				96.9	38.7	103.9	41.55	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	19.9	7.97	SYSTEM INTACT		NOT SAF
				95.1	38	102	40.82	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	18.7	7.48	SYSTEM INTACT		NOT SAF
				93.9	37.6	100.8	40.33	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Stafford 20MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_20MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	21.9	8.76	SYSTEM INTACT		NOT SAF
				96.9	38.7	102.7	41.07	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	19.9	7.98	SYSTEM INTACT		NOT SAF
				95.1	38	100.9	40.34	66753 RUNNING4 66760 LUND 4 1		SAF
60290 ST LAKE5	69561 WASHCO 5	1	132	7.2	9.48	6.9	9.09	SYSTEM INTACT		NOT SAF
				102.9	135.82	103.7	136.86	39450 ST LAKE 39449 ARROWHD 1	SW962	SAF
				102.9	135.82	103.7	136.86	60290 ST LAKE5 61631 MINONG 5 1	SW962	SAF

Stafford 15MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_15MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	21.7	8.69	SYSTEM INTACT		NOT SAF
				96.9	38.7	101	40.4	66753 RUNNING4 66760 LUND 4 1		SAF

Stafford 10MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_10MW_STAFFORD				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Compton		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Compton 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_COMPTON				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
38809 533-TIE 38810 WADENA 1	34	28.4	9.6	125	42.5	SYSTEM INTACT		SAF
		28.9	9.8	131.6	44.74	60101 FORBES 2 60198 CHIS-N 2 1		SAF
		28.9	9.8	131.6	44.75	60197 CHIS CO2 60198 CHIS-N 2 1		SAF
		28.8	9.8	139.1	47.28	62893-63058-62894 WINGRIV4 230/115/13 1		SAF
		28.8	9.8	139.1	47.28	62894-63058-62893 WINGRIV4 230/115/13 1		SAF
		28.9	9.8	139.4	47.38	63058-62893-62894 WINGRIV4 230/115/13 1	SW1128	SAF
38810 WADENA 38811 CMPTN TP 1	34	7.5	2.5	137.6	46.78	SYSTEM INTACT		SAF
		13.8	4.7	143.7	48.87	60101 FORBES 2 60198 CHIS-N 2 1		SAF
		13.8	4.7	143.7	48.87	60197 CHIS CO2 60198 CHIS-N 2 1		SAF
		7.4	2.5	150.6	51.2	62893-63058-62894 WINGRIV4 230/115/13 1		SAF
		7.4	2.5	150.6	51.2	62894-63058-62893 WINGRIV4 230/115/13 1		SAF
		7.5	2.5	150.9	51.29	63058-62893-62894 WINGRIV4 230/115/13 1	SW1128	SAF
38811 CMPTN TP 62914 COMPTON9 1	22.7	6.4	1.4	216.6	49.17	SYSTEM INTACT		SAF
		6.4	1.5	225.7	51.23	60101 FORBES 2 60198 CHIS-N 2 1		SAF
		6.4	1.5	225.7	51.24	60197 CHIS CO2 60198 CHIS-N 2 1		SAF
		7.4	2.5	235.8	53.53	62893-63058-62894 WINGRIV4 230/115/13 1		SAF
		7.4	2.5	235.8	53.53	62894-63058-62893 WINGRIV4 230/115/13 1		SAF
		6.4	1.4	236.3	53.63	63058-62893-62894 WINGRIV4 230/115/13 1	SW1128	SAF

Appendix D - AC Analysis

Compton 35MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_COMPTON				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38809 533-TIE	38810 WADENA	1	34	28.4	9.6	97	32.98	SYSTEM INTACT		NOT SAF
				28.9	9.8	109	37.07	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				29.2	9.9	110	37.41	61642 VERNDLE7 62893 WINGRIV7 1		SAF
				29.3	10	111.1	37.77	62893-63058-62894 WINGRIV4 230/115/13 1	SW1052	SAF
				29.3	10	111.1	37.77	63052 INMAN 4 63058 WINGRIV4 1	SW1052	SAF
				29.3	10	111.1	37.77	63058 WINGRIV4 61612 RIVERTN4 1	SW1052	SAF
38810 WADENA	38811 CMPTN TP	1	34	7.5	2.5	110.9	37.7	SYSTEM INTACT		SAF
				7.5	2.5	122.4	41.6	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				7.3	2.5	123.3	41.91	61642 VERNDLE7 62893 WINGRIV7 1		SAF
				7.3	2.5	124.3	42.26	62893-63058-62894 WINGRIV4 230/115/13 1	SW1052	SAF
				7.3	2.5	124.3	42.26	63052 INMAN 4 63058 WINGRIV4 1	SW1052	SAF
				7.3	2.5	124.3	42.26	63058 WINGRIV4 61612 RIVERTN4 1	SW1052	SAF
38811 CMPTN TP	62914 COMPTON9	1	22.7	6.4	1.4	176.4	40.04	SYSTEM INTACT		SAF
				6.4	1.4	193.3	43.87	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				7.3	2.5	194.6	44.18	61642 VERNDLE7 62893 WINGRIV7 1		SAF
				6.5	1.5	196.1	44.52	62893-63058-62894 WINGRIV4 230/115/13 1	SW1052	SAF
				6.5	1.5	196.1	44.52	63052 INMAN 4 63058 WINGRIV4 1	SW1052	SAF
				6.5	1.5	196.1	44.52	63058 WINGRIV4 61612 RIVERTN4 1	SW1052	SAF

Compton 30MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_COMPTON				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38811 CMPTN TP	62914 COMPTON9	1	22.7	6.4	1.4	144.7	32.85	SYSTEM INTACT		SAF
				6.4	1.4	153.8	34.92	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				6.5	1.5	153.3	34.81	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
				6.5	1.5	153.3	34.81	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
				6.5	1.5	153.3	34.81	63058 WINGRIV4 61612 RIVERTN4 1	SW1015	SAF
				6.4	1.4	153.8	34.92	63058 WINGRIV4 63052 INMAN 4 1	SW1128	SAF
66773 ULRICH 9	66781 ULRICH T	1	15	23.9	3.58	23.9	3.58	SYSTEM INTACT		NOT SAF
				188.7	28.3	201	30.15	63238 WINGER 7 66786 WINGER T 1	SW209	SAF

Appendix D - AC Analysis

Compton 25MW											
Output File:			SUOP_NW_Base Case		SUOP_NW_25MW_COMPTON						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
38811 CMPTN TP	62914 COMPTON9	1	22.7	6.4	1.4	117.3	26.62	SYSTEM INTACT				SAF
				6.4	1.4	123.2	27.96	61612 RIVERTN4	63058 WINGRIV4	1	SW1128	SAF
				6.5	1.5	122.5	27.81	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				6.5	1.5	122.5	27.81	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				6.5	1.5	122.5	27.81	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
				6.4	1.4	123.2	27.96	63058 WINGRIV4	63052 INMAN 4	1	SW1128	SAF

Compton 20MW											
Output File:			SUOP_NW_Base Case		SUOP_NW_20MW_COMPTON						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Moranvi		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 21 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Moranville 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	22.9	9.16	SYSTEM INTACT		NOT SAF
		96.9	38.7	108	43.18	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1	40	19	7.6	21	8.38	SYSTEM INTACT		NOT SAF
		95.1	38	106.1	42.46	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6 67017 RUNNING8 1	40	17.7	7.1	19.7	7.9	SYSTEM INTACT		NOT SAF
		93.9	37.6	105	41.99	66753 RUNNING4 66760 LUND 4 1		SAF

Moranville 35MW

Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	23	9.19	SYSTEM INTACT		NOT SAF
		96.9	38.7	106.7	42.68	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1	40	19	7.6	21	8.41	SYSTEM INTACT		NOT SAF
		95.1	38	104.9	41.95	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6 67017 RUNNING8 1	40	17.7	7.1	19.7	7.89	SYSTEM INTACT		NOT SAF
		93.9	37.6	103.7	41.47	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Moranville 30MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22.7	9.08	SYSTEM INTACT		NOT SAF
				96.9	38.7	105.2	42.08	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	20.7	8.3	SYSTEM INTACT		NOT SAF
				95.1	38	103.4	41.35	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	19.5	7.78	SYSTEM INTACT		NOT SAF
				93.9	37.6	102.2	40.88	66753 RUNNING4 66760 LUND 4 1		SAF

Moranville 25								
Output File:		SUOP_NW_Base Case		SUOP_NW_25MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22.3	8.91	SYSTEM INTACT		NOT SAF
				96.9	38.7	104.3	41.73	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	20.3	8.13	SYSTEM INTACT		NOT SAF
				95.1	38	102.5	41	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	19.1	7.62	SYSTEM INTACT		NOT SAF
				93.9	37.6	101.3	40.52	66753 RUNNING4 66760 LUND 4 1		SAF

Mornville 20MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_20MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22	8.8	SYSTEM INTACT		NOT SAF
				96.9	38.7	102.8	41.14	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	20.1	8.02	SYSTEM INTACT		NOT SAF
				95.1	38	101	40.41	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Moranville 15MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_15MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	21.7	8.7	SYSTEM INTACT		NOT SAF
				96.9	38.7	101.1	40.43	66753 RUNNING4 66760 LUND 4 1		SAF

Moranville10MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_10MW_MORANVI				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Nashua		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 21 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Nashua 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_NASHUA				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	5.4	0.9	5.4	0.93	SYSTEM INTACT		NOT SAF
		23.3	4	211.7	36.62	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		24.9	4.3	210.2	36.37	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7163 CASCJT 4 7164 DALTON 4 1	34	3.6	1.2	3.6	1.23	SYSTEM INTACT		NOT SAF
		12.7	4.3	107.1	36.41	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		13.5	4.6	106.4	36.16	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7164 DALTON 4 62538 TEN MIL9 1	34	2	0.7	2	0.68	SYSTEM INTACT		NOT SAF
		11	3.8	108.1	36.76	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		11.8	4	107.4	36.5	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 62538 TEN MIL9 1	34	0	0	0	0	SYSTEM INTACT		NOT SAF
		9.2	3.1	109.1	37.08	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		10	3.4	108.3	36.82	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	15.5	3.2	179.6	37.72	SYSTEM INTACT		SAF
		15.4	3.2	180.1	37.82	61590 BISON 14 66756 SQBUTTE4 1		SAF
		15.4	3.2	180	37.79	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		15.4	3.2	179.9	37.78	63369 JAMESTN3 66791 CENTER 3 1		SAF
7198 CATSEYE 4 7200 ASHBYJT 4 1	34	9.5	3.2	110.9	37.7	SYSTEM INTACT		SAF
		9.5	3.2	111.2	37.8	61590 BISON 14 66756 SQBUTTE4 1		SAF
		9.5	3.2	111.1	37.77	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		9.5	3.2	111.1	37.76	63369 JAMESTN3 66791 CENTER 3 1		SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	12.4	2.6	182.3	38.29	SYSTEM INTACT		SAF
		12.3	2.6	182.8	38.39	61590 BISON 14 66756 SQBUTTE4 1		SAF
		12.4	2.6	182.7	38.36	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		12.4	2.6	182.6	38.35	63369 JAMESTN3 66791 CENTER 3 1		SAF

Appendix D - AC Analysis

Nashua 40MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_NASHUA				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7200 ASHBYJT 4 7201 ELBOWJ 4 1	34	10.4	3.5	110.2	37.48	SYSTEM INTACT		SAF
		10.3	3.5	110.5	37.58	61590 BISON 14 66756 SQBUTTE4 1		SAF
		10.3	3.5	110.5	37.55	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		10.3	3.5	110.4	37.55	63369 JAMESTN3 66791 CENTER 3 1		SAF
7204 NASUAJCT 4 7205 NASHUA 41 1	18	1.9	0.3	225	40.5	SYSTEM INTACT		SAF
		34.8	11.7	225.4	40.58	61590 BISON 14 66756 SQBUTTE4 1		SAF
		34.9	11.7	225.3	40.56	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		34.9	11.7	225.3	40.55	63369 JAMESTN3 66791 CENTER 3 1		SAF
7204 NASUAJCT 4 8786 WENDEL 4 1	24	9.5	2.3	10.7	2.56	SYSTEM INTACT		NOT SAF
		4.1	1	162.5	39	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		1.4	0.3	165.3	39.68	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
7215 ELBOWLK 4 63220 ELBOWLK7 1	33.6	35.1	11.8	101.7	34.16	SYSTEM INTACT		SAF
		34.8	11.7	102.3	34.37	61590 BISON 14 66756 SQBUTTE4 1		SAF
		34.9	11.7	102.1	34.31	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		34.9	11.7	102.1	34.29	63369 JAMESTN3 66791 CENTER 3 1		SAF
7449 HERMAN 4 8786 WENDEL 4 1	24	7.1	1.7	8	1.93	SYSTEM INTACT		NOT SAF
		6.5	1.6	160	38.39	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		3.8	0.9	162.8	39.07	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
63123 HOOT LK9 63223 HOOT LK7 1	27	28.9	7.8	29.1	7.85	SYSTEM INTACT		NOT SAF
		40.9	11	126.6	34.18	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		42	11.3	125.7	33.95	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF

Appendix D - AC Analysis

Nashua 35MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_NASHUA				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	5.4	0.9	5.4	0.93	SYSTEM INTACT		NOT SAF
		23.3	4	185.3	32.05	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		24.9	4.3	183.8	31.8	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	15.5	3.2	157.5	33.07	SYSTEM INTACT		SAF
		15.4	3.2	158	33.18	61590 BISON 14 66756 SQBUTTE4 1		SAF
		15.4	3.2	157.9	33.15	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		15.4	3.2	157.8	33.14	63369 JAMESTN3 66791 CENTER 3 1		SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	12.4	2.6	160.1	33.62	SYSTEM INTACT		SAF
		12.3	2.6	160.6	33.73	61590 BISON 14 66756 SQBUTTE4 1		SAF
		12.4	2.6	160.5	33.7	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		12.4	2.6	160.4	33.68	63369 JAMESTN3 66791 CENTER 3 1		SAF
7204 NASUAJCT 4 7205 NASHUA 4 1	18	1.9	0.3	198.6	35.76	SYSTEM INTACT		SAF
		1.9	0.3	199.2	35.85	61590 BISON 14 66756 SQBUTTE4 1		SAF
		1.9	0.3	199	35.82	63314 BIGSTON4 63315 BIGSTN1G 1		SAF
		1.9	0.3	199	35.81	63369 JAMESTN3 66791 CENTER 3 1		SAF
7204 NASUAJCT 4 8786 WENDEL 4 1	24	9.5	2.3	10.4	2.5	SYSTEM INTACT		NOT SAF
		4.1	1	142.6	34.23	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		1.4	0.3	145.3	34.87	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
7449 HERMAN 4 8786 WENDEL 4 1	24	7.1	1.7	7.9	1.89	SYSTEM INTACT		NOT SAF
		6.5	1.6	140.2	33.66	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		3.8	0.9	142.9	34.3	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
63123 HOOT LK9 63223 HOOT LK7 1	27	28.9	7.8	29	7.84	SYSTEM INTACT		NOT SAF
		40.9	11	110.6	29.85	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		42	11.3	109.8	29.63	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF

Appendix D - AC Analysis

Nashua 30MW										
Output File:			SUOP_NW_BaseCase		SUOP_NW_30MW_NASHUA					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7198 CATSEYE 4	7199 WENDEL 4	1	21	15.5	3.2	181.5	38.11	SYSTEM INTACT				SAF
				15.4	3.2	209.1	43.92	39449 ARROWHD 39450 ST LAKE		1		SAF
				15.5	3.3	208.7	43.83	61625 BLCKBRY4 61624 FORBES 4		1	SW1073	SAF
				15.5	3.3	208.7	43.83	61625 BLCKBRY4 61624 FORBES 4		1	SW1075	SAF
				15.5	3.3	208.7	43.83	61626 BOSWELL4 61625 BLCKBRY4		1	SW1073	SAF
				15.5	3.2	209.1	43.91	64896 MCCOOL 3 66571 GR ISLD3		1		SAF
7198 CATSEYE 4	7200 ASHBYJT 4	1	34	9.5	3.2	112.5	38.24	SYSTEM INTACT				SAF
				9.5	3.2	130.5	44.38	39449 ARROWHD 39450 ST LAKE		1		SAF
				9.5	3.2	130.5	44.37	61625 BLCKBRY4 61624 FORBES 4		1	SW1073	SAF
				9.5	3.2	130.5	44.37	61625 BLCKBRY4 61624 FORBES 4		1	SW1075	SAF
				9.5	3.2	130.5	44.37	61626 BOSWELL4 61625 BLCKBRY4		1	SW1073	SAF
				9.5	3.2	130.8	44.46	64896 MCCOOL 3 66571 GR ISLD3		1		SAF
7199 WENDEL 4	7204 NASUAJCT 4	1	21	12.4	2.6	183	38.43	SYSTEM INTACT				SAF
				12.4	2.6	209.2	43.92	39449 ARROWHD 39450 ST LAKE		1		SAF
				12.5	2.6	210.6	44.22	61612 RIVERTN4 61617 MUDLAKE4		1	SW1112	SAF
				12.5	2.6	210.6	44.22	61612 RIVERTN4 61617 MUDLAKE4		1	SW1113	SAF
				12.5	2.6	210.6	44.22	61612 RIVERTN4 63058 WINGRIV4		1	SW1112	SAF
				12.5	2.6	210.6	44.22	61612 RIVERTN4 63058 WINGRIV4		1	SW1113	SAF
7200 ASHBYJT 4	7201 ELBOWJ 4	1	34	10.4	3.5	112.2	38.15	SYSTEM INTACT				SAF
				10.4	3.5	130.6	44.39	61625 BLCKBRY4 61624 FORBES 4		1	SW1073	SAF
				10.4	3.5	130.6	44.39	61625 BLCKBRY4 61624 FORBES 4		1	SW1075	SAF
				10.4	3.5	130.6	44.39	61626 BOSWELL4 61625 BLCKBRY4		1	SW1073	SAF
				10.4	3.5	130.6	44.39	61626 BOSWELL4 61625 BLCKBRY4		1	SW1075	SAF
				10.4	3.5	130.8	44.48	64896 MCCOOL 3 66571 GR ISLD3		1		SAF
7204 NASUAJCT 4	7205 NASHUA 4	1	18	1.9	0.3	224.3	40.38	SYSTEM INTACT				SAF
				1.9	0.4	256.4	46.15	61612 RIVERTN4 61617 MUDLAKE4		1	SW1112	SAF
				1.9	0.4	256.4	46.15	61612 RIVERTN4 61617 MUDLAKE4		1	SW1113	SAF
				1.9	0.4	256.4	46.15	61612 RIVERTN4 63058 WINGRIV4		1	SW1112	SAF
				1.9	0.4	256.4	46.15	61612 RIVERTN4 63058 WINGRIV4		1	SW1113	SAF
				1.9	0.4	254.2	45.76	61643 EAGLVLY7 62893 WINGRIV7		1	sw51	SAF
7215 ELBOWLK 4	63220 ELBOWLK7	1	33.6	35.1	11.8	113.5	38.13	SYSTEM INTACT				SAF
				35	11.8	137.4	46.18	39449 ARROWHD 39450 ST LAKE		1		SAF
				35.1	11.8	137.4	46.17	61625 BLCKBRY4 61624 FORBES 4		1	SW1073	SAF

Appendix D - AC Analysis

Nashua 30MW								
Output File:		SUOP_NW_BaseCase		SUOP_NW_30MW_NASHUA				SIGNIFICANTLY
CIRCUIT/WINDING # NAME # TO # NAME # CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
		35.1	11.8	137.4	46.17	61625 BLCKBRY4 61624 FORBES 4 1	SW1075	SAF
		35.1	11.8	137.4	46.17	61626 BOSWELL4 61625 BLCKBRY4 1	SW1073	SAF
		35.1	11.8	137.7	46.28	64896 MCCOOL 3 66571 GR ISLD3 1		SAF

Nashua 25MW								
Output File:		SUOP_NW_BaseCase		SUOP_NW_25MW_NASHUA				SIGNIFICANTLY
CIRCUIT/WINDING # NAME # TO # NAME # CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	5.4	0.9	5.4	0.93	SYSTEM INTACT		NOT SAF
		23.3	4	168.6	29.17	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		24.9	4.3	168.2	29.1	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	15.5	3.2	127.7	26.81	SYSTEM INTACT		SAF
		15.7	3.3	131.1	27.53	63051 HENNING4 63052 INMAN 4 1		SAF
		15.9	3.3	131.7	27.65	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		15.7	3.3	132	27.71	63314 BIGSTON4 66503 BLAIR 4 1		SAF
		14.9	3.1	139.7	29.34	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		15	3.1	140.2	29.45	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	12.4	2.6	129.9	27.28	SYSTEM INTACT		SAF
		12.6	2.6	133.3	27.99	63051 HENNING4 63052 INMAN 4 1		SAF
		12.8	2.7	133.9	28.12	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		12.7	2.7	134.2	28.18	63314 BIGSTON4 66503 BLAIR 4 1		SAF
		12	2.5	142	29.82	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		12	2.5	142.5	29.92	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7204 NASUAJCT 4 7205 NASHUA 4 1	18	1.9	0.3	162.3	29.21	SYSTEM INTACT		SAF
		2	0.4	167.1	30.08	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		2	0.4	167.5	30.15	63314 BIGSTON4 66503 BLAIR 4 1		SAF
		2	0.4	166.5	29.97	66318 MORRIS 9 66555 MORRIS 7 1	SW257	SAF
		1.9	0.3	176.9	31.84	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		1.9	0.3	177.5	31.95	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF

Appendix D - AC Analysis

Nashua 20MW									
Output File:		SUOP_NW_BaseCase		SUOP_NW_20MW_NASHUA					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7163 CASCJT	4 63123 HOOT LK9	1	17.3	5.4	0.9	5.4	0.93	SYSTEM INTACT				NOT SAF
				23.3	4	113.6	19.65	7198 CATSEYE	4 7200 ASHBYJT	4 1	SW204	SAF
				24.9	4.3	112.7	19.49	7200 ASHBYJT	4 7201 ELBOWJ	4 1	SW204	SAF
7199 WENDEL	4 7204 NASUAJCT	4 1	21	12.4	2.6	96.8	20.32	SYSTEM INTACT				NOT SAF
				12.7	2.7	100.4	21.08	63219 GRANTCO7	69413 EFERGUS7	1		SAF
				12.8	2.7	101.1	21.24	63223 HOOT LK7	69413 EFERGUS7	1		SAF
7204 NASUAJCT	4 7205 NASHUA	4 1	18	1.9	0.3	123.5	22.22	SYSTEM INTACT				SAF
				1.9	0.3	126.3	22.73	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF
				2	0.4	128	23.03	63219 GRANTCO7	69413 EFERGUS7	1		SAF
				2	0.4	128.9	23.19	63223 HOOT LK7	69413 EFERGUS7	1		SAF
				2	0.4	126.3	22.74	63314 BIGSTON4	66503 BLAIR 4	1		SAF
				2	0.4	126.3	22.74	63331 FERGSFL4	63366 SILVRLK4	1		SAF

Nashua 15MW									
Output File:		SUOP_NW_BaseCase		SUOP_NW_15MW_NASHUA					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Osage		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 21 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Osage 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
38781 LLCAPBNK 38783 OSAGE MP 1	34	33.4	11.4	94.8	32.24	SYSTEM INTACT		NOT SAF
		22.4	7.6	104.2	35.41	62413 PINEPT 9 62414 OSAGE 9 1		SAF
38781 LLCAPBNK 62421 LONG LK9 1	34	33.4	11.4	94.8	32.24	SYSTEM INTACT		NOT SAF
		22.4	7.6	104.2	35.41	62413 PINEPT 9 62414 OSAGE 9 1		SAF
38783 OSAGE MP 62414 OSAGE 9 1	18.1	62.8	11.4	178.4	32.3	SYSTEM INTACT		SAF
		62.6	11.3	179.2	32.43	61578 MUDLKJCT 61617 MUDLAKE4 1	SW1110	SAF
		62.6	11.3	179.2	32.43	61617 MUDLAKE4 63045 BENTON 4 1	SW1110	SAF
		42.1	7.6	196	35.47	62413 PINEPT 9 62414 OSAGE 9 1		SAF
		62.4	11.3	179.3	32.45	63202 AUDUBONY 63236 AUDUBON7 1		SAF

Osage 35MW

Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
38783 OSAGE MP 62414 OSAGE 9 1	18.1	62.8	11.4	157	28.42	SYSTEM INTACT		SAF
		62.6	11.3	158.9	28.75	61610 BADOURA4 63053 HUBBARD4 1	SW1101	SAF
		62.6	11.3	158.9	28.75	61612 RIVERTN4 61610 BADOURA4 1	SW1101	SAF
		62.6	11.3	172.7	31.25	62413 PINEPT 9 62414 OSAGE 9 1		SAF
		62.5	11.3	159.7	28.9	63369 JAMESTN3 66791 CENTER 3 1		SAF

Appendix D - AC Analysis

Osage 30MW									
Output File:			SUOP_NW_Base Case		SUOP_NW_30MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38783 OSAGE MP	62414 OSAGE 9	1	18.1	62.8	11.4	125.6	22.74	SYSTEM INTACT		SAF
				62.6	11.3	136.6	24.72	62413 PINEPT 9 62414 OSAGE 9 1		SAF

Osage 25MW									
Output File:			SUOP_NW_Base Case		SUOP_NW_25MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38783 OSAGE MP	62414 OSAGE 9	1	18.1	62.8	11.4	93.1	16.86	SYSTEM INTACT		NOT SAF
				62.6	11.3	105.5	19.09	62413 PINEPT 9 62414 OSAGE 9 1		SAF

Osage 20MW									
Output File:			SUOP_NW_Base Case		SUOP_NW_20MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	65.9	288.59	SYSTEM INTACT		NOT SAF
				108.8	476.38	109	477.39	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				108.8	476.38	109	477.39	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF
				108.8	476.38	109	477.39	61626 BOSWELL4 61625 BLCKBRY4 1	SW1089	SAF

Osage 15MW									
Output File:			SUOP_NW_Base Case		SUOP_NW_15MW_OSAGE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone contingency analysis summary - Parker		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 21 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Parker 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_PARKER.				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7197 PARKERS 4 62547 PRKPRTP9 1	24	14.5	3.5	161	38.64	SYSTEM INTACT		SAF
		14.6	3.5	162	38.88	63051 HENNING4 63052 INMAN 4 1	SW1014	SAF
		14.6	3.5	162	38.89	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		14.6	3.5	162	38.88	63331 FERGSFL4 63366 SILVRLK4 1	SW1014	SAF
		14.5	3.5	162.7	39.04	7206 CARLSJCT 4 62772 CARLOS 9 1	SW246	SAF
7197 PARKERS 4 62548 PRPPRSW9 1	24	27.5	6.6	149.2	35.82	SYSTEM INTACT		SAF
		27.7	6.7	150.3	36.08	63051 HENNING4 63052 INMAN 4 1	SW1014	SAF
		27.8	6.7	150.4	36.1	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		27.7	6.7	150.3	36.08	63331 FERGSFL4 63366 SILVRLK4 1	SW1014	SAF
		27.5	6.6	151.1	36.27	7206 CARLSJCT 4 62772 CARLOS 9 1	SW246	SAF
62539 PRKR PR9 62547 PRKPRTP9 1	23.8	14.6	3.5	162.4	38.65	SYSTEM INTACT		SAF
		14.8	3.5	163.4	38.88	63051 HENNING4 63052 INMAN 4 1	SW1014	SAF
		14.8	3.5	163.4	38.89	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		14.8	3.5	163.4	38.88	63331 FERGSFL4 63366 SILVRLK4 1	SW1014	SAF
		14.6	3.5	164.1	39.05	7206 CARLSJCT 4 62772 CARLOS 9 1	SW246	SAF
62548 PRPPRSW9 62773 MILTONA9 1	27.4	24.1	6.6	130.7	35.8	SYSTEM INTACT		SAF
		24.3	6.7	131.6	36.07	63051 HENNING4 63052 INMAN 4 1	SW1014	SAF
		24.3	6.7	131.7	36.08	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		24.3	6.7	131.6	36.07	63331 FERGSFL4 63366 SILVRLK4 1	SW1014	SAF
		24.1	6.6	132.3	36.26	7206 CARLSJCT 4 62772 CARLOS 9 1	SW246	SAF
62753 MILTONA7 62773 MILTONA9 1	30	55	16.5	111	33.29	SYSTEM INTACT		SAF
		56.1	16.8	112.7	33.8	63051 HENNING4 63052 INMAN 4 1	SW1014	SAF
		55.5	16.7	112.7	33.8	63051 HENNING4 63309 HENNING9 1	SW1014	SAF
		55.8	16.7	112.7	33.82	63223 HOOT LK7 69413 EFERGUS7 1		SAF
		56.1	16.8	112.7	33.8	63331 FERGSFL4 63366 SILVRLK4 1	SW1014	SAF

Appendix D - AC Analysis

Parker 35MW										
Output File:			SUOP_NW_Base Case		SUOP_NW_35MW_PARKER.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS 4	62547 PRKPRTP9	1	24	14.5	3.5	160.4	38.5	SYSTEM INTACT				SAF
				14.7	3.5	163.8	39.31	63051 HENNING4	63052 INMAN 4	1	SW1013	SAF
				14.7	3.5	163.8	39.31	63051 HENNING4	63309 HENNING9	1	SW1013	SAF
				14.7	3.5	163.8	39.31	63331 FERGSFL4	63194 FERGSFLY	1	SW1013	SAF
				14.7	3.5	163.8	39.31	63331 FERGSFL4	63329 WAHPETN4	1	SW1013	SAF
				14.7	3.5	163.8	39.31	63331 FERGSFL4	63366 SILVRLK4	1	SW1013	SAF
7197 PARKERS 4	62548 PRPPRSW9	1	24	27.5	6.6	147.3	35.36	SYSTEM INTACT				SAF
				27.8	6.7	150.6	36.13	63051 HENNING4	63052 INMAN 4	1	SW1013	SAF
				27.8	6.7	150.6	36.13	63051 HENNING4	63309 HENNING9	1	SW1013	SAF
				27.8	6.7	150.6	36.13	63331 FERGSFL4	63194 FERGSFLY	1	SW1013	SAF
				27.8	6.7	150.6	36.13	63331 FERGSFL4	63329 WAHPETN4	1	SW1013	SAF
				27.8	6.7	150.6	36.13	63331 FERGSFL4	63366 SILVRLK4	1	SW1013	SAF
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	14.6	3.5	161.8	38.51	SYSTEM INTACT				SAF
				14.8	3.5	165.2	39.32	63051 HENNING4	63052 INMAN 4	1	SW1013	SAF
				14.8	3.5	165.2	39.32	63051 HENNING4	63309 HENNING9	1	SW1013	SAF
				14.8	3.5	165.2	39.32	63331 FERGSFL4	63194 FERGSFLY	1	SW1013	SAF
				14.8	3.5	165.2	39.32	63331 FERGSFL4	63329 WAHPETN4	1	SW1013	SAF
				14.8	3.5	165.2	39.32	63331 FERGSFL4	63366 SILVRLK4	1	SW1013	SAF
62548 PRPPRSW9	62773 MILTONA9	1	27.4	24.1	6.6	129	35.34	SYSTEM INTACT				SAF
				24.3	6.7	131.8	36.12	63051 HENNING4	63052 INMAN 4	1	SW1013	SAF
				24.3	6.7	131.8	36.12	63051 HENNING4	63309 HENNING9	1	SW1013	SAF
				24.3	6.7	131.8	36.12	63331 FERGSFL4	63194 FERGSFLY	1	SW1013	SAF
				24.3	6.7	131.8	36.12	63331 FERGSFL4	63329 WAHPETN4	1	SW1013	SAF
				24.3	6.7	131.8	36.12	63331 FERGSFL4	63366 SILVRLK4	1	SW1013	SAF
62753 MILTONA7	62773 MILTONA9	1	30	55	16.5	114.7	34.42	SYSTEM INTACT				SAF
				55.5	16.7	117.9	35.38	63051 HENNING4	63052 INMAN 4	1	SW1013	SAF
				55.5	16.7	117.9	35.38	63051 HENNING4	63309 HENNING9	1	SW1013	SAF
				55.5	16.7	117.9	35.38	63331 FERGSFL4	63194 FERGSFLY	1	SW1013	SAF
				55.5	16.7	117.9	35.38	63331 FERGSFL4	63329 WAHPETN4	1	SW1013	SAF
				55.5	16.7	117.9	35.38	63331 FERGSFL4	63366 SILVRLK4	1	SW1013	SAF

Appendix D - AC Analysis

Parker 30MW									
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_PARKER.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS	4 62547 PRKPRTP9	1	24	14.5	3.5	128.2	30.76	SYSTEM INTACT		SAF
				14.7	3.5	140.3	33.68	62752 MLTN TP7 67471 ALEXTAP7 1		SAF
				14.7	3.5	130.8	31.4	63051 HENNING4 63052 INMAN 4 1		SAF
				14.7	3.5	130.7	31.37	63329 WAHPETN4 63191 WAHPET1Y 1	SW1006	SAF
				14.7	3.5	130.7	31.37	63331 FERGSFL4 63329 WAHPETN4 1	SW1006	SAF
				14.7	3.5	130.7	31.37	66754 MAPLE R4 66750 FRNTIER4 1	SW1006	SAF
7197 PARKERS	4 62548 PRPPRSW9	1	24	27.5	6.6	115.4	27.7	SYSTEM INTACT		SAF
				27.8	6.7	127	30.49	62752 MLTN TP7 67471 ALEXTAP7 1		SAF
				27.8	6.7	118	28.31	63051 HENNING4 63052 INMAN 4 1		SAF
				27.9	6.7	117.8	28.28	63329 WAHPETN4 63191 WAHPET1Y 1	SW1006	SAF
				27.9	6.7	117.8	28.28	63331 FERGSFL4 63329 WAHPETN4 1	SW1006	SAF
				27.9	6.7	117.8	28.28	66754 MAPLE R4 66750 FRNTIER4 1	SW1006	SAF
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	14.6	3.5	129.3	30.77	SYSTEM INTACT		SAF
				14.8	3.5	141.6	33.69	62752 MLTN TP7 67471 ALEXTAP7 1		SAF
				14.8	3.5	132	31.41	63051 HENNING4 63052 INMAN 4 1		SAF
				14.8	3.5	131.8	31.38	63329 WAHPETN4 63191 WAHPET1Y 1	SW1006	SAF
				14.8	3.5	131.8	31.38	63331 FERGSFL4 63329 WAHPETN4 1	SW1006	SAF
				14.8	3.5	131.8	31.38	66754 MAPLE R4 66750 FRNTIER4 1	SW1006	SAF
62548 PRPPRSW9	62773 MILTONA9	1	27.4	24.1	6.6	101	27.68	SYSTEM INTACT		SAF
				24.3	6.7	111.2	30.47	62752 MLTN TP7 67471 ALEXTAP7 1		SAF
				24.4	6.7	103.3	28.3	63051 HENNING4 63052 INMAN 4 1		SAF
				24.4	6.7	103.1	28.26	63329 WAHPETN4 63191 WAHPET1Y 1	SW1006	SAF
				24.3	6.7	103.1	28.26	63331 FERGSFL4 63329 WAHPETN4 1	SW1006	SAF
				24.4	6.7	103.1	28.26	66754 MAPLE R4 66750 FRNTIER4 1	SW1006	SAF

Appendix D - AC Analysis

Parker 25MW											
Output File:				SUOP_NW SS_Base Case		SUOP_NW_25MW_PRKR.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS	4 62547 PRKPRTP9	1	24	14.5	3.5	102.8	24.67	SYSTEM INTACT				SAF
				14.7	3.5	109.5	26.28	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				14.7	3.5	105.2	25.26	63051 HENNING4	63052 INMAN 4	1	SW1014	SAF
				14.7	3.5	105.2	25.26	63051 HENNING4	63309 HENNING9	1	SW1014	SAF
				14.7	3.5	105.2	25.26	63052 INMAN 4	62531 INMAN 7	1	SW1014	SAF
				14.7	3.5	105.2	25.26	63331 FERGSFL4	63366 SILVRLK4	1	SW1014	SAF
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	14.6	3.5	103.7	24.68	SYSTEM INTACT				SAF
				14.8	3.8	110.5	26.29	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				14.8	3.8	106.2	25.27	63051 HENNING4	63052 INMAN 4	1	SW1014	SAF
				14.8	3.8	106.2	25.27	63051 HENNING4	63309 HENNING9	1	SW1014	SAF
				14.8	3.8	106.2	25.27	63052 INMAN 4	62531 INMAN 7	1	SW1014	SAF
				14.8	3.8	106.2	25.27	63331 FERGSFL4	63366 SILVRLK4	1	SW1014	SAF

Parker 20MW											
Output File:				SUOP_NWS_Base Case		SUOP_NW_20MW_PRKR.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Shooks		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 21 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Shooks 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_SHOOK				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9268 BIG FALS	6 67017 RUNNING8	1	40	6.4	2.6	98.1	39.23	SYSTEM INTACT		NOT SAF
				6.4	2.6	100.1	40.03	61564 FORB4JCT 61624 FORBES 4 2	SW1095	SAF
				6.4	2.6	100.1	40.03	61624 FORBES 4 61623 MINNTAC4 1	SW1095	SAF
				6.4	2.6	100.1	40.04	61626 BOSWELL4 61775 BOSWE44G 1	SW1084	SAF
				6.4	2.6	103.6	41.42	66753 RUNNING4 66760 LUND 4 1		SAF
				6.4	2.6	100.2	40.07	67564 DORSEY 2 67598 DORSY2M4 51		SAF
66753 RUNNING4	66779 RUNNINST	1	81	30	24.3	75.9	61.51	SYSTEM INTACT		NOT SAF
				69.5	56.3	120.2	97.33	66753 RUNNING4 66760 LUND 4 1		SAF
66779 RUNNINST	66780 RUNNINU8	1	70	34.7	24.3	87.9	61.51	SYSTEM INTACT		NOT SAF
				80.4	56.3	139	97.33	66753 RUNNING4 66760 LUND 4 1		SAF

Shooks 35MW

Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_SHOOK				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
66753 RUNNING4	66779 RUNNINST	1	81	30	24.3	69.8	56.51	SYSTEM INTACT		NOT SAF
				69.5	56.3	115.7	93.69	66753 RUNNING4 66760 LUND 4 1		SAF
66779 RUNNINST	66780 RUNNINU8	1	70	34.7	24.3	80.7	56.51	SYSTEM INTACT		NOT SAF
				80.4	56.3	133.8	93.69	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Shooks 30MW												
Output File:				SUOP_NW_Base Case		SUOP_NW_30MW_SHOOK						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
66753	RUNNING4	66779	RUNNINST	1	81	30	24.3	62.1	50.27	SYSTEM INTACT				NOT SAF
						69.5	56.3	107.7	87.28	66753 RUNNING4	66760 LUND	4 1		SAF
66779	RUNNINST	66780	RUNNINU8	1	70	34.7	24.3	71.8	50.27	SYSTEM INTACT				NOT SAF
						80.4	56.3	124.7	87.28	66753 RUNNING4	66760 LUND	4 1		SAF

Shooks 25MW												
Output File:				SUOP_NW_Base Case		SUOP_NW_25MW_SHOOK						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
66779	RUNNINST	66780	RUNNINU8	1	70	34.7	24.3	64.2	44.94	SYSTEM INTACT				NOT SAF
						80.4	56.3	115.2	80.66	66753 RUNNING4	66760 LUND	4 1		SAF

Shooks 20MW												
Output File:				SUOP_NW_Base Case		SUOP_NW_20MW_SHOOK						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
66779	RUNNINST	66780	RUNNINU8	1	70	34.7	24.3	56	39.23	SYSTEM INTACT				NOT SAF
						80.4	56.3	106.3	74.44	66753 RUNNING4	66760 LUND	4 1		SAF

Shooks 15MW												
Output File:				SUOP_NW_Base Case		SUOP_NW_15MW_SHOOK						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NW Planning Zone single site contingency analysis summary - Williams		
Date:	9/8/2009 10:37	
Date of Run:	MAY 30 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Williams 40MW

Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9256 WILLMS T 6 66999 MORANVI8 1	41.8	0	0	0	0	SYSTEM INTACT		NOT SAF
		3.9	1.6	102	42.63	9256 WILLMS T 6 9258 PITT 6 1	SW624	SAF
		8.3	3.5	101.4	42.39	9258 PITT 6 66801 LUND 8 1	SW624	SAF
9256 WILLMS T 6 9257 WILLIAMS 6 1	40	2.3	0.9	98.9	39.56	SYSTEM INTACT		NOT SAF
		2.3	0.9	103.7	41.48	60192 BLUE LK3 60233 PARKERS3 1		SAF
		2.3	0.9	103.7	41.48	62128-63040-62130 BLAINE 4 230/69/13 1	sw6	SAF
		3.1	1.2	106.6	42.64	9256 WILLMS T 6 9258 PITT 6 1	SW624	SAF
		3	1.2	109.7	43.89	9258 PITT 6 66801 LUND 8 1	SW624	SAF
		2.3	0.9	104.8	41.93	9269 BIRCHDAL 6 9270 LOMAN 6 1		SAF
9256 WILLMS T 6 9258 PITT 6 1	39	3	1.2	101.4	39.55	SYSTEM INTACT		SAF
		3	1.2	106.3	41.47	60192 BLUE LK3 60233 PARKERS3 1		SAF
		3	1.2	106.3	41.47	62128-63040-62130 BLAINE 4 230/69/13 1	sw6	SAF
		3	1.2	106.3	41.47	62925-63030-63081 DICKNSN3 345/115/12 1		SAF
		3	1.2	106.3	41.47	63290 HARVEY 4 63307 HARVEY Y 1	SW5003	SAF
		3	1.2	107.5	41.92	9269 BIRCHDAL 6 9270 LOMAN 6 1		SAF
9258 PITT 6 66801 LUND 8 1	40	6	2.4	95.4	38.17	SYSTEM INTACT		NOT SAF
		6	2.4	100.1	40.06	60192 BLUE LK3 60233 PARKERS3 1		SAF
		6	2.4	100.1	40.06	62128-63040-62130 BLAINE 4 230/69/13 1	sw6	SAF
		6	2.4	100.1	40.06	62925-63030-63081 DICKNSN3 345/115/12 1		SAF
		6	2.4	100.1	40.06	63290 HARVEY 4 63307 HARVEY Y 1	SW5003	SAF
		6	2.4	101.2	40.5	9269 BIRCHDAL 6 9270 LOMAN 6 1		SAF
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	28.8	11.51	SYSTEM INTACT		NOT SAF
		96.9	38.7	114.1	45.65	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Williams 40MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_40MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	26.9	10.74	SYSTEM INTACT		NOT SAF
				95.1	38	112.3	44.92	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	25.6	10.26	SYSTEM INTACT		NOT SAF
				93.9	37.6	111.1	44.44	66753 RUNNING4 66760 LUND 4 1		SAF

Williams 35MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	28.7	11.47	SYSTEM INTACT		NOT SAF
				96.9	38.7	112	44.82	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	26.7	10.7	SYSTEM INTACT		NOT SAF
				95.1	38	110.2	44.09	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	25.4	10.18	SYSTEM INTACT		NOT SAF
				93.9	37.6	109	43.62	66753 RUNNING4 66760 LUND 4 1		SAF
63223 HOOT LK7	69413 EFERGUS7	1	88	75.7	66.66	76	66.85	SYSTEM INTACT		NOT SAF
				119.6	96.5	114	100.3	63331 FERGSFL4 63366 SILVRLK4 1		SAF

Williams 30MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	26.8	10.73	SYSTEM INTACT		NOT SAF
				96.9	38.7	110.4	44.15	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	24.9	9.96	SYSTEM INTACT		NOT SAF
				95.1	38	108.5	43.41	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	23.7	9.47	SYSTEM INTACT		NOT SAF
				93.9	37.6	107.3	42.93	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Williams 25MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_25MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	26.6	10.66	SYSTEM INTACT		NOT SAF
				96.9	38.7	108.3	43.31	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	24.7	9.88	SYSTEM INTACT		NOT SAF
				95.1	38	106.5	42.58	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	23.4	9.35	SYSTEM INTACT		NOT SAF
				93.9	37.6	105.3	42.1	66753 RUNNING4 66760 LUND 4 1		SAF

Williams 20MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_20MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	25.5	10.18	SYSTEM INTACT		NOT SAF
				96.9	38.7	106.3	42.53	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	23.5	9.4	SYSTEM INTACT		NOT SAF
				95.1	38	104.5	41.8	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	22.2	8.89	SYSTEM INTACT		NOT SAF
				93.9	37.6	103.3	41.32	66753 RUNNING4 66760 LUND 4 1		SAF
66773 ULRICH 9	66781 ULRICH T	1	15	23.9	3.58	23.9	3.58	SYSTEM INTACT		NOT SAF
				188.7	28.3	199.7	29.95	63238 WINGER 7 66786 WINGER T 1	SW209	SAF

Williams 15MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_15MW_WILLIAMS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	24.3	9.7	SYSTEM INTACT		NOT SAF
				96.9	38.7	104.4	41.77	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	22.3	8.92	SYSTEM INTACT		NOT SAF
				95.1	38	102.6	41.04	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	21	8.41	SYSTEM INTACT		NOT SAF
				93.9	37.6	101.4	40.56	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Williams 10MW											
Output File:			SUOP_NW_Base Case		SUOP_NW_10MW_WILLIAMS						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	23.2	9.29	SYSTEM INTACT				NOT SAF
				96.9	38.7	101.9	40.76	66753 RUNNING4	66760 LUND 4	1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	21.3	8.51	SYSTEM INTACT				NOT SAF
				95.1	38	100.1	40.03	66753 RUNNING4	66760 LUND 4	1		SAF

Appendix D - AC Analysis

SUOP NE Planning zone singel site contingency analysis summary - Verndale		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Verndale 40MW

Output File:		SUOP_NE_Base Case		SUOP_NE_40MW_VERNDALE				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone single site contingency analysis summary - Bena		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Bena 40MW

Output File:		SUOP_NE_Base Case		SUOP_NE_40MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
62480 BENA 8	62483 BENA TP8	1	27.7	4.3	1.2	150.8	41.78	SYSTEM INTACT		SAF
				4.3	1.2	153.1	42.41	61640 BADOURA7 62412 TRIPPLK7 1		SAF
				4.4	1.2	153.6	42.54	61748 BOSWELL7 61790 COHSSTTP 1		SAF
				4.4	1.2	153.1	42.4	62177 BIRCHLK7 62412 TRIPPLK7 1		SAF
				4.4	1.2	153.1	42.4	62177-62209-62214 BIRCHLK7 115/69/13 1		SAF
				4.4	1.2	156.1	43.25	62482 SALEMSW8 62483 BENA TP8 1		SAF

Bena 35MW

Output File:		SUOP_NE_Base Case		SUOP_NE_35MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
62480 BENA 8	62483 BENA TP8	1	27.7	4.3	1.2	133	36.84	SYSTEM INTACT		SAF
				4.4	1.2	134.5	37.25	61739 BLCKBRY7 61781 20L TAP7 1		SAF
				4.4	1.2	134.3	37.19	61790 COHSSTTP 61791 LAKEHD 7 1		SAF
				4.4	1.2	137.9	38.21	62479 BALLCLB8 62483 BENA TP8 1		SAF
				4.4	1.2	140.1	38.82	62479 BALLCLB8 62487 DEER RV8 1		SAF
				4.4	1.2	133.9	37.1	62482 SALEMSW8 62483 BENA TP8 1		SAF

Appendix D - AC Analysis

Bena 30MW								
Output File:		SUOP_NE_Base Case		SUOP_NE_30MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
62480 BENA 8 62483 BENA TP8 1	27.7	4.3	1.2	113	31.31	SYSTEM INTACT		SAF
		4.3	1.2	116	32.13	61640 BADOURA7 62412 TRIPPLK7 1		SAF
		4.3	1.2	116	32.12	62177 BIRCHLK7 62412 TRIPPLK7 1		SAF
		4.3	1.2	115.9	32.12	62177-62209-62214 BIRCHLK7 115/69/13 1		SAF
		4.3	1.2	115.1	31.89	62475 GUNN 8 62484 ARBO TP8 1		SAF
		4.3	1.2	115.2	31.9	62484 ARBO TP8 62487 DEER RV8 1		SAF

Bena 25MW								
Output File:		SUOP_NE_Base Case		SUOP_NE_25MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone single site contingency analysis summary - Dewing		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Dewing 40MW

Output File:		SUOP_NE_Base Case		SUOP_NE_40MW_DEWING				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone single site contingency analysis summary - Hubbard		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hubbard 40MW

Output File:		SUOP_NESS_Base Case		SUOP_NE_40MW_HUBBARD				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone single site contingency analysis summary - National		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

National 40MW

Output File:				SUOP_NE_Base Case		SUOP_NE_40MW_NATIONAL					
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone single site contingency analysis summary - Palmer Lake		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Palmer Lake 40MW

Output File:		SUOP_NE_Base Case		SUOP_NE_40MW_PALMER LAKE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	66	289.18	SYSTEM INTACT		NOT SAF
				108.8	476.38	109.2	478.4	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				108.8	476.38	109.2	478.4	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF

Palmer Lake 35MW

Output File:		SUOP_NE_Base Case		SUOP_NE_35MW_PALMRER				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	66	289.04	SYSTEM INTACT		NOT SAF
				108.8	476.38	109.2	478.14	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				108.8	476.38	109.2	478.14	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF

Palmer Lake 30MW

Output File:		SUOP_NE_Base Case		SUOP_NE_30MW_PALMRER				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	66	288.89	SYSTEM INTACT		NOT SAF
				108.8	476.38	109.1	477.89	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				108.8	476.38	109.1	477.89	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF

Appendix D - AC Analysis

Palmer Lake 25MW											
Output File:			SUOP_NE_Base Case		SUOP_NE_25MW_PALMRER						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	65.9	288.74	SYSTEM INTACT				NOT SAF
				108.8	476.38	109.1	477.64	61625 BLCKBRY4	61626 BOSWELL4	1		SAF
				108.8	476.38	109.1	477.64	61626 BOSWELL4	61625 BLCKBRY4	1	SW1088	SAF

Palmer Lake 20MW											
Output File:			SUOP_NE_Base Case		SUOP_NE_20MW_PALMRER						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	65.9	288.59	SYSTEM INTACT				NOT SAF
				108.8	476.38	109	477.39	61625 BLCKBRY4	61626 BOSWELL4	1		SAF
				108.8	476.38	109	477.39	61626 BOSWELL4	61625 BLCKBRY4	1	SW1088	SAF

Palmer Lake 15MW											
Output File:			SUOP_NE_Base Case		SUOP_NE_15MW_PALMRER						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NE Planning zone contingency analysis Pine Lake site summary		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	AUG 27 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Pine Lake 40MW									
Output File:			SUOP_NE_BaseCase		SUOP_NE_40MW_PineLake				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38854 BERTRAM	61836 SWANVIL9	1	34.1	3.3	1.1	125.3	42.74	SYSTEM INTACT		SAF
				3.3	1.1	126.3	43.06	61578 MUDLKJCT 61617 MUDLAKE4 1	SW1108	SAF
				3.3	1.1	127.5	43.47	61636 SWANVIL7 61647 LONG PR7 1		SAF
				3.3	1.1	126.2	43.03	62893-63058-62894 WINGRIV4 230/115/13 1	SW1052	SAF
				3.3	1.1	126.2	43.03	63052 INMAN 4 63058 WINGRIV4 1	SW1052	SAF
				3.3	1.1	126.2	43.03	63058 WINGRIV4 61612 RIVERTN4 1	SW1052	SAF
38854 BERTRAM	62859 PINELK9	1	34.1	0.1	0	127.6	43.52	SYSTEM INTACT		SAF
				0.1	0	128.6	43.84	61578 MUDLKJCT 61617 MUDLAKE4 1	SW1108	SAF
				0.1	0	129.8	44.26	61636 SWANVIL7 61647 LONG PR7 1		SAF
				0.1	0	128.5	43.82	62893-63058-62894 WINGRIV4 230/115/13 1	SW1052	SAF
				0.1	0	128.5	43.82	63052 INMAN 4 63058 WINGRIV4 1	SW1052	SAF
				0.1	0	128.5	43.82	63058 WINGRIV4 61612 RIVERTN4 1	SW1052	SAF
61636 SWANVIL7	61836 SWANVIL9	1	39.2	13.1	5.1	112.6	44.14	SYSTEM INTACT		SAF
				9.6	3.7	114.7	44.97	38881 SWANVLLE 38885 508-27T7 1	sw23	SAF
				2.8	1.1	118.7	46.54	38881 SWANVLLE 61836 SWANVIL9 1	sw23	SAF
				9.6	3.7	114.7	44.97	38885 508-27T7 62854 FLNSBRG9 1	sw23	SAF
				13.1	5.2	116.2	45.55	61636 SWANVIL7 61647 LONG PR7 1		SAF
				13.1	5.1	114.7	44.95	61636 SWANVIL7 61649 BLNCHRD7 1		SAF

Appendix D - AC Analysis

Pine Lake 35MW												
Output File:				SUOP_NE_BaseCase		SUOP_NE_35MW_PineLake						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
38854	BERTRAM	61836	SWANVIL9	1	34.1	3.3	1.1	109.4	37.31	SYSTEM INTACT				SAF
						3.3	1.1	109.9	37.46	60151 MNTCELO3	65902 WAITEPK3	1		SAF
						3.3	1.1	109.9	37.46	62531 INMAN 7	63052 INMAN 4	1	SW985	SAF
						3.3	1.1	109.9	37.46	63052 INMAN 4	63051 HENNING4	1	SW985	SAF
						3.3	1.1	109.9	37.46	63052 INMAN 4	63058 WINGRIV4	1	SW985	SAF
						3.3	1.1	109.9	37.46	65900 WAITEPK7	65902 WAITEPK3	1		SAF
38854	BERTRAM	62859	PINELK9	1	34.1	0.1	0	111.8	38.11	SYSTEM INTACT				SAF
						0.1	0	112.2	38.26	60151 MNTCELO3	65902 WAITEPK3	1		SAF
						0.1	0	112.2	38.26	62531 INMAN 7	63052 INMAN 4	1	SW985	SAF
						0.1	0	112.2	38.26	63052 INMAN 4	63051 HENNING4	1	SW985	SAF
						0.1	0	112.2	38.26	63052 INMAN 4	63058 WINGRIV4	1	SW985	SAF
						0.1	0	112.2	38.26	65900 WAITEPK7	65902 WAITEPK3	1		SAF
61636	SWANVIL7	61836	SWANVIL9	1	39.2	13.1	5.1	95.3	37.37	SYSTEM INTACT				NOT SAF
						2.8	1.1	101.6	39.81	38881 SWANVLLE	61836 SWANVIL9	1	sw23	SAF

Pine Lake 30MW												
Output File:				SUOP_NE_BaseCase		SUOP_NE_30MW_PineLake						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NE Planinng zone single site contingency analysis summary - West Union		
Date:	9/8/2009 10:29	
Date of Run:	MAY 29 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

West Union 40MW

Output File:		SUOP_NE_Base Case		SUOP_NE_40MW_W.UNION				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60751 SAUKCMU8 62820 W UNION8 1	39.6	46.1	18.2	81	32.08	SYSTEM INTACT		NOT SAF
		4.4	1.8	105.2	41.64	60750 OSAKIS 8 62820 W UNION8 1		SAF
		70.2	27.8	104.8	41.5	63050-62427-62443 WILLMAR4 230/69/12 1	SW1054	SAF
		70.2	27.8	103.2	40.89	66550 GRANITF4 63050 WILLMAR4 1	SW1054	SAF

West Union 35MW

Output File:		SUOP_NE_Base Case		SUOP_NE_35MW_W.UNION				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60751 SAUKCMU8 62820 W UNION8 1	39.6	46.1	18.2	76.7	30.36	SYSTEM INTACT		NOT SAF
		70.2	27.8	100.5	39.8	63050-62427-62443 WILLMAR4 230/69/12 1	SW1054	SAF

West Union 30MW

Output File:		SUOP_NE_Base Case		SUOP_NE_30MW_W.UNION				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP WC Single Site contingency analysis - Hutichinson		
Date:	9/8/2009 11:18	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hutchinson 40MW										
Output File:			SUOP_WC_BaseCase-line			SUOP_WC_40MW_HUTCHINSON				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone Single Site contingency analysis summary - Albany		
Date:	9/8/2009 11:12	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Albany 40MW

Output File:		SUOP_WC_Base Case		SUOP_WC_40MW_ALBANY				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone Single Site contingency analysis summary - Benton		
Date:	9/8/2009 11:12	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Benton 40MW											
Output File:			SUOP_WC_Base Case			SUOP_WC_40MW_BENTON					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone single site contingency analysis summary - Big Swan		
Date:	9/8/2009 11:12	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Big Swan 40MW										
Output File:		SUOP_WC_Base Case			SUOP_WC_40MW_BIGSWAN					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Single Site contingency analysis summary - Crooks		
Date:	9/8/2009 11:12	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Crooks 40MW

Output File:			SUOP_WC_Base Case		SUOP_WC_40MW_CROOKS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60679 CROOKS 8	60680 EMMET R8	1	40.7	12.7	5.2	43.9	17.88	SYSTEM INTACT		NOT SAF
				6.1	2.5	101.7	41.38	60676 TROYT R8 60695 DANUBE 8 1		SAF
				6.1	2.5	103.1	41.94	60679 CROOKS 8 60695 DANUBE 8 1		SAF
60680 EMMET R8	60694 RENVILL8	1	40.7	11.9	4.8	40.9	16.63	SYSTEM INTACT		NOT SAF
				7.8	3.2	100.5	40.89	60679 CROOKS 8 60695 DANUBE 8 1		SAF

Crooks 35MW

Output File:			SUOP_WC_Base Case		SUOP_WC_35MW_CROOKS				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC single site contingency analysis summary - Douglass		
Date:	9/8/2009 11:12	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Douglass 40MW									
Output File:		SUOP_WC_Base Case		SUOP_WC_40MW_DOUGLASS					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Single Site Contingency analysis - Fiest		
Date:	9/8/2009 11:18	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Fiesta 40MW									
Output File:		SUOP_WC_Base Case		SUOP_WC_40MW_FIEST					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone Single Site contingency analysis - Glen Wood		
Date:	9/8/2009 11:18	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Glenwood 40MW										
Output File:		SUOP_WC_Base Case		SUOP_WC_40MW_GLENWOOD						SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY				AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM	TO	CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP WC Single Site contingency analysis summary - Wilamr Muncipal		
Date:	9/8/2009 11:18	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Wilmar Muncipal 40MW

Output File:		SUOP_WC_Base Case		SUOP_WC_40MW_WILMAR				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60767 WLMSTAP8 62009 LKJOHNA8 1	38.6	84.7	32.68	86.7	33.46	SYSTEM INTACT		NOT SAF
		105.6	40.8	110.9	42.82	63050-62427-62443 WILLMAR4 230/69/12 1	SW1054	SAF

Wilmar Muncipal 35MW

Output File:		SUOP_WC_Base Case		SUOP_WC_35MW_WILMAR				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60767 WLMSTAP8 62009 LKJOHNA8 1	38.6	84.7	32.68	86.4	33.36	SYSTEM INTACT		NOT SAF
		105.6	40.8	110.3	42.56	63050-62427-62443 WILLMAR4 230/69/12 1	SW1054	SAF

Wilmar Muncipal 30MW

Output File:		SUOP_WC_Base Case		SUOP_WC_30MW_WILMAR				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP SW Planning Zone single site analysis summary - Milroy		
Date:	9/8/2009 11:10	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Milroy 40MW

Output File:		SUOP_SW_Base Case		SUOP_SW_40MW_Milroy				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	26.2	8.89	SYSTEM INTACT		NOT SAF
		88.9	30.2	114.4	38.91	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	61.9	14.85	SYSTEM INTACT		NOT SAF
		64.9	15.6	107.8	25.87	60171 LYON CO7 60502 LYON CO3 C1		SAF
		95.6	22.9	143.4	34.41	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
		25	6	150.7	36.17	60903 LYON CO8 62738 MILROY 8 1		SAF
60771 RDWDFLTG 62735 REDWOOD8 1	34.8	18.5	6.5	44.4	15.45	SYSTEM INTACT		NOT SAF
		68.6	23.9	101.7	35.38	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
		11.9	4.2	107.2	37.29	60903 LYON CO8 62738 MILROY 8 1		SAF
62735 REDWOOD8 62737 SHRDNTP8 1	31.6	23.7	7.5	52.9	16.73	SYSTEM INTACT		NOT SAF
		80.1	25.3	116.7	36.86	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
		7	2.2	123	38.88	60903 LYON CO8 62738 MILROY 8 1		SAF

Milroy 35MW

Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_MILRO				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	24.3	8.25	SYSTEM INTACT		NOT SAF
		88.9	30.2	111.4	37.89	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	57.2	13.73	SYSTEM INTACT		NOT SAF
		64.9	15.6	102.3	24.54	60171 LYON CO7 60502 LYON CO3 C1		SAF
		95.6	22.9	137.8	33.07	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
		25	6	129.1	30.98	60903 LYON CO8 62738 MILROY 8 1		SAF

Appendix D - AC Analysis

Milroy 35MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_MILRO					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	49.3	15.57	SYSTEM INTACT		NOT SAF
				80.1	25.3	112.3	35.5	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
				7	2.2	106.7	33.72	60903 LYON CO8 62738 MILROY 8 1		SAF

Milroy 30MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_MILROY					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	22.4	7.61	SYSTEM INTACT		NOT SAF
				88.9	30.2	108.2	36.78	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	52.6	12.62	SYSTEM INTACT		NOT SAF
				95.6	22.9	131.7	31.61	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
				25	6	107.9	25.89	60903 LYON CO8 62738 MILROY 8 1		SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	45.6	14.41	SYSTEM INTACT		NOT SAF
				80.1	25.3	107.7	34.04	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Milroy 25MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_25MW_MILROY					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	20.5	6.97	SYSTEM INTACT		NOT SAF
				88.9	30.2	104.9	35.68	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	47.8	11.47	SYSTEM INTACT		NOT SAF
				95.6	22.9	125.6	30.14	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	41.8	13.22	SYSTEM INTACT		NOT SAF
				80.1	25.3	103.1	32.57	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Appendix D - AC Analysis

Milroy 20MW											
Output File:			SUOP_SW_Base Case		SUOP_SW_20MW_MILROY						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	18.6	6.34	SYSTEM INTACT				NOT SAF
				88.9	30.2	101.7	34.57	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	43.3	10.39	SYSTEM INTACT				NOT SAF
				95.6	22.9	119.5	28.68	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF

Mirloy 15MW											
Output File:			SUOP_SW_Base Case		SUOP_SW_15MW_MILROY						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	38.9	9.34	SYSTEM INTACT				NOT SAF
				95.6	22.9	113.3	27.18	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF

Milroy 10MW											
Output File:			SUOP_SW_Base Case		SUOP_SW_10MW_MILROY						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	34.6	8.32	SYSTEM INTACT				NOT SAF
				95.6	22.9	107.2	25.73	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF

Appendix D - AC Analysis

SUOP SW Single Site contingency analysis - Granite Fall		
Date:	9/8/2009 10:50	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Granite Fall 40MW										
Output File:			SUOP_SW_Base Case			SUOP_SW_40MW_GRANITE FALL				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW single site contingency analysis summary - Hardwick		
Date:	9/8/2009 10:50	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hardwick 40MW										
Output File:			SUOP_SW_Base Case		SUOP_SW_40MW_HARDWICK					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW Single Site contingency analysis summary - Holland		
Date:	9/8/2009 10:50	
Date of Run:	JUN 02 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Holland 40MW

Output File:		SUOP_SW_Base Case		SUOP_SW_40MW_HOLLAND				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
66006 H TAP	66008 HOLLAND	1	45.4	49.5	22.5	13.8	6.27	SYSTEM INTACT		NOT SAF
				0	0	100.3	45.55	66007 HOLLAND 66008 HOLLAND 1		SAF
				0	0	100.3	45.55	66007 HOLLAND 66505 FLANDRU7 1		SAF
66007 HOLLAND	66008 HOLLAND	1	52	43.1	22.4	88.7	46.14	SYSTEM INTACT		NOT SAF
				52	27	100.6	52.29	66000 STEEN 66001 LUVERNE 1		SAF
				62.5	32.5	111.9	58.2	66000 STEEN 66245 CLEVELD8 1		SAF
				55.6	28.9	104	54.06	66001 LUVERNE 66003 HARDWICK 1		SAF
				55.6	28.9	104	54.09	66003 HARDWICK 66004 TROSKY 1		SAF
				55.7	28.9	104.1	54.11	66004 TROSKY 66005 PIPETAP 1		SAF

Holland 35MW

Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_HOLLAND				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
66007 HOLLAND	66008 HOLLAND	1	52	43.1	22.4	82.9	43.1	SYSTEM INTACT		NOT SAF
				62.5	32.5	105.6	54.89	66000 STEEN 66245 CLEVELD8 1		SAF

Appendix D - AC Analysis

Holland 30MW										
Output File:			SUOP_SW_Base Case		SUOP_SW_30MW_HOLLAND					SIGNIFICANTLY
CIRCUIT/WINDING	TO	CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME	# NAME	#	MVA	%I	MVA	%I	MVA	FROM TO	CKT	SWITCH FACILITY

SUOP SW single site contingency analysis summary - Ivanhoe

Date:	9/8/2009 10:50	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Ivanhoe 40MW

Output File:		SUOP_SW_Base Case		SUOP_SW_40MW_IVANHOE				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP SW Planning Zone single site contingency analysis - Lake Sarah		
Date:	9/8/2009 10:53	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.00%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Lake Sarah 40MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_40MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60392 WRIDGE 8 60859 ROCKTAP8 1	51.7	22.3	11.5	45.3	23.4	SYSTEM INTACT		NOT SAF
		32.6	16.9	107.8	55.7	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60392 WRIDGE 8 66005 PIPETAP 1	51.7	37.4	19.4	60.6	31.3	SYSTEM INTACT		NOT SAF
		46.9	24.2	123.6	63.9	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
		34.6	17.9	113.7	58.8	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
		33.6	17.4	111.9	57.8	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8 62710 CHANDLR8 1	34.8	9	3.1	24.9	8.7	SYSTEM INTACT		NOT SAF
		14.3	5	116	40.4	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
		21.3	7.4	101.9	35.5	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	25	8.51	SYSTEM INTACT		NOT SAF
		88.9	30.2	112.5	38.27	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	39.5	9.49	SYSTEM INTACT		NOT SAF
		95.6	22.4	118.5	28.45	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60855 TRACYSW8 62713 LKSRHTP8 1	51.7	12.5	6.5	70.3	36.36	SYSTEM INTACT		NOT SAF
		36.2	18.7	126.5	65.43	60392 WRIDGE 8 60859 ROCKTAP8 1		SAF
		57	29.4	108.1	55.9	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60855 TRACYSW8 62741 WLNTGTP8 1	51.7	9.4	4.8	57.6	29.79	SYSTEM INTACT		NOT SAF
		36.2	18.7	113.7	58.77	60392 WRIDGE 8 60859 ROCKTAP8 1		SAF

Appendix D - AC Analysis

Lake Sarah 35MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60392 WRIDGE 8	60859 ROCKTAP8	1	51.7	22.3	11.5	42.3	21.89	SYSTEM INTACT		NOT SAF
				21.4	11	108.5	56.11	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
				20.9	10.8	105.9	54.76	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	57.6	29.77	SYSTEM INTACT		NOT SAF
				46.9	24.2	113.6	58.7	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
				34.6	17.9	123.8	64.01	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
				33.6	17.4	121.2	62.65	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8	62710 CHANDLR8	1	34.8	9	3.1	20.6	7.18	SYSTEM INTACT		NOT SAF
				14.3	5	101.7	35.4	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
				21.3	7.4	116	40.38	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
				24.4	8.5	112.3	39.08	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	23.3	7.91	SYSTEM INTACT		NOT SAF
				88.9	30.2	109.8	37.33	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	37.8	9.08	SYSTEM INTACT		NOT SAF
				95.6	22.4	116	27.84	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60855 TRACYSW8	62713 LKSRHTP8	1	51.7	12.5	6.5	62.1	32.12	SYSTEM INTACT		NOT SAF
				36.2	18.7	113.7	58.78	60392 WRIDGE 8 60859 ROCKTAP8 1		SAF
60855 TRACYSW8	62741 WLNTGTP8	1	51.7	9.4	4.8	49.4	25.55	SYSTEM INTACT		NOT SAF
				36.2	18.7	100.8	52.13	60392 WRIDGE 8 60859 ROCKTAP8 1		SAF

Lake Sarah 30MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60392 WRIDGE 8	60859 ROCKTAP8	1	51.7	22.3	11.5	39.4	20.36	SYSTEM INTACT		NOT SAF
				32.6	16.9	110.8	57.27	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	54.6	28.24	SYSTEM INTACT		NOT SAF
				46.9	24.2	126	65.12	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
				34.6	17.9	104.6	54.06	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
				33.6	17.4	102.6	53.04	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	9.8	3.41	SYSTEM INTACT		NOT SAF
				103.4	35.99	110.3	38.37	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60395 ERIDGE 8	62710 CHANDLR8	1	34.8	9	3.1	16.4	5.7	SYSTEM INTACT		NOT SAF
				14.3	5	119.3	41.52	60855 TRACYSW8 62713 LKSRHTP8 1		SAF

Appendix D - AC Analysis

Lake Sarah 30MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	21.5	7.32	SYSTEM INTACT		NOT SAF
				88.9	30.2	106.8	36.3	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	36.1	8.67	SYSTEM INTACT		NOT SAF
				95.6	22.4	113	27.12	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60855 TRACYSW8	62713 LKSRHTP8	1	51.7	12.5	6.5	54.1	27.96	SYSTEM INTACT		NOT SAF
				36.2	18.7	101.4	52.43	60392 WRIDGE 8 60859 ROCKTAP8 1		SAF
				57	29.4	124.8	64.53	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60855 TRACYSW8	62741 WLNTGTP8	1	51.7	9.4	4.8	41.3	21.36	SYSTEM INTACT		NOT SAF
				45.7	23.6	112.3	58.03	60392 WRIDGE 8 66005 PIPETAP 1		SAF

Lake Sara 25MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_25MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	51.7	26.73	SYSTEM INTACT		NOT SAF
				46.9	24.2	107.6	55.62	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	13.8	4.79	SYSTEM INTACT		NOT SAF
				103.4	35.99	110.1	38.32	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	19.8	6.73	SYSTEM INTACT		NOT SAF
				88.9	30.2	103.8	35.28	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	34.5	8.27	SYSTEM INTACT		NOT SAF
				95.6	22.4	109.9	26.37	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60855 TRACYSW8	62713 LKSRHTP8	1	51.7	12.5	6.5	46.2	23.87	SYSTEM INTACT		NOT SAF
				57	29.4	113.2	58.52	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60855 TRACYSW8	62741 WLNTGTP8	1	51.7	9.4	4.8	33.3	17.24	SYSTEM INTACT		NOT SAF
				45.7	23.6	100.6	52.03	60392 WRIDGE 8 66005 PIPETAP 1		SAF

Appendix D - AC Analysis

Lake Sarah 20MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_20MW_Lake Sarah					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	17.8	6.19	SYSTEM INTACT		NOT SAF
				103.4	35.99	108.2	37.65	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	18.1	6.14	SYSTEM INTACT		NOT SAF
				88.9	30.2	100.8	34.26	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	32.8	7.88	SYSTEM INTACT		NOT SAF
				95.6	22.4	106.9	25.65	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60855 TRACYSW8	62713 LKSRHTP8	1	51.7	12.5	6.5	38.4	19.87	SYSTEM INTACT		NOT SAF
				57	29.4	100.6	52.03	60392 WRIDGE 8 66005 PIPETAP 1		SAF

Lake Sarah 15MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_15MW_Lake Sarah					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	21.9	7.61	SYSTEM INTACT		NOT SAF
				103.4	35.99	106.8	37.18	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	31.3	7.5	SYSTEM INTACT		NOT SAF
				95.6	22.4	103.9	24.94	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Lake Sarah 10MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_10MW_Lake Sarah					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	29.7	7.13	SYSTEM INTACT		NOT SAF
				95.6	22.4	100.9	24.23	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Appendix D - AC Analysis

SUOP SW Planning Zone single site contingency analysis summary - Lyon		
Date:	9/8/2009 10:53	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Lyon 40MW

Output File:		SUOP_Sw_Base Case		SUOP_SW_40MW_LYON.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60171 LYON	60903 LYON CO8	1	80.5	28.7	23.1	31.2	25.09	SYSTEM INTACT		NOT SAF
				65.4	52.6	113	90.97	60502 LYON CO3 60171 LYON C1	SW924	SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	14.1	4.8	SYSTEM INTACT		NOT SAF
				88.9	30.2	111	37.72	60502 LYON CO3 60171 LYON C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	29.3	7.04	SYSTEM INTACT		NOT SAF
				95.6	22.9	118.2	28.36	60502 LYON CO3 60171 LYON C1	SW924	SAF

Lyon 35MW

Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_LYON.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60171 LYON	60903 LYON CO8	1	80.5	28.7	23.1	30.9	24.84	SYSTEM INTACT		NOT SAF
				65.4	52.6	110.5	88.95	60502 LYON CO3 60171 LYON C1	SW924	SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	13.7	4.67	SYSTEM INTACT		NOT SAF
				88.9	30.2	106.9	36.33	60502 LYON CO3 60171 LYON C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	29	6.96	SYSTEM INTACT		NOT SAF
				95.6	22.9	113.2	27.18	60502 LYON CO3 60171 LYON C1	SW924	SAF

Appendix D - AC Analysis

Lyon 30MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT		SWITCH	FACILITY
60171 LYON 60903 LYON CO8 1	80.5	28.7	23.1	30.5	24.58	SYSTEM INTACT			NOT SAF
		65.4	52.6	107.8	86.75	60502 LYON CO3 60171 LYON	C1	SW924	SAF
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	13.4	4.55	SYSTEM INTACT			NOT SAF
		88.9	30.2	104.5	35.53	60502 LYON CO3 60171 LYON	C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	28.7	6.89	SYSTEM INTACT			NOT SAF
		95.6	22.9	111.1	26.66	60502 LYON CO3 60171 LYON	C1	SW924	SAF

Lyon 25MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_25MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT		SWITCH	FACILITY
60171 LYON 60903 LYON CO8 1	80.5	28.7	23.1	30.2	24.33	SYSTEM INTACT			NOT SAF
		65.4	52.6	105.5	84.91	60502 LYON CO3 60171 LYON	C1	SW924	SAF
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	13	4.42	SYSTEM INTACT			NOT SAF
		88.9	30.2	101.9	34.63	60502 LYON CO3 60171 LYON	C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	28.4	6.81	SYSTEM INTACT			NOT SAF
		95.6	22.9	108.3	25.99	60502 LYON CO3 60171 LYON	C1	SW924	SAF

Lyon 20MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_20MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT		SWITCH	FACILITY
60171 LYON 60903 LYON CO8 1	80.5	28.7	23.1	29.9	24.07	SYSTEM INTACT			NOT SAF
		65.4	52.6	103.2	83.08	60502 LYON CO3 60171 LYON	C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	28.1	6.73	SYSTEM INTACT			NOT SAF
		95.6	22.9	105.6	25.35	60502 LYON CO3 60171 LYON	C1	SW924	SAF

Appendix D - AC Analysis

Lyon 15MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_15MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60171 LYON	60903 LYON CO8	1	80.5	28.7	23.1	29.6	23.82	SYSTEM INTACT				NOT SAF
				65.4	52.6	100.9	81.25	60502 LYON CO3	60171 LYON	C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	27.7	6.66	SYSTEM INTACT				NOT SAF
				95.6	22.9	103	24.71	60502 LYON CO3	60171 LYON	C1	SW924	SAF

Lyon 10MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_10MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	27.4	6.58	SYSTEM INTACT				NOT SAF
				95.6	22.9	100.3	24.08	60502 LYON CO3	60171 LYON	C1	SW924	SAF

Lyon 5MW									
Output File:		SUOP_SW_Base Case		SUOP_SW_10MW_LYON.					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW Planning Zone single site contingency analysis summary - Walnut		
Date:	9/8/2009 11:11	
Date of Run:	JUN 02 2009	JUN 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Walnut 40MW

Output File:		SUOP_SW_BaseCase		SUOP_SW_40MW_Walnut				
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60392 WRIDGE 8 66005 PIPETAP 1	51.7	37.4	19.4	52.6	27.2	SYSTEM INTACT		NOT SAF
		38.4	19.9	111.4	57.6	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8 60835 CHNDLRT8 1	34.8	34.1	11.86	14.3	4.97	SYSTEM INTACT		NOT SAF
		103.4	35.99	110.4	38.43	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	26.8	9.12	SYSTEM INTACT		NOT SAF
		88.9	30.2	115.3	39.21	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	41.5	9.96	SYSTEM INTACT		NOT SAF
		95.6	22.9	121.3	29.12	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Walnut 35MW

Output File:		SUOP_SW_BaseCase		SUOP_SW_35MW_Walnut				
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60392 WRIDGE 8 66005 PIPETAP 1	51.7	37.4	19.4	50.7	26.2	SYSTEM INTACT		NOT SAF
		38.4	19.9	101.5	52.5	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8 60835 CHNDLRT8 1	34.8	34.1	11.86	16.4	5.71	SYSTEM INTACT		NOT SAF
		103.4	35.99	111.2	38.69	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8 60684 YELWMED8 1	34	11.2	3.8	24.8	8.44	SYSTEM INTACT		NOT SAF
		88.9	30.2	111.9	38.06	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8 60771 RDWDFLTG 1	24	26.8	6.4	39.2	9.42	SYSTEM INTACT		NOT SAF
		95.6	22.9	117.9	28.3	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Appendix D - AC Analysis

Walnut 30MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_Walnut				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	48.7	25.2	SYSTEM INTACT		NOT SAF
				38.4	19.9	113.8	58.83	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	18.7	6.52	SYSTEM INTACT		NOT SAF
				103.4	35.99	109.7	38.17	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60395 ERIDGE 8	62710 CHANDLR8	1	34.8	9	3.1	7.8	2.7	SYSTEM INTACT		NOT SAF
				7.5	2.6	103.3	35.95	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	22.8	7.76	SYSTEM INTACT		NOT SAF
				88.9	30.2	108.8	37	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	37.3	8.96	SYSTEM INTACT		NOT SAF
				95.6	22.9	115.1	27.61	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Walnut 25MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_25MW_Walnut				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	21.2	7.37	SYSTEM INTACT		NOT SAF
				103.4	35.99	108.5	37.77	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	20.9	7.09	SYSTEM INTACT		NOT SAF
				88.9	30.2	105.5	35.86	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	35.4	8.5	SYSTEM INTACT		NOT SAF
				95.6	22.9	111.6	26.77	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Walnut 20MW								
Output File:		SUOP_SW_Base Case		SUOP_SW_20MW_Walnut				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	23.7	8.24	SYSTEM INTACT		NOT SAF
				103.4	35.99	107.6	37.44	60392 WRIDGE 8 66005 PIPETAP 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	18.9	6.43	SYSTEM INTACT		NOT SAF
				88.9	30.2	102.1	34.71	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	33.6	8.06	SYSTEM INTACT		NOT SAF
				95.6	22.9	108.2	25.97	60502 LYON CO3 60171 LYON CO7 C1	SW924	SAF

Appendix D - AC Analysis

Walnut 15MW														
				Output File:		SUOP_SW_Base Case		SUOP_SW_15MW_Walnut						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728	FRANKLN8	60771	RDWDFLTG	1	24	26.8	6.4	31.8	7.63	SYSTEM INTACT				NOT SAF
						95.6	22.9	104.9	25.18	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF

Walnut 10MW														
				Output File:		SUOP_SW_Base Case		SUOP_SW_10MW_Walnut						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728	FRANKLN8	60771	RDWDFLTG	1	24	26.8	6.4	30.1	7.22	SYSTEM INTACT				NOT SAF
						95.6	22.9	101.6	24.39	60502 LYON CO3	60171 LYON CO7	C1	SW924	SAF

Appendix D - AC Analysis

SUOP SE Planning Zone contingency analysis summary - Wabaca		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Wabaca 40MW

Output File:		SUOP_SE_Base Case		SUOP_SE_40MW_WABACA				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.2	222.57	SYSTEM INTACT				NOT SAF
				126.3	255.21	127.3	257.22	60102 ADAMS 3	34014 ADAMS 5	1	SW1058	SAF
				126.3	255.21	127.3	257.22	60102 ADAMS 3	34018 HAZLTON3	1	SW1058	SAF
				126.3	255.21	127.3	257.22	63032 PL VLLY3	60102 ADAMS 3	1	SW1058	SAF
				126.3	255.21	127.3	257.22	63032-63070-63073 PL VLLY3	345/161/13	1	SW1058	SAF

Wabaca 35MW

Output File:		SUOP_SE_Base Case		SUOP_SE_35MW_WABACA				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Altura		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 05 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Altura 40MW

Output File:		SUOP_SE_Base Case		SUOP_SE_40MW_ALTURA						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Elgin		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 05 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Elgin 40MW

Output File:		SUOP_SE_Base Case		SUOP_SE_40MW_ELGIN				
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis - Harmony		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Harmony 40MW

Output File:		SUOP_SE_Base Case		SUOP_SE_40MW_HARMOMY				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingecy analysis summary - Henderson		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Henderson 40MW

Output File:		SUOP_SE_Base Case		SUOP_SE_40MW_HENDERSON				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34009 WINBAGO5	34013 WNBAGOS5	1	181.9	62.6	113.86	63.6	115.64	SYSTEM INTACT		NOT SAF
				101.4	184.4	102.7	186.82	60105 PR ISLD3 60236 REDROCK3 2	SW935	SAF
				101	183.79	102.4	186.27	60105 PR ISLD3 61950 BYRON 3 1		SAF
				101.4	184.4	102.7	186.82	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	84.8	28.83	SYSTEM INTACT		NOT SAF
				74.3	25.3	149.9	50.97	60724 HENDRSN8 60868 LESR TP8 1		SAF
				55.7	18.9	120.9	41.09	60826 TRAVRSE8 62350 TRAVERS8 1		SAF
				56.7	19.3	126.4	42.97	60868 LESR TP8 62349 RUSHRVR8 1		SAF
				56.1	19.1	124.2	42.23	62341 NWSWDTP8 62349 RUSHRVR8 1		SAF
				55.6	18.9	122.2	41.54	62341 NWSWDTP8 62350 TRAVERS8 1		SAF
60730 ARLNGTN8	62674 JSNLDTP8	1	34	64.1	21.81	11.4	3.87	SYSTEM INTACT		NOT SAF
				9.5	3.2	119.8	40.72	60724 HENDRSN8 60868 LESR TP8 1		SAF

Henderson 35MW

Output File:		SUOP_SE_Base Case		SUOP_SE_35MW_HENDERSON				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.8	78.31	SYSTEM INTACT		NOT SAF
				102.2	76.4	110.3	82.37	34000 NIW 5 34015 LIME CK5 1		SAF
34009 WINBAGO5	34013 WNBAGOS5	1	181.9	62.6	113.86	63.5	115.43	SYSTEM INTACT		NOT SAF
				101.4	184.4	102.5	186.44	60105 PR ISLD3 60236 REDROCK3 2	SW935	SAF
				101	183.79	102.2	185.96	60105 PR ISLD3 61950 BYRON 3 1		SAF
				101.4	184.4	102.5	186.44	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF

Appendix D - AC Analysis

Henderson 35MW											
			Output File:		SUOP_SE_Base Case		SUOP_SE_35MW_HENDERSON				SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO CKT	SWITCH	AFFECTED FACILITY
60730	ARLNGTN8	60731	GRENISL8	1	34	41.6	14.1	79.3	26.97	SYSTEM INTACT			NOT SAF
						74.3	25.3	140.2	47.67	60724 HENDRSN8	60868 LESR TP8 1		SAF
						55.7	18.9	111.7	37.99	60826 TRAVRSE8	62350 TRAVERS8 1		SAF
						56.7	19.3	116.9	39.74	60868 LESR TP8	62349 RUSHRVR8 1		SAF
						56.1	19.1	114.8	39.02	62341 NWSWDTP8	62349 RUSHRVR8 1		SAF
						55.6	18.9	113	38.42	62341 NWSWDTP8	62350 TRAVERS8 1		SAF
60730	ARLNGTN8	62674	JSNLDTP8	1	34	64.1	21.81	3.7	1.26	SYSTEM INTACT			NOT SAF
						9.5	3.2	103.8	35.29	60724 HENDRSN8	60868 LESR TP8 1		SAF

Henderson 30MW											
			Output File:		SUOP_SE_Base Case		SUOP_SE_30MW_HENDERSON				SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO CKT	SWITCH	AFFECTED FACILITY
34008	FOX LK 5	34012	FOXLAKE8	1	74.7	104.6	78.17	104.8	78.29	SYSTEM INTACT			NOT SAF
						102.2	76.4	110.3	82.4	34000 NIW 5	34015 LIME CK5 1		SAF
						108	80.6	110.1	82.3	61934 RUTLAND	62354 BFFLKET8 1		SAF
34009	WINBAGO5	34013	WNBAGOS5	1	181.9	62.6	113.86	63.3	115.21	SYSTEM INTACT			NOT SAF
						101.4	184.4	102.4	186.24	60105 PR ISLD3	60236 REDROCK3 2	SW935	SAF
						101	183.79	102.1	185.65	60105 PR ISLD3	61950 BYRON 3 1		SAF
						101.4	184.4	102.4	186.24	60105 PR ISLD3	61950 BYRON 3 1	SW935	SAF
60730	ARLNGTN8	60731	GRENISL8	1	34	41.6	14.1	73.8	25.1	SYSTEM INTACT			NOT SAF
						74.3	25.3	130.7	44.44	60724 HENDRSN8	60868 LESR TP8 1		SAF
						55.7	18.9	102.5	34.84	60826 TRAVRSE8	62350 TRAVERS8 1		SAF
						56.7	19.3	107.6	36.59	60868 LESR TP8	62349 RUSHRVR8 1		SAF
						56.1	19.1	105.6	35.9	62341 NWSWDTP8	62349 RUSHRVR8 1		SAF
						55.6	18.9	103.7	35.24	62341 NWSWDTP8	62350 TRAVERS8 1		SAF

Appendix D - AC Analysis

Henderson 25MW									
Output File:		SUOP_SE_Base Case		SUOP_SE_25MW_HENDERSON					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.8	78.27	SYSTEM INTACT				NOT SAF
				108	80.6	110.1	82.2	61934 RUTLAND	62354 BFFLKET8	1		SAF
34009 WINBAGO5	34013 WNBAGOS5	1	181.9	62.6	113.86	63.2	114.99	SYSTEM INTACT				NOT SAF
				101.4	184.4	102.2	185.92	60105 PR ISLD3	60236 REDROCK3	2	SW935	SAF
				101	183.79	101.9	185.43	60105 PR ISLD3	61950 BYRON 3	1		SAF
				101.4	184.4	102.2	185.92	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	101.7	198.36	SYSTEM INTACT				NOT SAF
				115.5	225.15	116.2	226.58	34006 LAKEFLD3	63875 RAUN 3	1		SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	68.4	23.25	SYSTEM INTACT				NOT SAF
				74.3	25.3	121.1	41.17	60724 HENDRSN8	60868 LESR TP8	1		SAF

Henderson 20MW									
Output File:		SUOP_SE_Base Case		SUOP_SE_20MW_HENDERSON					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.8	78.25	SYSTEM INTACT				NOT SAF
				108	80.6	110.1	82.2	61934 RUTLAND	62354 BFFLKET8	1		SAF
34009 WINBAGO5	34013 WNBAGOS5	1	181.9	62.6	113.86	63.1	114.77	SYSTEM INTACT				NOT SAF
				101.4	184.4	102	185.62	60105 PR ISLD3	60236 REDROCK3	2	SW935	SAF
				101	183.79	101.8	185.12	60105 PR ISLD3	61950 BYRON 3	1		SAF
				101.4	184.4	102	185.62	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	101.6	198.16	SYSTEM INTACT				NOT SAF
				115.5	225.15	116.1	226.3	34006 LAKEFLD3	63875 RAUN 3	1		SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	62.6	21.27	SYSTEM INTACT				NOT SAF
				74.3	25.3	111.7	37.99	60724 HENDRSN8	60868 LESR TP8	1		SAF

Henderson 15MW									
Output File:		SUOP_SE_Base Case		SUOP_SE_15MW_HENDERSON					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.7	78.23	SYSTEM INTACT				NOT SAF
				108	80.6	110	82.2	61934 RUTLAND	62354 BFFLKET8	1		SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	57.2	19.45	SYSTEM INTACT				NOT SAF
				74.3	25.3	102.2	34.74	60724 HENDRSN8	60868 LESR TP8	1		SAF

Appendix D - AC Analysis

Henderson 10MW														
Output File:				SUOP_SE_Base Case			SUOP_SE_10MW_HENDRERSON							SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	

Appendix D - AC Analysis

SUOP SE Planning Zone single site analysis summary - St. Charles		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

St. Charles 40MW										
Output File:			SUOP_SE_Base Case		SUOP_SE_40MW_ST. Charles					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Whitewater		
Date:	9/8/2009 10:42	
Date of Run:	JUN 01 2009	JUN 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Whitewater 40MW										
	Output		SUOP_SE_Base Case		SUOP_SE_40MW_WHITE					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	8.6	1.6	219	41.61	SYSTEM INTACT				SAF
				8.6	1.6	219.8	41.77	60779 ALTURA 8	68719 WEAVER	1		SAF
				8.6	1.6	219.8	41.76	68719 WEAVER	68874 ALMA 8	1		SAF
				8.6	1.6	219.7	41.75	68721 PETERSON	68726 HARMNY	1		SAF
				9.1	1.7	219.7	41.75	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				9.1	1.7	228.7	43.44	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	16.1	3.1	213.5	40.57	SYSTEM INTACT				SAF
				16.2	3.1	214.3	40.73	60779 ALTURA 8	68719 WEAVER	1		SAF
				16.2	3.1	214.3	40.72	68719 WEAVER	68874 ALMA 8	1		SAF
				16.2	3.1	214.3	40.71	68721 PETERSON	68726 HARMNY	1		SAF
				17.2	3.3	214.2	40.71	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				17.2	3.3	223	42.37	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
68706 T WHWATR	69158 T PLV 8	1	19	14.9	2.83	15.1	2.87	SYSTEM INTACT				NOT SAF
				104.7	19.8	214.1	40.69	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	7.5	1.43	7.6	1.45	SYSTEM INTACT				NOT SAF
				111.5	21.2	208	39.53	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF

Appendix D - AC Analysis

Whitwater 35MW									
Output File:		SUOP_SE_Base Case		SUOP_SE_35MW_WHITE					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT		SWITCH	FACILITY
68703 PLAINVIE 68705 WHITEWAT 1	19	8.6	1.6	192	36.48	SYSTEM INTACT			SAF
		8.6	1.6	192.1	36.5	58195 FLYDMID8 64252 FLOYD 5	1		SAF
		8.6	1.6	192.1	36.49	60384 FEPTP 7 62234 LKMARN 7	1		SAF
		8.6	1.6	192.1	36.5	68795 HILLSBOR 69515 HLSBORO5	1		SAF
		9.1	1.7	199	37.82	69198 WABACO 8 69549 WABACO 5	1	SW123	SAF
		8.6	1.6	192.1	36.5	69523 GENOA 5 68810 GENOA	1	SW1133	SAF
68703 PLAINVIE 69158 T PLV 8 1	19	16.1	3.1	186.5	35.44	SYSTEM INTACT			SAF
		16.2	3.1	186.6	35.45	58195 FLYDMID8 64252 FLOYD 5	1		SAF
		16.1	3.1	186.6	35.45	60384 FEPTP 7 62234 LKMARN 7	1		SAF
		16.2	3.1	186.6	35.45	68795 HILLSBOR 69515 HLSBORO5	1		SAF
		17.2	3.3	193.4	36.74	69198 WABACO 8 69549 WABACO 5	1	SW123	SAF
		16.2	3.1	186.6	35.45	69523 GENOA 5 68810 GENOA	1	SW1133	SAF
68706 T WHWATR 69158 T PLV 8 1	19	14.9	2.83	15.2	2.88	SYSTEM INTACT			NOT SAF
		104.7	19.8	184.5	35.06	69158 T PLV 8 69198 WABACO 8	1	SW123	SAF
68707 T ZUM 68711 WEST ALB 1	19	7.5	1.43	7.7	1.46	SYSTEM INTACT			NOT SAF
		111.5	21.2	178.4	33.9	69158 T PLV 8 69198 WABACO 8	1	SW123	SAF

Whitewater 30MW									
Output File:		SUOP_SE_Base Case		UOP_SE_30MW_WHITEWATE					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT		SWITCH	FACILITY
68703 PLAINVIE 68705 WHITEWAT 1	19	8.6	1.6	163.9	31.14	SYSTEM INTACT			SAF
		8.6	1.6	164	31.17	60126 SPLT RK3 60286 NOBLES 3	1	SW957	SAF
		8.6	1.6	164	31.17	60131 SPLTRTB3 60126 SPLT RK3	1	SW957	SAF
		8.6	1.6	164.1	31.17	60302 COULEE 5 60967 COULEE 8	2		SAF
		8.6	1.6	164	31.17	68869 T LO 68873 CREAM	1		SAF
		9.1	1.7	169.7	32.24	69198 WABACO 8 69549 WABACO 5	1	SW123	SAF
68703 PLAINVIE 69158 T PLV 8 1	19	16.1	3.1	158.4	30.1	SYSTEM INTACT			SAF
		16.2	3.1	158.6	30.13	60126 SPLT RK3 60286 NOBLES 3	1	SW957	SAF
		16.2	3.1	158.6	30.13	60131 SPLTRTB3 60126 SPLT RK3	1	SW957	SAF
		16.1	3.1	158.6	30.13	60302 COULEE 5 60967 COULEE 8	2		SAF
		8.6	1.6	158.6	30.13	68869 T LO 68873 CREAM	1		SAF
		17.2	3.3	164	31.17	69198 WABACO 8 69549 WABACO 5	1	SW123	SAF

Appendix D - AC Analysis

Whitewater 30MW								
Output File:		SUOP_SE_Base Case		UOP_SE_30MW_WHITEWATE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
68706 T WHWATR	69158 T PLV 8	1	19	14.9	2.83	15.2	2.88	SYSTEM INTACT		NOT SAF
				104.7	19.8	156	29.65	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	7.5	1.43	7.7	1.46	SYSTEM INTACT		NOT SAF
				111.5	21.2	149.9	28.47	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF

Whitewater 25MW								
Output File:		SUOP_SE_Base Case		UOP_SE_25MW_WHITEWATE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	8.6	1.6	135.9	25.81	SYSTEM INTACT		SAF
				8.6	1.6	135.9	25.83	39242 SGL 138 39245 ARP 138 1		SAF
				8.6	1.6	135.9	25.83	60945 NSPGENO8 68810 GENOA 1		SAF
				8.6	1.6	136	25.83	63415 N HILLS 63420 IBM 1		SAF
				9.1	1.7	140.5	26.7	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
				8.6	1.6	135.9	25.83	69523 GENOA 5 69535 LAC TAP5 1	SW1133	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	16.1	3.1	130.4	24.78	SYSTEM INTACT		SAF
				16.1	3.1	130.5	24.8	39242 SGL 138 39245 ARP 138 1		SAF
				16.2	3.1	130.5	24.8	60945 NSPGENO8 68810 GENOA 1		SAF
				16.1	3.1	130.5	24.8	63415 N HILLS 63420 IBM 1		SAF
				17.2	3.3	134.9	25.64	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
				16.2	3.1	130.5	24.8	69523 GENOA 5 69535 LAC TAP5 1	SW1133	SAF
68706 T WHWATR	69158 T PLV 8	1	19	14.9	2.83	15.1	2.88	SYSTEM INTACT		NOT SAF
				104.7	19.8	128.2	24.36	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	7.5	1.43	7.7	1.46	SYSTEM INTACT		NOT SAF
				111.5	21.2	122.1	23.19	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF

Appendix D - AC Analysis

Whitewater 20MW													
Output File:				SUOP_SE_Base Case		UOP_SE_20MW_WHITEWATE							SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
68703	PLAINVIE	68705	WHITEWAT	1	19	8.6	1.6	107.8	20.48	SYSTEM INTACT				SAF
						9.1	1.7	111.5	21.18	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
68703	PLAINVIE	69158	T PLV 8	1	19	16.1	3.1	102.4	19.45	SYSTEM INTACT				SAF
						17.2	3.3	105.9	20.12	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF

Whitewater 15MW													
Output File:				SUOP_SE_Base Case		UOP_SE_15MW_WHITEWATE							SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Stafford		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 24 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Stafford 40MW

				SUOP_NW_Base Case		SUOP_NW_40MW_Stafford				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
9241 STAFFORD	6 9244 MALUNG	6 1	41	22.9	9.38	67.2	27.53	SYSTEM INTACT				NOT SAF
				0	0	118.3	48.49	9241 STAFFORD	6 9243 POLARIS8	6 1		SAF

Stafford 35MW

				SUOP_NW_Base Case		SUOP_NW_35MW_Stafford				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
9241 STAFFORD	6 9244 MALUNG	6 1	41	22.9	9.38	56.5	23.15	SYSTEM INTACT				NOT SAF
				0	0	101.8	41.73	9241 STAFFORD	6 9243 POLARIS8	6 1		SAF

Stafford 30MW

				SUOP_NW_Base Case		SUOP_NW_30MW_Stafford				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis summary - Compton		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Compton 40MW

Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Compton				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38809 533-TIE	38810 WADENA	1	34	41.4	14.07	104.7	35.59	SYSTEM INTACT		SAF
				43.2	14.68	120.4	40.92	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				43.2	14.7	120.4	40.93	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
				43.2	14.7	120.4	40.93	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
				43.2	14.7	120.4	40.93	63058 WINGRIV4 61612 RIVERTN4 1	SW1015	SAF
				43.2	14.68	120.4	40.92	63058 WINGRIV4 63052 INMAN 4 1	SW1128	SAF
38810 WADENA	38811 CMPTN TP	1	34	8.4	2.87	126	42.83	SYSTEM INTACT		SAF
				8.7	2.95	140.6	47.81	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				8.7	2.95	140.6	47.82	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
				8.7	2.95	140.6	47.82	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
				8.7	2.95	140.6	47.82	63058 WINGRIV4 61612 RIVERTN4 1	SW1015	SAF
				8.7	2.95	140.6	47.81	63058 WINGRIV4 63052 INMAN 4 1	SW1128	SAF
38811 CMPTN TP	62914 COMPTON9	1	22.7	8.7	1.98	199.5	45.29	SYSTEM INTACT		SAF
				9.1	2.06	221.1	50.2	61612 RIVERTN4 63058 WINGRIV4 1	SW1128	SAF
				9.1	2.07	221.2	50.2	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
				9.1	2.07	221.2	50.2	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
				9.1	2.06	221.2	50.2	63058 WINGRIV4 61612 RIVERTN4 1	SW1015	SAF
				9.1	2.06	221.1	50.2	63058 WINGRIV4 63052 INMAN 4 1	SW1128	SAF

Appendix D - AC Analysis

Compton 35MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_35MW_Compton					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
38810 WADENA	38811 CMPTN TP	1	34	8.4	2.87	104.2	35.44	SYSTEM INTACT				SAF
				8.7	2.95	113.4	38.57	61642 VERNDLE7	62893 WINGRIV7	1		SAF
				8.7	2.95	111.9	38.05	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				8.7	2.95	112	38.09	62893-63058-62894 WINGRIV4 230/115/13		1	SW1052	SAF
				8.7	2.95	112	38.09	63052 INMAN 4	63058 WINGRIV4	1	SW1052	SAF
				8.7	2.95	112	38.09	63058 WINGRIV4	61612 RIVERTN4	1	SW1052	SAF
38811 CMPTN TP	62914 COMPTON9	1	22.7	8.7	1.98	166.7	37.84	SYSTEM INTACT				SAF
				9.1	2.06	180.2	40.9	61642 VERNDLE7	62893 WINGRIV7	1		SAF
				9.1	2.06	178	40.4	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				9.1	2.06	178.1	40.43	62893-63058-62894 WINGRIV4 230/115/13		1	SW1052	SAF
				9.1	2.07	178.1	40.43	63052 INMAN 4	63058 WINGRIV4	1	SW1052	SAF
				9.1	2.06	178.1	40.43	63058 WINGRIV4	61612 RIVERTN4	1	SW1052	SAF

Compton 30MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_30MW_Compton					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
38811 CMPTN TP	62914 COMPTON9	1	22.7	8.7	1.98	137.6	31.23	SYSTEM INTACT				SAF
				9.1	2.06	144.5	32.8	62893-63058-62894 WINGRIV4 230/115/13		1		SAF
				9.1	2.06	144.5	32.8	62894-63058-62893 WINGRIV4 230/115/13		1		SAF
				9.1	2.07	144.5	32.81	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				9.1	2.07	144.5	32.81	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				9.1	2.06	144.5	32.81	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF

Appendix D - AC Analysis

Compton 25MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_25MW_Compton					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
38811 CMPTN TP	62914 COMPTON9	1	22.7	8.7	1.98	113.7	25.81	SYSTEM INTACT				SAF
				9.1	2.06	116.4	26.41	61612 RIVERTN4	63058 WINGRIV4	1	SW1128	SAF
				9.1	2.07	116	26.34	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				9.1	2.07	116	26.34	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				9.1	2.06	116.4	26.41	63058 WINGRIV4	63052 INMAN 4	1	SW1128	SAF
				9.1	2.06	116.3	26.39	63058-62893-62894 WINGRIV4	230/115/13	1	SW1128	SAF

Compton 20MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_20MW_Compton					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis summary - Moranville		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Moranville 40MW

Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Moranville				SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
9269 BIRCHDAL	6 66801 LUND	8 1	40	22.8	9.14	24.9	9.97	SYSTEM INTACT				NOT SAF
				91.3	36.53	101.6	40.66	66753 RUNNING4	66760 LUND	4 1		SAF

Moranville 35MW

Output File:		SUPK_NW_Base Case		SUPK_NW_35MW_Moranville				SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
9269 BIRCHDAL	6 66801 LUND	8 1	40	22.8	9.14	24.7	9.87	SYSTEM INTACT				NOT SAF
				91.3	36.53	100.5	40.18	66753 RUNNING4	66760 LUND	4 1		SAF

Moranville 30MW

Output File:		SUPK_NW_Base Case		SUPK_NW_30MW_Moranville				SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis - Nashua		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Nashua 40MW

Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	8.7	1.5	8.7	1.51	SYSTEM INTACT		NOT SAF
		33.3	5.75	203.9	35.27	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		35.2	6.1	202.1	34.96	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7163 CASCJT 4 7164 DALTON 4 1	34	4.7	1.6	4.7	1.61	SYSTEM INTACT		NOT SAF
		17.2	5.85	103.5	35.18	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		18.2	6.2	102.6	34.87	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7164 DALTON 4 62538 TEN MIL9 1	34	1.9	0.66	1.9	0.66	SYSTEM INTACT		NOT SAF
		14.3	4.85	105.4	35.82	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		15.3	5.19	104.4	35.5	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 62538 TEN MIL9 1	34	0	0	0	0	SYSTEM INTACT		NOT SAF
		12.6	4.28	106	36.03	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		13.6	4.62	105	35.7	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	20.9	4.39	174.3	36.61	SYSTEM INTACT		SAF
		20.9	4.39	174.5	36.65	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		20.9	4.39	174.5	36.65	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		20.9	4.39	174.6	36.66	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		20.9	4.39	174.6	36.66	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		20.9	4.39	174.6	36.66	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7198 CATSEYE 4 7200 ASHBYJT 4 1	34	12.9	4.38	107.6	36.58	SYSTEM INTACT		SAF
		12.9	4.38	107.7	36.63	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		12.9	4.38	107.7	36.63	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		12.9	4.38	107.7	36.63	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		12.9	4.38	107.7	36.63	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		12.9	4.38	107.7	36.63	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF

Appendix D - AC Analysis

Nashua 40MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7199 WENDEL 4 7204 NASUAJCT 4 1	21	16.5	3.47	178.2	37.43	SYSTEM INTACT		SAF
		16.5	3.47	178.4	37.47	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		16.5	3.47	178.4	37.47	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		16.5	3.47	178.4	37.47	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		16.5	3.47	178.4	37.47	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		16.5	3.47	178.4	37.47	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7200 ASHBYJT 4 7201 ELBOWJ 4 1	34	13.9	4.72	106.8	36.32	SYSTEM INTACT		SAF
		13.9	4.72	107	36.38	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		13.9	4.72	107	36.38	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		13.9	4.72	107	36.38	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		13.9	4.72	107	36.38	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		13.9	4.72	107	36.38	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT 4 7205 NASHUA 4 1	18	2.6	0.47	224.3	40.38	SYSTEM INTACT		SAF
		2.6	0.47	224.5	40.41	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		2.6	0.47	224.5	40.41	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		2.6	0.47	224.5	40.41	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		2.6	0.47	224.5	40.41	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		2.6	0.47	224.5	40.41	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT 4 8786 WENDEL 2 4 1	24	12.6	3.02	14	3.35	SYSTEM INTACT		NOT SAF
		12.6	3.02	161.1	38.66	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		12.6	3.02	165.1	39.61	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
7449 HERMAN 4 8786 WENDEL 2 4 1	24	9.7	2.34	10.8	2.6	SYSTEM INTACT		NOT SAF
		9.7	2.34	157.8	37.88	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		9.7	2.34	161.8	38.84	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
63123 HOOT LK9 63223 HOOT LK7 1	27	50.6	13.66	50.8	13.72	SYSTEM INTACT		NOT SAF
		67	18.09	113.4	30.62	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		68.3	18.44	113.5	30.64	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF

Appendix D - AC Analysis

Nashua 35MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_35MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	8.7	1.5	8.7	1.51	SYSTEM INTACT		NOT SAF
		33.3	5.75	177	30.63	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		35.2	6.1	175.4	30.34	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	20.9	4.39	152.2	31.96	SYSTEM INTACT		SAF
		20.9	4.39	152.5	32.02	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		20.9	4.39	152.5	32.02	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		20.9	4.39	152.5	32.02	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		20.9	4.39	152.5	32.02	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		20.9	4.39	152.5	32.02	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	16.5	3.47	156	32.75	SYSTEM INTACT		SAF
		16.5	3.47	156.2	32.81	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		16.5	3.47	156.2	32.81	63195 BIGSTONY 63314 BIGSTON4 1		SAF
		16.5	3.47	156.2	32.81	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		16.5	3.47	156.2	32.81	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		16.5	3.47	156.2	32.81	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT 4 7205 NASHUA 4 1	18	2.6	0.47	197.9	35.61	SYSTEM INTACT		SAF
		2.6	0.47	198.1	35.66	63195 BIGSTONY 63214 BIGSTON7 1		SAF
		2.6	0.47	198.1	35.66	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
		2.6	0.47	198.1	35.66	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
		2.6	0.47	198.1	35.66	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT 4 8786 WENDEL 2 4 1	24	12.6	3.02	13.7	3.28	SYSTEM INTACT		NOT SAF
		12.6	3.02	141.4	33.95	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		12.6	3.02	145.2	34.85	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
7449 HERMAN 4 8786 WENDEL 2 4 1	24	9.7	2.34	10.6	2.54	SYSTEM INTACT		NOT SAF
		9.7	2.34	138.4	33.21	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
		9.7	2.34	142.1	34.12	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
63123 HOOT LK9 63223 HOOT LK7 1	27	50.6	13.66	50.8	13.71	SYSTEM INTACT		NOT SAF
		67	18.09	103.2	27.87	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		68.3	18.44	102.5	27.66	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF

Appendix D - AC Analysis

Nashua 30MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_30MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
7163 CASCJT	4 63123 HOOT LK9	1	17.3	8.7	1.5	8.7	1.5	SYSTEM INTACT		NOT SAF
				33.3	5.75	150.3	26.01	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
				35.2	6.1	148.7	25.72	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE	4 7199 WENDEL	4 1	21	20.9	4.39	129.8	27.26	SYSTEM INTACT		SAF
				20.9	4.39	130.1	27.33	63195 BIGSTONY 63214 BIGSTON7 1		SAF
				20.9	4.39	130.1	27.33	63195 BIGSTONY 63314 BIGSTON4 1		SAF
				20.9	4.39	130.1	27.32	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
				20.9	4.39	130.1	27.32	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
				20.9	4.39	130.1	27.32	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7199 WENDEL	4 7204 NASUAJCT	4 1	21	16.5	3.47	133.5	28.03	SYSTEM INTACT		SAF
				16.5	3.47	133.8	28.09	63195 BIGSTONY 63214 BIGSTON7 1		SAF
				16.5	3.47	133.8	28.09	63195 BIGSTONY 63314 BIGSTON4 1		SAF
				16.5	3.47	133.7	28.08	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
				16.5	3.47	133.7	28.08	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
				16.5	3.47	133.7	28.08	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT	4 7205 NASHUA	4 1	18	2.6	0.47	171.1	30.8	SYSTEM INTACT		SAF
				2.6	0.47	171.4	30.86	63195 BIGSTONY 63214 BIGSTON7 1		SAF
				2.6	0.47	171.4	30.86	63195 BIGSTONY 63314 BIGSTON4 1		SAF
				2.6	0.47	171.4	30.85	63327 HANKSON4 63329 WAHPETN4 1	SW1007	SAF
				2.6	0.47	171.4	30.85	63329 WAHPETN4 63191 WAHPET1Y 1	SW1007	SAF
				2.6	0.47	171.4	30.85	63329 WAHPETN4 63201 WAHPET2Y 1	SW1007	SAF
7204 NASUAJCT	4 8786 WENDEL 2	4 1	24	12.6	3.02	13.4	3.22	SYSTEM INTACT		NOT SAF
				12.6	3.02	122.1	29.3	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
				12.6	3.02	125.7	30.17	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF
7449 HERMAN	4 8786 WENDEL 2	4 1	24	9.7	2.34	10.4	2.5	SYSTEM INTACT		NOT SAF
				9.7	2.34	119.1	28.6	7198 CATSEYE 4 7199 WENDEL 4 1	SW218	SAF
				9.7	2.34	122.8	29.47	7199 WENDEL 4 7204 NASUAJCT 4 1	SW218	SAF

Appendix D - AC Analysis

Nashua 25MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_25MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	8.7	1.5	8.7	1.5	SYSTEM INTACT		NOT SAF
		33.3	5.75	130	22.49	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		35.2	6.1	128.75	22.27	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	20.9	4.39	124.4	26.12	SYSTEM INTACT		SAF
		21.4	4.48	128.9	27.06	62893-63058-62894 WINGRIV4 230/115/13 1	SW1015	SAF
		21.4	4.48	128.8	27.04	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
		21.2	4.46	128.9	27.08	63219 GRANTCO7 66555 MORRIS 7 1		SAF
		21.5	4.51	132.9	27.91	63219 GRANTCO7 69413 EFERGUS7 1		SAF
		21.6	4.54	135	28.36	63223 HOOT LK7 69413 EFERGUS7 1		SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	16.5	3.47	127.5	26.78	SYSTEM INTACT		SAF
		16.9	3.55	132.1	27.73	62893-63058-62894 WINGRIV4 230/115/13 1	SW1015	SAF
		16.9	3.55	132	27.71	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
		16.8	3.53	132.1	27.75	63219 GRANTCO7 66555 MORRIS 7 1		SAF
		17	3.57	136.1	28.58	63219 GRANTCO7 69413 EFERGUS7 1		SAF
		17.1	3.59	138.3	29.04	63223 HOOT LK7 69413 EFERGUS7 1		SAF
7204 NASUAJCT 4 7205 NASHUA 4 1	18	2.6	0.47	163.2	29.38	SYSTEM INTACT		SAF
		2.6	0.47	168.8	30.38	62893-63058-62894 WINGRIV4 230/115/13 1	SW1015	SAF
		2.6	0.48	168.7	30.36	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
		2.7	0.48	168.9	30.4	63219 GRANTCO7 66555 MORRIS 7 1		SAF
		2.7	0.48	173.8	31.28	63219 GRANTCO7 69413 EFERGUS7 1		SAF
		2.6	0.47	176.4	31.75	63223 HOOT LK7 69413 EFERGUS7 1		SAF

Nashua 20MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_20MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
7163 CASCJT 4 63123 HOOT LK9 1	17.3	8.7	1.5	8.7	1.5	SYSTEM INTACT		NOT SAF
		33.3	5.75	109.7	18.98	7198 CATSEYE 4 7200 ASHBYJT 4 1	SW204	SAF
		35.2	6.1	108.8	18.82	7200 ASHBYJT 4 7201 ELBOWJ 4 1	SW204	SAF
7198 CATSEYE 4 7199 WENDEL 4 1	21	20.9	4.39	91	19.11	SYSTEM INTACT		NOT SAF
		22.3	4.68	103.3	21.7	63219 GRANTCO7 63220 ELBOWLK7 1	SW51	SAF
7199 WENDEL 4 7204 NASUAJCT 4 1	21	16.5	3.47	94.1	19.77	SYSTEM INTACT		NOT SAF
		17.6	3.71	106.6	22.39	63219 GRANTCO7 63220 ELBOWLK7 1	SW51	SAF

Appendix D - AC Analysis

Nashua 20MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_20MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
7204 NASUAJCT	4 7205 NASHUA 4	1	18	2.6	0.47	124	22.31	SYSTEM INTACT		SAF
				2.6	0.47	127.3	22.91	62893-63058-62894 WINGRIV4 230/115/13 1	SW1015	SAF
				2.6	0.48	127	22.85	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
				2.8	0.5	139.7	25.15	63219 GRANTCO7 63220 ELBOWLK7 1	SW51	SAF
				2.7	0.48	128.7	23.17	63219 GRANTCO7 69413 EFERGUS7 1		SAF
				2.6	0.47	129.8	23.36	63223 HOOT LK7 69413 EFERGUS7 1		SAF

Nashua 15MW								
Output File:		SUPK_NW_Base Case		SUPK_NW_15MW_Nashua				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingecy analysis summary - Osage		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 26 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Osage 40MW

Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Osage				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
38781 LLCAPBNK	38783 OSAGE MP	1	34	40.1	13.64	89.6	30.48	SYSTEM INTACT				NOT SAF
				25.7	8.7	100.6	34.22	62413 PINEPT 9	62414 OSAGE 9	1		SAF
38783 OSAGE MP	62414 OSAGE 9	1	18.1	75.4	13.6	168.7	30.54	SYSTEM INTACT				SAF
				75.4	13.6	169.9	30.75	60133 SHEYNNE4	60134 SHEYNNE7	5		SAF
				75.4	13.6	169.9	30.75	60133 SHEYNNE4	60134 SHEYNNE7	6		SAF
				75.7	13.69	169.9	30.74	61612 RIVERTN4	63058 WINGRIV4	1	SW1114	SAF
				48.2	8.7	189.4	34.28	62413 PINEPT 9	62414 OSAGE 9	1		SAF
				75.4	13.6	169.8	30.74	62893-63058-62894 WINGRIV4 230/115/13		1		SAF

Osage 35MW

Output File:		SUPK_NW_Base Case		SUPK_NW_35MW_Osage				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
38783 OSAGE MP	62414 OSAGE 9	1	18.1	75.4	13.6	147.3	26.67	SYSTEM INTACT				SAF
				75.8	13.71	151.4	27.41	61612 RIVERTN4	61796 RIVERJCT	1	SW1119	SAF
				75.4	13.6	165.6	29.97	62413 PINEPT 9	62414 OSAGE 9	1		SAF
				75.7	13.7	151.3	27.38	63336 AUDUBON4	60133 SHEYNNE4	1	SW973	SAF
				75.7	13.7	151.3	27.38	63336 AUDUBON4	63053 HUBBARD4	1	SW973	SAF
				75.7	13.7	151.3	27.38	63336 AUDUBON4	63202 AUDUBONY	1	SW973	SAF

Appendix D - AC Analysis

Osage 30MW											
Output File:			SUPK_NW_Base Case		SUPK_NW_30MW_Osage						SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
38783 OSAGE MP	62414 OSAGE 9	1	18.1	75.4	13.6	113.5	20.54	SYSTEM INTACT				SAF
				75.4	13.6	116.8	21.13	60114 ELM CRK3	60151 MNTCELO3	1		SAF
				75.4	13.6	132.1	23.91	62413 PINEPT 9	62414 OSAGE 9	1		SAF
				75.4	13.6	116.7	21.13	62531 INMAN 7	63052 INMAN 4	1	SW985	SAF
				75.4	13.6	116.7	21.13	63052 INMAN 4	63051 HENNING4	1	SW985	SAF
				75.4	13.6	116.7	21.13	63052 INMAN 4	63058 WINGRIV4	1	SW985	SAF

Osage 25MW											
Output File:			SUPK_NW_Base Case		SUPK_NW_25MW_Osage						SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
38783 OSAGE MP	62414 OSAGE 9	1	18.1	75.4	13.6	87.7	15.87	SYSTEM INTACT				NOT SAF
				75.4	13.6	105.5	19.1	62413 PINEPT 9	62414 OSAGE 9	1		SAF

Osage 20MW											
Output File:			SUPK_NW_Base Case		SUPK_NW_20MW_Osage						SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	

Appendix D - AC Analysis

SUPK SE Planning Zone contingency analysis summary - Parkers Prairie		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 24 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Parkers Prairie 40MW																
Output File:				SUPK_NW_Base Case		SUPK_NW_40MW_Parkers Prairie										SIGNIFICANTLY
CIRCUIT/WINDING		TO		CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY						AFFECTED
# NAME	#	NAME	#		MVA	%I	MVA	%I	MVA	FROM		TO		CKT	SWITCH	FACILITY
7197 PARKERS	4	62547 PRKPRTP9		1	24	18.7	4.48	157.9	37.9	SYSTEM INTACT						SAF
						18.7	4.48	158.2	37.97	61642 VERNDLE7	62893 WINGRIV7			1		SAF
						18.7	4.48	158.6	38.05	63327 HANKSON4	63329 WAHPETN4			1	SW1007	SAF
						18.7	4.48	158.2	37.97	63327 HANKSON4	63363 FORMAN 4			1		SAF
						18.7	4.48	158.6	38.05	63329 WAHPETN4	63191 WAHPET1Y			1	SW1007	SAF
						18.7	4.48	158.6	38.05	63329 WAHPETN4	63201 WAHPET2Y			1	SW1007	SAF
7197 PARKERS	4	62548 PRPPRSW9		1	24	35.6	8.53	143.2	34.37	SYSTEM INTACT						SAF
						35.6	8.53	143.5	34.45	61642 VERNDLE7	62893 WINGRIV7			1		SAF
						35.6	8.53	144	34.55	63327 HANKSON4	63329 WAHPETN4			1	SW1007	SAF
						35.6	8.53	143.5	34.45	63327 HANKSON4	63363 FORMAN 4			1		SAF
						35.6	8.53	144	34.55	63329 WAHPETN4	63191 WAHPET1Y			1	SW1007	SAF
						35.6	8.53	144	34.55	63329 WAHPETN4	63201 WAHPET2Y			1	SW1007	SAF
62539 PRKR PR9		62547 PRKPRTP9		1	23.8	18.9	4.49	159.3	37.91	SYSTEM INTACT						SAF
						18.9	4.49	159.6	37.98	61642 VERNDLE7	62893 WINGRIV7			1		SAF
						18.9	4.49	159.9	38.06	63327 HANKSON4	63329 WAHPETN4			1	SW1007	SAF
						18.9	4.49	159.6	37.98	63327 HANKSON4	63363 FORMAN 4			1		SAF
						18.9	4.49	159.9	38.06	63329 WAHPETN4	63191 WAHPET1Y			1	SW1007	SAF
						18.9	4.49	159.9	38.06	63329 WAHPETN4	63201 WAHPET2Y			1	SW1007	SAF
62548 PRPPRSW9		62773 MILTONA9		1	27.4	31.1	8.53	125.4	34.36	SYSTEM INTACT						SAF
						31.1	8.53	125.7	34.44	61642 VERNDLE7	62893 WINGRIV7			1		SAF
						31.1	8.53	126	34.53	63327 HANKSON4	63329 WAHPETN4			1	SW1007	SAF
						31.1	8.53	125.7	34.44	63327 HANKSON4	63363 FORMAN 4			1		SAF
						31.1	8.53	126	34.53	63329 WAHPETN4	63191 WAHPET1Y			1	SW1007	SAF
						31.1	8.53	126	34.53	63329 WAHPETN4	63201 WAHPET2Y			1	SW1007	SAF

Appendix D - AC Analysis

Parkers Prairie 40MW									
Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
62753 MILTONA7	62773 MILTONA9	1	30	69.3	20.78	103.6	31.09	SYSTEM INTACT				SAF
				69.3	20.78	104.2	31.25	61642 VERNDLE7	62893 WINGRIV7	1		SAF
				69.3	20.78	104.8	31.45	63327 HANKSON4	63329 WAHPETN4	1	SW1007	SAF
				69.3	20.78	104.2	31.25	63327 HANKSON4	63363 FORMAN 4	1		SAF
				69.3	20.78	104.8	31.45	63329 WAHPETN4	63191 WAHPET1Y	1	SW1007	SAF
				69.3	20.78	104.8	31.45	63329 WAHPETN4	63201 WAHPET2Y	1	SW1007	SAF

Parkers Prairie 35MW									
Output File:		SUPK_NW_Base Case		SUPK_NW_35MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS	4 62547 PRKPRTP9	1	24	18.7	4.48	155.8	37.4	SYSTEM INTACT				SAF
				19	4.55	162.8	39.07	62527 ELMO	7 62752 MLTN TP7	1		SAF
				18.9	4.53	164.2	39.42	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				18.9	4.53	163.8	39.31	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				18.9	4.53	163.8	39.31	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				18.9	4.53	163.8	39.31	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
7197 PARKERS	4 62548 PRPPRSW9	1	24	35.6	8.53	140	33.6	SYSTEM INTACT				SAF
				36.1	8.66	146.6	35.18	62527 ELMO	7 62752 MLTN TP7	1		SAF
				35.9	8.62	148	35.51	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				35.9	8.62	147.6	35.41	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				35.9	8.62	147.6	35.41	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				35.9	8.62	147.6	35.41	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	18.9	4.49	157.2	37.41	SYSTEM INTACT				SAF
				19.1	4.55	164.2	39.08	62527 ELMO	7 62752 MLTN TP7	1		SAF
				19	4.53	165.7	39.43	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				19	4.53	165.2	39.32	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				19	4.53	165.2	39.32	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				19	4.53	165.2	39.32	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF

Appendix D - AC Analysis

Parkers Prairie 35MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_35MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
62548 PRPPRSW9	62773 MILTONA9	1	27.4	31.1	8.53	122.5	33.58	SYSTEM INTACT				SAF
				31.6	8.66	128.3	35.17	62527 ELMO 7	62752 MLTN TP7	1		SAF
				31.4	8.61	129.6	35.5	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				31.4	8.62	129.2	35.4	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				31.4	8.62	129.2	35.4	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				31.4	8.62	129.2	35.4	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
62753 MILTONA7	62773 MILTONA9	1	30	69.3	20.78	107.7	32.32	SYSTEM INTACT				SAF
				70.3	21.08	114.5	34.36	62527 ELMO 7	62752 MLTN TP7	1		SAF
				71.2	21.36	116	34.79	62893-63058-62894 WINGRIV4 230/115/13		1	SW1015	SAF
				71.2	21.36	115.5	34.66	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				71.2	21.36	115.5	34.66	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				71.2	21.36	115.5	34.66	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF

Parkers Prairie 30MW										
Output File:			SUPK_NW_Base Case		SUPK_NW_30MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS	4 62547 PRKPRTP9	1	24	18.7	4.48	124.6	29.91	SYSTEM INTACT				SAF
				18.8	4.52	136.4	32.74	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				18.9	4.53	129	30.96	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				18.9	4.53	129	30.96	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				18.9	4.53	129	30.96	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
				18.7	4.48	135.1	32.42	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF
7197 PARKERS	4 62548 PRPPRSW9	1	24	35.6	8.53	109.3	26.22	SYSTEM INTACT				SAF
				35.9	8.61	120.3	28.88	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				35.9	8.62	113.4	27.21	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				35.9	8.62	113.4	27.21	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				35.9	8.62	113.4	27.21	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
				35.6	8.53	119.1	28.58	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF

Appendix D - AC Analysis

Parkers Prairie 30MW									
Output File:		SUPK_NW_Base Case		SUPK_NW_30MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	18.9	4.49	125.7	29.92	SYSTEM INTACT				SAF
				19	4.53	137.6	32.75	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				19	4.53	130.1	30.97	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				19	4.53	130.1	30.97	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				19	4.53	130.1	30.97	63058 WINGRIV4	61612 RIVERTN4	1	SW1015	SAF
				18.9	4.49	136.3	32.43	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF
62548 PRPPRSW9	62773 MILTONA9	1	27.4	31.1	8.53	95.6	26.2	SYSTEM INTACT				NOT SAF
				31.4	8.6	105.3	28.86	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				31.1	8.53	104.2	28.56	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF

Parkers Prairie 25MW									
Output File:		SUPK_NW_Base Case		SUPK_NW_25MW_Parkers Prairie					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
7197 PARKERS	4 62547 PRKPRTP9	1	24	18.7	4.48	99.7	23.92	SYSTEM INTACT				NOT SAF
				18.8	4.52	104.6	25.11	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				18.9	4.53	103.1	24.75	62893-63058-62894 WINGRIV4	230/115/13	1	SW1015	SAF
				18.9	4.53	103	24.73	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				18.9	4.53	103	24.73	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				18.7	4.48	105.1	25.21	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF
62539 PRKR PR9	62547 PRKPRTP9	1	23.8	35.6	8.53	100.6	23.93	SYSTEM INTACT				SAF
				35.9	8.61	105.5	25.12	62752 MLTN TP7	67471 ALEXTAP7	1		SAF
				35.9	8.62	104	24.76	62893-63058-62894 WINGRIV4	230/115/13	1	SW1015	SAF
				35.9	8.62	104	24.74	63052 INMAN 4	63051 HENNING4	1	SW1015	SAF
				35.9	8.62	104	24.74	63052 INMAN 4	63058 WINGRIV4	1	SW1015	SAF
				35.6	8.53	106	25.22	63219 GRANTCO7	63220 ELBOWLK7	1	SW51	SAF

Appendix D - AC Analysis

Parkers Prairie 20MW																
Output File:					SUPK_NW_Base Case			SUPK_NW_20MW_Parkers Prairie								
CIRCUIT/WINDING		TO		CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT		CONTINGENCY				SIGNIFICANTLY AFFECTED
#	NAME	#	NAME	#	MVA	%I	MVA	%I	MVA		FROM	TO	CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site analysis summary - Shooks		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	MAY 30 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Shooks 40MW

Output File:		SUPK_NW_Base Case		SUPK_NW_40MW_Shooks				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9268 BIG FALS 6 67017 RUNNING8 1	40	7.9	3.15	103.3	41.3	SYSTEM INTACT		SAF
		8	3.21	104.7	41.89	61564 FORB4JCT 61624 FORBES 4 2		SAF
		8	3.21	104.8	41.93	61624 FORBES 4 61623 MINNTAC4 1	SW1105	SAF
		8	3.21	104.7	41.87	61626 BOSWELL4 61775 BOSWE44G 1	SW1084	SAF
		8	3.21	104.7	41.87	67503 DORSEY 4 67566 DORSEYM4 52		SAF
		8	3.21	104.8	41.91	67564 DORSEY 2 67566 DORSEYM4 52		SAF
66779 RUNNINST 66780 RUNNINU8 1	70	19.9	13.95	55.6	38.89	SYSTEM INTACT		NOT SAF
		41.3	28.93	104.9	73.46	66753 RUNNING4 66760 LUND 4 1		SAF

Shooks 35MW

Output File:		SUPK_NW_Base Case		SUPK_NW_35MW_Shooks				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Williams		
Date:	9/8/2009 12:42	
Date of Run:	MAY 30 2009	JUN 24 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Williams 40MW

Output		SUOP_NW_Base Case		SUOP_NW_40MW_Williams				SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	
9256 WILLMS T 6 66999 MORANVI8 1			41.8	0	0	0	0	SYSTEM INTACT		NOT SAF
				3.6	1.52	102.7	42.92	9256 WILLMS T 6 9258 PITT 6 1	SW624	SAF
9256 WILLMS T 6 9257 WILLIAMS 6 1			40	3.1	1.26	102	40.8	SYSTEM INTACT		SAF
				3.3	1.32	102.9	41.16	61564 FORB4JCT 61624 FORBES 4 2	SW1093	SAF
				3.3	1.32	102.9	41.17	61626 BOSWELL4 61775 BOSWE44G 1	SW1084	SAF
				3.3	1.32	102.9	41.16	67557 LETELER4 67559 LAVEREN4 1		SAF
				3.6	1.52	107.3	42.93	9256 WILLMS T 6 9258 PITT 6 1	SW624	SAF
				3.6	1.52	107.1	42.84	9258 PITT 6 66801 LUND 8 1	SW624	SAF
9256 WILLMS T 6 9258 PITT 6 1			39	3.7	1.44	104.6	40.79	SYSTEM INTACT		SAF
				4.7	1.5	105.5	41.15	61564 FORB4JCT 61624 FORBES 4 2	SW1093	SAF
				4.7	1.5	105.5	41.16	61626 BOSWELL4 61775 BOSWE44G 1	SW1084	SAF
				4.7	1.5	105.5	41.14	67503 DORSEY 4 67598 DORSY2M4 51		SAF
				4.7	1.5	105.5	41.15	67557 LETELER4 67559 LAVEREN4 1		SAF
				4.7	1.5	105.5	41.14	9269 BIRCHDAL 6 9270 LOMAN 6 1		SAF
9269 BIRCHDAL 6 66801 LUND 8 1			40	22.8	9.14	31.1	12.44	SYSTEM INTACT		NOT SAF
				91.3	36.53	107.4	42.95	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1			40	20.6	8.23	28.9	11.54	SYSTEM INTACT		NOT SAF
				89.1	35.65	105.2	42.07	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6 67017 RUNNING8 1			40	19.3	7.72	27.5	10.99	SYSTEM INTACT		NOT SAF
				88	35.18	104	41.6	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

Williams 35MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_35MW_Williams				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL	6 66801 LUND 8	1	40	22.8	9.14	30.1	12.04	SYSTEM INTACT		NOT SAF
				91.3	36.53	105.4	42.17	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL	6 9270 LOMAN	6 1	40	20.6	8.23	27.9	11.14	SYSTEM INTACT		NOT SAF
				89.1	35.65	103.2	41.29	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN	6 67017 RUNNING8	1	40	19.3	7.72	26.5	10.6	SYSTEM INTACT		NOT SAF
				88	35.18	102.1	40.83	66753 RUNNING4 66760 LUND 4 1		SAF

Williams 30MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_30MW_Williams				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL	6 66801 LUND 8	1	40	22.8	9.14	29.1	11.64	SYSTEM INTACT		NOT SAF
				91.3	36.53	103.7	41.48	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL	6 9270 LOMAN	6 1	40	20.6	8.23	26.8	10.74	SYSTEM INTACT		NOT SAF
				89.1	35.65	101.5	40.6	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN	6 67017 RUNNING8	1	40	19.3	7.72	25.5	10.2	SYSTEM INTACT		NOT SAF
				88	35.18	100.3	40.14	66753 RUNNING4 66760 LUND 4 1		SAF

Williams 25MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_25MW_Williams				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL	6 66801 LUND 8	1	40	22.8	9.14	28.1	11.24	SYSTEM INTACT		NOT SAF
				91.3	36.53	101.7	40.66	66753 RUNNING4 66760 LUND 4 1		SAF

Williams 20MW								
Output File:		SUOP_NW_Base Case		SUOP_NW_20MW_Williams				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Verndale		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 11 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Verndale 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_VERNDALE				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.57	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1191.92	36420 ZION ; B 39247 ARCADN3 1		SAF

Verndale 35MW

Output File:		SUPK_NE_Base Case		SUPK_NE_35MW_VERNDALE				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.41	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.67	36420 ZION ; B 39247 ARCADN3 1		SAF

Verndale 30MW

Output File:		SUPK_NE_Base Case		SUPK_NE_30MW_VERNDALE				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.24	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.42	36420 ZION ; B 39247 ARCADN3 1		SAF

Appendix D - AC Analysis

Verndale 25MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_25MW_VERNDALE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.08	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.17	36420 ZION ; B 39247 ARCADN3 1		SAF

Verndale 20MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_20MW_VERNDALE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1042.91	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1190.91	36420 ZION ; B 39247 ARCADN3 1		SAF

Verndale 15MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_15MW_VERNDALE				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Bena		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 09 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Bena 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
36421 ZION ; R 38849 PLS PR2 1	1096	95.1	1042.21	95.2	1043.1	SYSTEM INTACT		NOT SAF
		108.6	1189.85	108.8	1191.97	36420 ZION ; B 39247 ARCADN3 1		SAF
62480 BENA 8 62483 BENA TP8 1	27.7	5.9	1.6	148.4	41.12	SYSTEM INTACT		SAF
		6	1.7	152.1	42.14	61739-62488-62513 BLCKBRY7 115/69/12 1		SAF
		6.3	1.7	159.4	44.16	61748 BOSWELL7 61790 COHSSTTP 1		SAF
		6.2	1.7	154.9	42.92	61790 COHSSTTP 61791 LAKEHD 7 1		SAF
		5.9	1.6	155.3	43.02	62482 SALEMSW8 62483 BENA TP8 1		SAF
		6	1.7	152.2	42.16	62485 WARBASW8 62488 BLCKBRY8 1		SAF

Bena 35MW

Output File:		SUPK_NE_Base Casee		SUPK_NE_35MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
36421 ZION ; R 38849 PLS PR2 1	1096	95.1	1042.21	95.2	1043.05	SYSTEM INTACT		NOT SAF
		108.6	1189.85	108.7	1191.87	36420 ZION ; B 39247 ARCADN3 1		SAF
62480 BENA 8 62483 BENA TP8 1	27.7	5.9	1.6	130.9	36.25	SYSTEM INTACT		SAF
		6.3	1.7	137.3	38.04	61748 BOSWELL7 61790 COHSSTTP 1		SAF
		6.2	1.7	133.9	37.1	61790 COHSSTTP 61791 LAKEHD 7 1		SAF
		5.9	1.6	132.2	36.61	62475 GUNN 8 62484 ARBO TP8 1		SAF
		5.9	1.6	133.4	36.96	62482 SALEMSW8 62483 BENA TP8 1		SAF
		5.9	1.6	133.7	37.03	62482 SALEMSW8 62489 REMER 8 1		SAF

Appendix D - AC Analysis

Bena 30MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_30MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
62480 BENA 8	62483 BENA TP8	1	27.7	5.9	1.6	111.2	30.82	SYSTEM INTACT		SAF
				6.3	1.7	116	32.14	61748 BOSWELL7 61790 COHSSTTP 1		SAF
				6.2	1.7	113.7	31.5	61790 COHSSTTP 61791 LAKEHD 7 1		SAF
				6.1	1.7	113.1	31.34	62479 BALLCLB8 62483 BENA TP8 1		SAF
				6	1.7	116.4	32.25	62479 BALLCLB8 62487 DEER RV8 1		SAF
				5.9	1.6	112.8	31.25	62482 SALEMSW8 62489 REMER 8 1		SAF

Bena 25MW								
Output File:		SUPK_NE_Base Casee		SUPK_NE_25MW_BENA.				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Dewing		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 10 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Dewing 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.68	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1192.07	36420 ZION ; B 39247 ARCADN3 1		SAF

Dewing 35MW

Output File:		SUPK_NE_Base Case		SUPK_NE_35MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.5	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.8	36420 ZION ; B 39247 ARCADN3 1		SAF

Dewing 30MW

Output File:		SUPK_NE_Base Case		SUPK_NE_30MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.32	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.53	36420 ZION ; B 39247 ARCADN3 1		SAF

Appendix D - AC Analysis

Dewing 25MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_25MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.14	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.26	36420 ZION ; B 39247 ARCADN3 1		SAF

Dewing 20MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_20MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1042.96	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1190.98	36420 ZION ; B 39247 ARCADN3 1		SAF

Dewing 15MW								
Output File:		SUPK_NE_Base Case		SUPK_NE_15MW_DEWING				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Hubbard		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 10 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hubbard 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_HUBBARD				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - National		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 10 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

National 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_NATIONAL				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.83	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1192.28	36420 ZION ; B 39247 ARCADN3 1		SAF

National 35MW

Output File:		SUPK_NE_Base Case		SUPK_NE_35MW_NATIONAL				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.63	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1191.98	36420 ZION ; B 39247 ARCADN3 1		SAF

National 30MW

Output File:		SUPK_NE_Base Case		SUPK_NE_30MW_NATIONAL				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.43	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.68	36420 ZION ; B 39247 ARCADN3 1		SAF

Appendix D - AC Analysis

National 25MW										
Output File:			SUPK_NE_Base Case		SUPK_NE_25MW_NATIONAL					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.12	SYSTEM INTACT				NOT SAF
				108.6	1189.85	108.8	1191.92	36420 ZION ; B	39247 ARCADN3	1		SAF

National 20MW										
Output File:			SUPK_NE_Base Case		SUPK_NE_20MW_NATIONAL					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1042.94	SYSTEM INTACT				NOT SAF
				108.6	1189.85	108.7	1191.62	36420 ZION ; B	39247 ARCADN3	1		SAF

National 15MW										
Output File:			SUPK_NE_Base Case		SUPK_NE_15MW_NATIONAL					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Palmer Lake		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 11 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Palmer Lake 40MW										
Output File:			SUPK_NE_Base Case		SUPK_NE_40MW_PALMER LAKE					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - Pine Lake		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	AUG 28 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Pine Lake 40MW

Output File:		SUPK_NE_BaseCase-line		SUPK_NE_40MW_Pine Lake				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
38854 BERTRAM 61836 SWANVIL9 1	34.1	6.4	2.2	123.8	42.21	SYSTEM INTACT		SAF
		6.4	2.2	130.8	44.62	38855 521-08SW 61856 BLNCHD29 1	SW9	SAF
		6.5	2.2	132.6	45.21	61636 SWANVIL7 61647 LONG PR7 1		SAF
		6.5	2.2	127.6	43.52	61636 SWANVIL7 61649 BLNCHRD7 1		SAF
				127.3	43.43	61649 BLNCHRD7 61849 BLNCHRD9 1	SW5014	SAF
		6.5	2.2	126.9	43.26	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF
38854 BERTRAM 62859 PINELK9 1	34.1	0.1	0	128.5	43.83	SYSTEM INTACT		SAF
		0.1	0	137.6	46.91	61636 SWANVIL7 61647 LONG PR7 1		SAF
		0.1	0	132.5	45.17	61636 SWANVIL7 61649 BLNCHRD7 1		SAF
				132.2	45.07	61649 BLNCHRD7 61849 BLNCHRD9 1	SW5014	SAF
		0.1	0	131.7	44.91	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF

Pine Lake 35MW

Output File:		SUPK_NE_BaseCase		SUPK_NE_35MW_Pine Lake				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
38854 BERTRAM 61836 SWANVIL9 1	34.1	6.4	2.2	107	36.47	SYSTEM INTACT		SAF
		6.4	2.2	110.3	37.62	38855 521-08SW 61856 BLNCHD29 1	SW9	SAF
		6.5	2.2	111.1	37.9	61636 SWANVIL7 61647 LONG PR7 1		SAF
		6.5	2.2	107.7	36.74	61649 BLNCHRD7 61849 BLNCHRD9 1	SW5014	SAF
		6.5	2.2	107.7	36.73	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
		6.5	2.2	107.7	36.73	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF

Appendix D - AC Analysis

Pine Lake 35MW

Output File:			SUPK_NE_BaseCase		SUPK_NE_35MW_Pine Lake				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
38854 BERTRAM	62859 PINELK9	1	34.1	0.1	0	111.8	38.11	SYSTEM INTACT		SAF
				0.1	0	116.1	39.58	61636 SWANVIL7 61647 LONG PR7 1		SAF
				0.1	0	112.6	38.38	61649 BLNCHRD7 61849 BLNCHRD9 1	SW5014	SAF
				0.1	0	112.5	38.38	63052 INMAN 4 63051 HENNING4 1	SW1015	SAF
				0.1	0	112.5	38.38	63052 INMAN 4 63058 WINGRIV4 1	SW1015	SAF

Pine Lake 30MW

Output File:			SUPK_NE_Base Case		SUPK_NE_30MW_Pine Lake				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Planning Zone single site contingency analysis summary - West Union		
Date:	9/8/2009 12:31	
Date of Run:	MAY 29 2009	JUN 12 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

West Union 40MW

Output File:		SUPK_NE_Base Case		SUPK_NE_40MW_W. UNION				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.79	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1192.22	36420 ZION ; B 39247 ARCADN3 1		SAF
60751 SAUKCMU8	62820 W UNION8	1	39.6	32.8	13	64.1	25.38	SYSTEM INTACT		NOT SAF
				16.2	6.4	101.4	40.17	60749 DGLAS C8 60750 OSAKIS 8 1		SAF
				6.6	2.6	106.7	42.24	60750 OSAKIS 8 62820 W UNION8 1		SAF

West Union 35MW

Output File:		SUPK_NE_Base Case		SUPK_NE_35MW_W. UNION				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.63	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.8	1191.97	36420 ZION ; B 39247 ARCADN3 1		SAF

West Union 30MW

Output File:		SUPK_NE_Base Case		SUPK_NE_30MW_W. UNION				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.45	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.71	36420 ZION ; B 39247 ARCADN3 1		SAF

Appendix D - AC Analysis

West Union 25MW									
Output File:		SUPK_NE_Base Case		SUPK_NE_25MW_W. UNION					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.27	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.43	36420 ZION ; B 39247 ARCADN3 1		SAF

West Union 20MW									
Output File:		SUPK_NE_Base Case		SUPK_NE_20MW_W. UNION					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.2	1043.07	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.7	1191.14	36420 ZION ; B 39247 ARCADN3 1		SAF

West Union 15MW									
Output File:		SUPK_NE_Base Case		SUPK_NE_15MW_W. UNION					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone single site contingency analysis summary - Hutchinson		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 16 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hutchinson 40MW												
Output				SUOP_WC_Base Case		SUOP_WC_40MW_Hutchinson						SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	

Appendix D - AC Analysis

SUPK WC Planning Zone single site contingency analysis summary - Albany		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 18 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Albany 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Albany					SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	

Appendix D - AC Analysis

SUPK WC Planning Zone single site contingency analysis summary - Benton		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 18 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Benton 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Benton				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK WC Planning Zone single site contingency analysis - Big Swan		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 18 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Big Swan 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Big Swan				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK WC Planning Zone single site contingecy analysis summary - Crooks		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 18 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Crooks 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Crooks				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60679 CROOKS 8	60680 EMMET R8	1	40.7	12.7	5.17	45.5	18.53	SYSTEM INTACT				NOT SAF
				6.4	2.6	101	41.11	60679 CROOKS 8	60695 DANUBE 8	1		SAF

Crooks 35MW

Output File:		SUPK_WC_Base Case		SUPK_WC_35MW_Crooks				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK WC Planning Zone single site analysis summary - Douglas Co		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 17 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Douglas Co 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Douglas Co				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK WC Planning Zone contingency analysis summary - Fiesta		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 17 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Fiesta 40MW

Output File:		SUPK_WC_Base Case		SUPK_WC_40MW_Fiesta				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone single site contingency analysis summary - Glenwood		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 16 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Glenwood 40MW											
Output				SUOP_WC_Base Case		SUOP_WC_40MW_Glenwood					
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Planning Zone single site contingency analysis summary - Willmar		
Date:	9/8/2009 13:02	
Date of Run:	JUN 02 2009	JUN 16 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Willmar 40MW

Output		SUOP_WC_Base Case		SUOP_WC_40MW_Willmar						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW Planning Zone single site contingency analysis summary - Milroy		
Date:	9/8/2009 12:58	
Date of Run:	JUN 01 2009	JUN 20 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Milroy 40MW

Output		SUOP_SW_Base Case		SUOP_SW_40MW_Milroy				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	25.3	6.07	52.2	12.52	SYSTEM INTACT		NOT SAF
				35.1	8.41	146.7	35.21	60903 LYON CO8 62738 MILROY 8 1		SAF
60771 RDWDFLTG	62735 REDWOOD8	1	34.8	10.7	3.72	34.2	11.89	SYSTEM INTACT		NOT SAF
				17	5.91	102.8	35.76	60903 LYON CO8 62738 MILROY 8 1		SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	14.2	4.5	42.9	13.56	SYSTEM INTACT		NOT SAF
				14.2	4.5	120.1	37.94	60903 LYON CO8 62738 MILROY 8 1		SAF

Milroy 35MW

Output File:		SUOP_SW_Base Case		SUOP_SW_35MW_Milroy				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	25.3	6.07	47.9	11.49	SYSTEM INTACT		NOT SAF
				35.1	8.41	125.2	30.06	60903 LYON CO8 62738 MILROY 8 1		SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	14.2	4.5	39.3	12.42	SYSTEM INTACT		NOT SAF
				14.2	4.5	103.9	32.83	60903 LYON CO8 62738 MILROY 8 1		SAF

Milroy 30MW

Output File:		SUOP_SW_Base Case		SUOP_SW_30MW_Milroy				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	25.3	6.07	43.7	10.5	SYSTEM INTACT		NOT SAF
				35.1	8.41	104.1	24.99	60903 LYON CO8 62738 MILROY 8 1		SAF

Appendix D - AC Analysis

Milroy 25MW												
Output File:			SUOP_SW_Base Case			SUOP_SW_25MW_Milroy						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone single site contingency analysis summary - Granite Falls		
Date:	9/8/2009 12:56	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Granite Falls 40MW

Output File:		SUPK_SW_Base Case		SUPK_SW_40MW_Granite Falls				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone single site contingency analysis summary - Hardwick		
Date:	9/8/2009 12:56	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Hardwick 40MW

Output File:		SUPK_SW_Base Case		SUPK_SW_40MW_Hardwick				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone single site contingency analysis - Holland		
Date:	9/8/2009 12:56	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Holland 40MW

Output File:		SUPK_SW_Base Case		SUPK_SW_40MW_Holland						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone single site contingecy analysis summary - Ivanhoe		
Date:	9/8/2009 12:56	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Ivanhoe 40MW

Output File:		SUPK_SW_Base Case		SUPK_SW_40MW_Ivanhoe					SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY			AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM	TO	CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone single site analysis summary - Lake Sarah		
Date:	9/8/2009 12:58	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Lake Sarah 40MW

Output File:		SUPK_SW_Base Case		SUPK_SW_40MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60392 WRIDGE 8 60859 ROCKTAP8 1	51.7	15.1	7.81	21.3	11.03	SYSTEM INTACT		NOT SAF
		24.4	12.62	102	52.71	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60392 WRIDGE 8 66005 PIPETAP 1	51.7	13.3	6.86	23.3	12.06	SYSTEM INTACT		NOT SAF
		22.8	11.77	104.3	53.92	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60395 ERIDGE 8 60835 CHNDLRT8 1	34.8	30.2	10.5	15.3	5.34	SYSTEM INTACT		NOT SAF
		41	14.26	125.6	43.72	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
60395 ERIDGE 8 62710 CHANDLR8 1	34.8	8.9	3.11	32.6	11.36	SYSTEM INTACT		NOT SAF
		22.7	7.91	151.3	52.66	60855 TRACYSW8 62713 LKSRHTP8 1		SAF
		40.5	14.1	107.1	37.26	60855 TRACYSW8 62741 WLNTGTP8 1		SAF
		45.4	15.78	103.6	36.05	60903 LYON CO8 62741 WLNTGTP8 1		SAF
62713 LKSRHTP8 62714 CURRIE 8 1	47	7.1	3.32	24.7	11.61	SYSTEM INTACT		NOT SAF
		22.3	10.5	112.1	52.67	60855 TRACYSW8 62713 LKSRHTP8 1		SAF

Lake Sarah 35MW

Output File:		SUPK_SW_Base Case		SUPK_SW_35MW_Lake Sarah				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
60395 ERIDGE 8 62710 CHANDLR8 1	34.8	8.9	3.11	28.3	9.86	SYSTEM INTACT		NOT SAF
		22.7	7.91	116.6	40.59	60855 TRACYSW8 62713 LKSRHTP8 1		SAF

Appendix D - AC Analysis

Lake Sarah 30MW										
Output File:			SUPK_SW_Base Case		SUPK_SW_30MW_Lake Sarah					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SW Planning Zone contingency analysis summary - Lyon Co		
Date:	9/8/2009 12:58	
Date of Run:	JUN 01 2009	JUN 19 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Lyon Co 40MW

Output File:			SUPK_SW_Base Case		SUPK_SW_40MW_Lyon Co					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW Planning Zone single site contingency analysis summary - Walnut Grove		
Date:	9/8/2009 12:58	
Date of Run:	JUN 01 2009	JUN 20 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Walnut Grove 40MW

					SUOP_SW_Base Case		SUOP_SW_40MW_Walnut Grove					
Output												SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
60395	ERIDGE 8	62710	CHANDLR8	1	34.8	8.9	3.11	23	8	SYSTEM INTACT				NOT SAF
						45.4	15.78	132	45.9	60903 LYON CO8	62741 WLNTGTP8	1		SAF

Walnut Grove 35MW

					SUOP_SW_Base Case		SUOP_SW_35MW_Walnut Grove					
Output File:												SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	
60395	ERIDGE 8	62710	CHANDLR8	1	34.8	8.9	3.11	20.2	7.02	SYSTEM INTACT				NOT SAF
						45.4	15.78	102.1	35.55	60903 LYON CO8	62741 WLNTGTP8	1		SAF

Walnut Grove 30MW

					SUOP_SW_Base Case		SUOP_SW_30MW_Walnut Grove					
Output File:												SIGNIFICANTLY AFFECTED FACILITY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	

Appendix D - AC Analysis

SUPK SE Planning Zone contingency analysis summary - Wabaca		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 13 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Wabaca 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_WABACA				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis summary - Altura		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Altura 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_ALTURA						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis summary - Elgin		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Elgin 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_ELGIN						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	TLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingency analysis - Harmony		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 14 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Harmony 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_HARMONY				
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		SIGNIFICANTLY AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site contingecy analysis summary - Henderson		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 13 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Henderson 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_HENDERSON				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60724 HENDRSN8	62674 JSNLDTP8	1	51.7	12.2	6.33	61.8	31.93	SYSTEM INTACT		NOT SAF
				52.4	27.08	103.2	53.34	60108 WILMART3 60504 HELNASS3 1		SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	29	9.85	66.5	22.6	SYSTEM INTACT		NOT SAF
				74.6	25.37	118.4	40.25	60108 WILMART3 60504 HELNASS3 1		SAF
				59.7	20.28	102	34.67	60192 BLUE LK3 60217 INVRHLS3 1	SW926	SAF
				59.7	20.28	102	34.67	60192 BLUE LK3 60504 HELNASS3 1	SW926	SAF
				59.7	20.28	102	34.67	60217 INVRHLS3 60236 REDROCK3 1	SW926	SAF
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	86.1	29.27	SYSTEM INTACT		NOT SAF
				72.3	24.59	149	50.66	60108 WILMART3 60504 HELNASS3 1		SAF
				35.5	12.06	110.2	37.45	60192 BLUE LK3 60217 INVRHLS3 1	SW926	SAF
				35.5	12.06	110.2	37.45	60192 BLUE LK3 60504 HELNASS3 1	SW926	SAF
				35.5	12.06	110.2	37.45	60217 INVRHLS3 60236 REDROCK3 1	SW926	SAF
				13.6	4.64	116.8	39.71	60724 HENDRSN8 60868 LESR TP8 1		SAF

Henderson 35MW

Output File:		SUPK_SE_Base Case		SUPK_SE_35MW_HENDERSON				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60730 ARLNGTN8	60731 GRENISL8	1	34	29	9.85	61.2	20.81	SYSTEM INTACT		NOT SAF
				74.6	25.37	112.9	38.37	60108 WILMART3 60504 HELNASS3 1		SAF
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	76.7	26.08	SYSTEM INTACT		NOT SAF
				72.3	24.59	139.4	47.41	60108 WILMART3 60504 HELNASS3 1		SAF
				35.5	12.06	100.7	34.25	60192 BLUE LK3 60217 INVRHLS3 1	SW926	SAF
				35.5	12.06	100.7	34.25	60192 BLUE LK3 60504 HELNASS3 1	SW926	SAF
				35.5	12.06	100.7	34.25	60217 INVRHLS3 60236 REDROCK3 1	SW926	SAF
				13.6	4.64	100.8	34.28	60724 HENDRSN8 60868 LESR TP8 1		SAF

Appendix D - AC Analysis

Henderson 30MW														
Output File:				SUPK_SE_Base Case		SUPK_SE_30MW_HENDERSON								SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT		SWITCH	AFFECTED FACILITY
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	67.3	22.89	SYSTEM INTACT					NOT SAF
				72.3	24.59	129.7	44.09	60108 WILMART3	60504 HELNASS3		1		SAF

Henderson 25MW														
Output File:				SUPK_SE_Base Case		SUPK_SE_25MW_HENDERSON								SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT		SWITCH	AFFECTED FACILITY
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	58	19.7	SYSTEM INTACT					NOT SAF
				72.3	24.59	120.1	40.84	60108 WILMART3	60504 HELNASS3		1		SAF

Henderson 20MW														
Output File:				SUPK_SE_Base Case		SUPK_SE_20MW_HENDERSON								SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT		SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Planning Zone single site analysis summary - St. Charles		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 13 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

St. Charles 40MW

Output File:		SUPK_SE_Base Case		SUPK_SE_40MW_ST. Charles				
CIRCUIT/WINDING TO CKT # NAME # NAME #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning Zone single site contingency analysis summary - Whitewater		
Date:	9/8/2009 12:52	
Date of Run:	MAY 30 2009	JUN 13 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Whitewater 40MW								
Output		SUOP_SE_Base Case		SUOP_SE_40MW_WHITE				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	12.1	2.3	216.8	41.19	SYSTEM INTACT				SAF
				12.1	2.3	217.4	41.31	68721 PETERSON	68773 LEWIS TP	1		SAF
				12.1	2.3	217.3	41.28	68734 WILSON	68735 T RUSH	1		SAF
				13.1	2.49	222.3	42.24	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				13.4	2.54	230.3	43.75	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
				12.3	2.34	217.5	41.33	69543 ALMA___5	69551 ELK MND5	1	SW1130	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	22.9	4.35	209.2	39.75	SYSTEM INTACT				SAF
				22.9	4.35	209.8	39.87	68721 PETERSON	68773 LEWIS TP	1		SAF
				22.9	4.35	209.7	39.85	68734 WILSON	68735 T RUSH	1		SAF
				24.8	4.71	214.6	40.77	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				25.2	4.8	222.3	42.24	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
				23.2	4.41	210	39.89	69543 ALMA___5	69551 ELK MND5	1	SW1130	SAF
68706 T WHWATR	69158 T PLV 8	1	19	21.2	4.03	21.8	4.14	SYSTEM INTACT				NOT SAF
				24.7	4.7	214.5	40.75	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	10.7	2.03	11	2.09	SYSTEM INTACT				NOT SAF
				35.9	6.82	206.5	39.23	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF

Appendix D - AC Analysis

Whitwater 35MW									
Output File:		SUOP_SE_Base Case		SUOP_SE_35MW_WHITE					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	12.1	2.3	189.7	36.05	SYSTEM INTACT		SAF
				13.1	2.49	191.8	36.45	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
				13.4	2.54	200.2	38.03	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	22.9	4.35	182.2	34.62	SYSTEM INTACT		SAF
				24.8	4.71	184.2	35	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
				25.2	4.8	192.2	36.53	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
68706 T WHWATR	69158 T PLV 8	1	19	21.2	4.03	21.9	4.16	SYSTEM INTACT		NOT SAF
				24.7	4.7	184.1	34.98	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	10.7	2.03	11	2.09	SYSTEM INTACT		NOT SAF
				35.9	6.82	176	33.45	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF

Whitewater 30MW									
Output File:		SUOP_SE_Base Case		UOP_SE_30MW_WHITEWATE					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	12.1	2.3	160.9	30.58	SYSTEM INTACT		SAF
				12.1	2.3	161.4	30.67	34325 ST.CHRT8 68713 ST CHARL 1		SAF
				12.1	2.3	161.7	30.71	68716 T STOC 68774 UTICA 1		SAF
				13.1	2.49	162.6	30.89	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
				13.4	2.54	170.3	32.36	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
				12.3	2.33	161.6	30.7	69543 ALMA___5 69549 WABACO 5 1		SAF
68703 PLAINVIE	69158 T PLV 8	1	19	22.9	4.35	153.5	29.16	SYSTEM INTACT		SAF
				22.9	4.35	153.9	29.25	34325 ST.CHRT8 68713 ST CHARL 1		SAF
				22.9	4.35	154.1	29.29	68716 T STOC 68774 UTICA 1		SAF
				24.8	4.71	155.1	29.46	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
				25.2	4.8	162.4	30.86	69198 WABACO 8 69549 WABACO 5 1	SW123	SAF
				23.2	4.4	154	29.27	69543 ALMA___5 69549 WABACO 5 1		SAF
68706 T WHWATR	69158 T PLV 8	1	19	21.2	4.03	21.8	4.14	SYSTEM INTACT		NOT SAF
				24.7	4.7	154.9	29.44	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	10.7	2.03	11	2.08	SYSTEM INTACT		NOT SAF
				35.9	6.82	146.9	27.91	69158 T PLV 8 69198 WABACO 8 1	SW123	SAF

Appendix D - AC Analysis

Whitewater 25MW										
Output File:			SUOP_SE_Base Case		UOP_SE_25MW_WHITEWATE					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	12.1	2.3	132.4	25.15	SYSTEM INTACT				SAF
				12.1	2.3	133.3	25.33	34325 ST.CHRT8	68713 ST CHARL	1		SAF
				13.1	2.49	134.2	25.49	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				13.4	2.54	140.7	26.73	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
				12.3	2.33	133.4	25.36	69543 ALMA___5	69549 WABACO 5	1		SAF
				12.3	2.34	133.2	25.31	69543 ALMA___5	69551 ELK MND5	1	SW1130	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	22.9	4.35	125	23.75	SYSTEM INTACT				SAF
				22.9	4.35	125.9	23.92	34325 ST.CHRT8	68713 ST CHARL	1		SAF
				24.8	4.71	126.7	24.07	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				25.2	4.8	132.9	25.25	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
				23.2	4.4	126	23.94	69543 ALMA___5	69549 WABACO 5	1		SAF
				23.2	4.41	125.8	23.9	69543 ALMA___5	69551 ELK MND5	1	SW1130	SAF
68706 T WHWATR	69158 T PLV 8	1	19	21.2	4.03	21.7	4.11	SYSTEM INTACT				NOT SAF
				24.7	4.7	126.6	24.05	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
68707 T ZUM	68711 WEST ALB	1	19	10.7	2.03	10.9	2.07	SYSTEM INTACT				NOT SAF
				35.9	6.82	118.6	22.54	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF

Whitewater 20MW										
Output File:			SUOP_SE_Base Case		UOP_SE_20MW_WHITEWATE					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
68703 PLAINVIE	68705 WHITEWAT	1	19	12.1	2.3	104	19.76	SYSTEM INTACT				SAF
				12.1	2.3	105	19.94	34318 ELGIN 8	34319 PLAINVW8	1		SAF
				13.1	2.49	106.1	20.16	69158 T PLV 8	69198 WABACO 8	1	SW123	SAF
				13.4	2.54	111.1	21.11	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF
				12.3	2.33	105.3	20.01	69543 ALMA___5	69549 WABACO 5	1		SAF
				12.3	2.34	105.1	19.97	69543 ALMA___5	69551 ELK MND5	1	SW1130	SAF
68703 PLAINVIE	69158 T PLV 8	1	19	22.9	4.35	96.8	18.4	SYSTEM INTACT				NOT SAF
				25.2	4.8	103.5	19.66	69198 WABACO 8	69549 WABACO 5	1	SW123	SAF

Appendix D - AC Analysis

Whitewater 15MW														
Output File:				SUOP_SE_Base Case			UOP_SE_15MW_WHITEWATE							SIGNIFICANTLY
CIRCUIT/WINDING		TO		CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY				AFFECTED
#	NAME	#	NAME	#	MVA	%I	MVA	%I	MVA	FROM	TO	CKT	SWITCH	FACILITY

Appendix D - AC Analysis

SUOP NW Zone contingency analysis summary		
Thermal violation criteria %I > 100 and Net MW Flow > 2MW		
Date:	9/8/2009 13:07	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

NW 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_NW_Base_Zone		SUOP_NW_Zone_200MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	19.2	7.7	SYSTEM INTACT		NOT SAF
				96.9	38.7	105.1	42.05	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	17.3	6.92	SYSTEM INTACT		NOT SAF
				95.1	38	103.3	41.34	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	16	6.41	SYSTEM INTACT		NOT SAF
				93.9	37.6	102.3	40.93	66753 RUNNING4 66760 LUND 4 1		SAF
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	66.6	291.74	SYSTEM INTACT		NOT SAF
				108.2	474.08	109.4	479.37	61625 BLCKBRY4 61624 FORBES 4 1	SW1073	SAF
				108.8	476.38	110.2	482.8	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				108.2	474.08	109.4	479.37	61626 BOSWELL4 61625 BLCKBRY4 1	SW1073	SAF
				108.8	476.38	110.2	482.8	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF
				108.8	476.38	110.2	482.8	61626 BOSWELL4 61625 BLCKBRY4 1	SW1089	SAF
66753 RUNNING4	66779 RUNNINST	1	81	30	24.3	77.1	62.44	SYSTEM INTACT		NOT SAF
				69.5	56.3	124.7	101.04	66753 RUNNING4 66760 LUND 4 1		SAF
				69.5	56.3	102.2	82.81	66760 LUND 4 66801 LUND 8 1		SAF
66779 RUNNINST	66780 RUNNINU8	1	70	34.7	24.3	89.2	62.44	SYSTEM INTACT		NOT SAF
				80.4	56.3	144.3	101.04	66753 RUNNING4 66760 LUND 4 1		SAF
				80.4	56.3	118.3	82.81	66760 LUND 4 66801 LUND 8 1		SAF
67327 ELLENDL7	67401 ABDNJCT7	1	88	77.1	67.89	79.4	69.86	SYSTEM INTACT		NOT SAF
				107.4	94.48	110	96.76	67105 LELANDO3 67160 GROTON 3 1		SAF

Appendix D - AC Analysis

NW 150MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_NW_Base_Zone		SUOP_NW_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	19.7	7.87	SYSTEM INTACT		NOT SAF
		96.9	38.7	103.7	41.46	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1	40	19	7.6	17.7	7.08	SYSTEM INTACT		NOT SAF
		95.1	38	101.9	40.75	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6 67017 RUNNING8 1	40	17.7	7.1	16.4	6.55	SYSTEM INTACT		NOT SAF
		93.9	37.6	100.8	40.33	66753 RUNNING4 66760 LUND 4 1		SAF
61625 BLCKBRY4 61626 BOSWELL4 2	438	65.8	287.99	66.4	290.8	SYSTEM INTACT		NOT SAF
		108.2	474.08	109.2	478.11	61625 BLCKBRY4 61624 FORBES 4 1	SW1073	SAF
		108.8	476.38	109.9	481.23	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
		108.2	474.08	109.2	478.11	61626 BOSWELL4 61625 BLCKBRY4 1	SW1073	SAF
		108.8	476.38	109.9	481.23	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF
		108.8	476.38	109.9	481.23	61626 BOSWELL4 61625 BLCKBRY4 1	SW1089	SAF
66753 RUNNING4 66779 RUNNINST 1	81	30	24.3	61.3	49.69	SYSTEM INTACT		NOT SAF
		69.5	56.3	112.7	91.28	66753 RUNNING4 66760 LUND 4 1		SAF
66779 RUNNINST 66780 RUNNINU8 1	70	34.7	24.3	71	49.69	SYSTEM INTACT		NOT SAF
		80.4	56.3	130.4	91.28	66753 RUNNING4 66760 LUND 4 1		SAF

NW 100MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_NW_Base_Zone		SUOP_NW_Zone_100MW				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
9269 BIRCHDAL 6 66801 LUND 8 1	40	20.9	8.4	19.7	7.9	SYSTEM INTACT		NOT SAF
		96.9	38.7	102.6	41.06	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6 9270 LOMAN 6 1	40	19	7.6	17.8	7.11	SYSTEM INTACT		NOT SAF
		95.1	38	100.8	40.33	66753 RUNNING4 66760 LUND 4 1		SAF
61625 BLCKBRY4 61626 BOSWELL4 2	438	65.8	287.99	66.2	289.89	SYSTEM INTACT		NOT SAF
		108.2	474.08	108.8	476.61	61625 BLCKBRY4 61624 FORBES 4 1	SW1073	SAF
		108.8	476.38	109.5	479.64	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
		108.2	474.08	108.8	476.61	61626 BOSWELL4 61625 BLCKBRY4 1	SW1073	SAF
		108.8	476.38	109.5	479.64	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF
		108.8	476.38	109.5	479.64	61626 BOSWELL4 61625 BLCKBRY4 1	SW1089	SAF

Appendix D - AC Analysis

NW 100MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUOP_NW_Base_Zone		SUOP_NW_Zone_100MW						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
66779	RUNNINST	66780	RUNNINU8	1	70	34.7	24.3	55.1	38.55	SYSTEM INTACT				NOT SAF
						80.4	56.3	113.1	79.18	66753 RUNNING4	66760 LUND 4	1		SAF

NW 50MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUOP_NW_Base_Zone.sav-line		UOP_NW_Zone_50MW.sav-lin						SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP NE Zone contingency analysis summary		
Thermal violation criteria %I > 100 and Net MW Flow > 2MW		
Date:	9/8/2009 13:07	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

NE 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_NE_Base_Zone		SUOP_NE_Zone_200MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	93.5	98.18	SYSTEM INTACT		NOT SAF
				110.3	115.85	113.3	119.01	36406 WEMPL; B 36407 WEMPL; R 1		SAF
				110.3	115.85	114.2	119.94	36407 WEMPL; R 39058 PAD 345 1		SAF
				120.8	126.84	123.9	130.12	39058 PAD 345 39059 PAD 138 1		SAF
				103.5	108.65	106.8	112.18	60186 AS KING3 60199 CHIS CO3 1	SW917	SAF
				106.1	111.37	109.8	115.3	60186 AS KING3 60304 EAU CL 3 1	SW400	SAF
60751 SAUKCMU8	62820 W UNION8	1	39.6	46.1	18.2	77.9	30.85	SYSTEM INTACT		NOT SAF
				70.9	28.1	104.9	41.55	60101 FORBES 2 60198 CHIS-N 2 1		SAF
				70.9	28.1	104.9	41.55	60197 CHIS CO2 60198 CHIS-N 2 1		SAF
				70.2	27.8	101.8	40.32	63050-62427-62443 WILLMAR4 230/69/12 1	SW1054	SAF
				70.2	27.8	100.3	39.72	66550 GRANITF4 60150 MNVLTAP4 1	SW1054	SAF
				70.2	27.8	100.3	39.72	66550 GRANITF4 63050 WILLMAR4 1	SW1054	SAF
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	66.1	289.39	SYSTEM INTACT		NOT SAF
				107.9	472.5	108.5	475.23	61568 BLBY2JCT 61569 BLBY2TR9 2	SW1072	SAF
				108.8	476.38	109.3	478.83	61625 BLCKBRY4 61626 BOSWELL4 1		SAF
				107.9	472.5	108.5	475.23	61626 BOSWELL4 61625 BLCKBRY4 1	SW1072	SAF
				108.8	476.38	109.3	478.83	61626 BOSWELL4 61625 BLCKBRY4 1	SW1088	SAF
				108.8	476.38	109.3	478.83	61626 BOSWELL4 61625 BLCKBRY4 1	SW1089	SAF

Appendix D - AC Analysis

NE 200MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_NE_Base_Zone		SUOP_NE_Zone_200MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
62646 WILSONL8	62647 SPRTLKS8	1	9.7	100	9.7	117.5	11.39	SYSTEM INTACT				NOT SAF
				139.7	13.55	176.5	17.12	62191 PINCTRT8	62651 VINLDTP8	1		SAF
				143.1	13.88	159.9	15.51	62642 ONAMIA 8	62652 RUMRVTP8	1	SW17	NOT SAF
				132.4	12.85	159.4	15.46	62650 VINELND8	62651 VINLDTP8	1		SAF

NE 150MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_NE_Base_Zone		SUOP_NE_Zone_150MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	92.7	97.32	SYSTEM INTACT				NOT SAF
				110.3	115.85	112.5	118.12	36406 WEMPL; B	36407 WEMPL; R	1		SAF
				110.3	115.85	112.5	118.12	36407 WEMPL; R	39058 PAD 345	1		SAF
				120.8	126.84	123.1	129.29	39058 PAD 345	39059 PAD 138	1		SAF
				103.5	108.65	105.8	111.07	60186 AS KING3	60199 CHIS CO3	1	SW917	SAF
				106.1	111.37	108.7	114.13	60186 AS KING3	60304 EAU CL 3	1	SW400	SAF
62646 WILSONL8	62647 SPRTLKS8	1	9.7	100	9.7	112.8	10.94	SYSTEM INTACT				NOT SAF
				139.7	13.55	168.9	16.39	62191 PINCTRT8	62651 VINLDTP8	1		SAF

NE 100MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_NE_Base_Zone		SUOP_NE_Zone_100MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP WC Zone contingency analysis summary		
Date:	9/8/2009 13:07	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

WC 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_WC_Base_Zone		SUOP_WC_Zone_200MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	107.3	80.13	SYSTEM INTACT		NOT SAF
				107.6	80.4	110.5	82.53	60126 SPLT RK3 60130 SPLTRTA3 1		SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	104.1	202.97	SYSTEM INTACT		SAF
				115.5	225.15	118.7	231.5	34006 LAKEFLD3 63875 RAUN 3 1		SAF
				111.9	218.29	115.3	224.9	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
				112.6	219.65	115.7	225.65	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
				112.6	219.65	115.7	225.65	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
				112.6	219.65	115.7	225.65	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF

WC 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_WC_Base_Zone		SUOP_WC_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34009 WINBAGO5	34013 WNBAGOS5	1	181.9	62.6	113.86	64.9	118.1	SYSTEM INTACT		NOT SAF
				101.4	184.4	105.5	191.94	60105 PR ISLD3 60236 REDROCK3 2	SW935	SAF
				101	183.79	105.2	191.32	60105 PR ISLD3 61950 BYRON 3 1		SAF
				101.4	184.4	105.5	191.94	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF

Appendix D - AC Analysis

WC 150MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUOP_WC_Base_Zone		SUOP_WC_Zone_150MW						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	103.5	201.77	SYSTEM INTACT				SAF
				115.5	225.15	118.4	230.89	34006 LAKEFLD3	63875 RAUN 3	1		SAF
				111.9	218.29	114.6	223.4	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
				112.6	219.65	115	224.29	60126 SPLT RK3	60286 NOBLES 3	1	SW957	SAF
				112.6	219.65	115	224.29	60131 SPLTRTB3	60126 SPLT RK3	1	SW957	SAF
				112.6	219.65	115	224.29	60131 SPLTRTB3	66564 SIOUXCY3	1	SW957	SAF

WC 100MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUOP_WC_Base_Zone		SUOP_WC_Zone_100MW						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.8	78.29	SYSTEM INTACT				NOT SAF
				101.5	75.9	107.5	80.31	60105 PR ISLD3	60236 REDROCK3	2	SW935	SAF
				101.5	75.9	107.5	80.31	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	102.7	200.21	SYSTEM INTACT				SAF
				115.5	225.15	117.4	228.84	34006 LAKEFLD3	63875 RAUN 3	1		SAF
				111.9	218.29	113.9	222.01	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
				112.6	219.65	114.1	222.48	60126 SPLT RK3	60286 NOBLES 3	1	SW957	SAF
				112.6	219.65	114.1	222.48	60131 SPLTRTB3	60126 SPLT RK3	1	SW957	SAF
				112.6	219.65	114.1	222.48	60131 SPLTRTB3	66564 SIOUXCY3	1	SW957	SAF

WC 50MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUOP_WC_Base_Zone		SUOP_WC_Zone_50MW						SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SW Zone contingency analysis summary		
Date:	9/8/2009 13:07	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

SW 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_SW_Base_Zone		SUOP_SW_Zone_200MW				
CIRCUIT/WINDING # NAME #	TO NAME #	CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.9	224	SYSTEM INTACT		SAF
				124.7	251.87	127	256.53	34018 HAZLTON3 60102 ADAMS 3 1		SAF
				126.3	255.21	128.6	259.81	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	128.6	259.81	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	128.6	259.81	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	128.2	259.01	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	107.2	80.05	SYSTEM INTACT		NOT SAF
				134.3	100.3	142.6	106.52	34012 FOXLAKE8 34275 WELCOMT8 1		SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	103.9	202.61	SYSTEM INTACT		SAF
				115.5	225.15	118.4	230.86	34006 LAKEFLD3 63875 RAUN 3 1		SAF
				111.8	218	114.8	223.88	60105 PR ISLD3 61950 BYRON 3 1		SAF
				112.6	219.65	115.5	225.27	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
				112.6	219.65	115.5	225.27	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
				112.6	219.65	115.5	225.27	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF
60392 WRIDGE 8	60859 ROCKTAP8	1	51.7	22.3	11.5	44.2	22.83	SYSTEM INTACT		NOT SAF
				20.9	10.8	118.5	61.27	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	59.1	30.56	SYSTEM INTACT		NOT SAF
				33.6	17.4	133.9	69.22	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60395 ERIDGE 8	60835 CHNDLRT8	1	34.8	34.1	11.86	5.1	1.78	SYSTEM INTACT		NOT SAF
				49.2	17.1	105.4	36.66	60903 LYON CO8 62741 WLNTGTP8 1		SAF

Appendix D - AC Analysis

SW 200MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SW_Base_Zone		SUOP_SW_Zone_200MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME #	TO NAME #	CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
60395 ERIDGE 8	62710 CHANDLR8	1	34.8	9	3.1	24.1	8.38	SYSTEM INTACT		NOT SAF
				24.4	8.5	132.5	46.1	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	41.8	14.23	SYSTEM INTACT		NOT SAF
				88.9	30.2	154	52.35	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				88.9	30.2	154	52.35	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				88.9	30.2	154	52.35	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				54.4	18.5	100.7	34.23	60171 LYON 60502 LYON CO3 C1		SAF
				88.9	30.2	154	52.35	60502 LYON CO3 60171 LYON C1	SW924	SAF
60684 YELWMED8	62739 MLRY TP8	1	51.7	17.2	8.9	36	18.64	SYSTEM INTACT		NOT SAF
				67.7	35	110.2	56.99	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				67.7	35	110.2	56.99	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				67.7	35	110.2	56.99	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				67.7	35	110.2	56.99	60502 LYON CO3 60171 LYON C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	70.4	16.9	SYSTEM INTACT		NOT SAF
				95.6	22.9	176.3	42.31	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				95.6	22.9	176.3	42.31	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				95.6	22.9	176.3	42.31	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				64.9	15.6	127.8	30.67	60171 LYON 60502 LYON CO3 C1		SAF
				95.6	22.9	176.3	42.31	60502 LYON CO3 60171 LYON C1	SW924	SAF
60771 RDWDFLTG	62735 REDWOOD8	1	34.8	18.5	6.5	50.3	17.52	SYSTEM INTACT		NOT SAF
				68.6	13.9	124.2	43.22	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				68.6	13.9	124.2	43.22	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				68.6	13.9	124.2	43.22	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				68.6	13.9	124.2	43.22	60502 LYON CO3 60171 LYON C1	SW924	SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	59.5	18.8	SYSTEM INTACT		NOT SAF
				80.1	25.3	141.3	44.66	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				80.1	25.3	141.3	44.66	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				80.1	25.3	141.3	44.66	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				56.3	17.8	104.4	32.98	60171 LYON 60502 LYON CO3 C1		SAF
				80.1	25.3	141.3	44.66	60502 LYON CO3 60171 LYON C1	SW924	SAF

Appendix D - AC Analysis

SW 150MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SW_Base_Zone		SUOP_SW_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.5	223.25	SYSTEM INTACT		SAF
				124.7	251.87	126.4	255.3	34018 HAZLTON3 60102 ADAMS 3 1		SAF
				126.3	255.21	128	258.52	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	128	258.52	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	128	258.52	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	127.6	257.84	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	107.1	79.99	SYSTEM INTACT		NOT SAF
				134.3	100.3	142.6	106.49	34012 FOXLAKE8 34275 WELCOMT8 1		SAF
				117.7	87.9	127.9	95.56	34237 WINDOMT8 34238 WINDMSW8 1		SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	103.2	201.19	SYSTEM INTACT		SAF
				115.5	225.15	117.9	229.96	34006 LAKEFLD3 63875 RAUN 3 1		SAF
				111.9	218.29	114.1	222.53	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
				112.6	219.65	114.7	223.58	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
				112.6	219.65	114.7	223.58	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
				112.6	219.65	114.7	223.58	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF
60392 WRIDGE 8	66005 PIPETAP	1	51.7	37.4	19.4	53.4	27.6	SYSTEM INTACT		NOT SAF
				33.6	17.4	107.1	55.38	60903 LYON CO8 62741 WLNTGTP8 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	33.8	11.49	SYSTEM INTACT		NOT SAF
				88.9	30.2	136.8	46.51	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				88.9	30.2	136.8	46.51	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				88.9	30.2	136.8	46.51	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				88.9	30.2	136.8	46.51	60502 LYON CO3 60171 LYON C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	58.3	14	SYSTEM INTACT		NOT SAF
				95.6	22.9	154.9	37.18	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				95.6	22.9	154.9	37.18	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				95.6	22.9	154.9	37.18	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				64.9	15.6	111.1	26.67	60171 LYON 60502 LYON CO3 C1		SAF
				95.6	22.9	154.9	37.18	60502 LYON CO3 60171 LYON C1	SW924	SAF

Appendix D - AC Analysis

SW 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_SW_Base_Zone		SUOP_SW_Zone_150MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60771 RDWDFLTG	62735 REDWOOD8	1	34.8	18.5	6.5	41.8	14.55	SYSTEM INTACT		NOT SAF
				68.6	13.9	109.5	38.1	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				68.6	13.9	109.5	38.1	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				68.6	13.9	109.5	38.1	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				68.6	13.9	109.5	38.1	60502 LYON CO3 60171 LYON C1	SW924	SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	50	15.8	SYSTEM INTACT		NOT SAF
				80.1	25.3	125.2	39.55	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				80.1	25.3	125.2	39.55	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				80.1	25.3	125.2	39.55	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				80.1	25.3	125.2	39.55	60502 LYON CO3 60171 LYON C1	SW924	SAF

SW 100MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_SW_Base_Zone		SUOP_SW_Zone_100MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.2	222.58	SYSTEM INTACT		NOT SAF
				124.7	251.87	125.9	254.24	34018 HAZLTON3 60102 ADAMS 3 1		SAF
				126.3	255.21	127.5	257.52	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	127.5	257.52	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	127.5	257.52	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	127.1	256.76	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	102.6	199.99	SYSTEM INTACT		SAF
				115.5	225.15	117.1	228.42	34006 LAKEFLD3 63875 RAUN 3 1		SAF
				111.9	218.29	113.7	221.63	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
				112.6	219.65	114	222.22	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
				112.6	219.65	114	222.22	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
				112.6	219.65	114	222.22	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF

Appendix D - AC Analysis

SW 100MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_SW_Base_Zone		SUOP_SW_Zone_100MW					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	26.7	9.07	SYSTEM INTACT				NOT SAF
				88.9	30.2	121.4	41.26	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				88.9	30.2	121.4	41.26	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				88.9	30.2	121.4	41.26	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				88.9	30.2	121.4	41.26	60502 LYON CO3	60171 LYON	C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	48	11.51	SYSTEM INTACT				NOT SAF
				95.6	22.9	135.6	32.55	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				95.6	22.9	135.6	32.55	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				95.6	22.9	135.6	32.55	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				95.6	22.9	135.6	32.55	60502 LYON CO3	60171 LYON	C1	SW924	SAF
62735 REDWOOD8	62737 SHRDNTP8	1	31.6	23.7	7.5	41.7	13.19	SYSTEM INTACT				NOT SAF
				80.1	25.3	110.6	34.96	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				80.1	25.3	110.6	34.96	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				80.1	25.3	110.6	34.96	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				80.1	25.3	110.6	34.96	60502 LYON CO3	60171 LYON	C1	SW924	SAF

SW 50MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_SW_Base_Zone		SUOP_SW_Zone_50MW					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	104.7	78.19	SYSTEM INTACT				NOT SAF
				117.7	87.9	129.3	96.57	34237 WINDOMT8	34238 WINDMSW8	1		SAF
34012 FOXLAKE8	34244 SHERBRN8	1	69	160.8	110.95	160.9	111.05	SYSTEM INTACT				NOT SAF
				174.5	120.4	183.5	126.64	34237 WINDOMT8	34238 WINDMSW8	1		SAF
34243 TRIMONT8	62794 TRIMONT8	1	90	127.4	114.64	127.5	114.74	SYSTEM INTACT				NOT SAF
				137.9	124.1	144.8	130.31	34237 WINDOMT8	34238 WINDMSW8	1		SAF
34244 SHERBRN8	62795 SHERBRN8	1	90	124.6	112.13	124.7	112.23	SYSTEM INTACT				NOT SAF
				135.1	121.6	142	127.8	34237 WINDOMT8	34238 WINDMSW8	1		SAF

Appendix D - AC Analysis

SW 50MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_SW_Base_Zone		SUOP_SW_Zone_50MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	18.4	6.25	SYSTEM INTACT				NOT SAF
				88.9	30.2	103.9	35.33	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				88.9	30.2	103.9	35.33	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				88.9	30.2	103.9	35.33	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				88.9	30.2	103.9	35.33	60502 LYON CO3	60171 LYON	C1	SW924	SAF
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	36.5	8.76	SYSTEM INTACT				NOT SAF
				95.6	22.9	114	27.37	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				95.6	22.9	114	27.37	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				95.6	22.9	114	27.37	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				95.6	22.9	114	27.37	60502 LYON CO3	60171 LYON	C1	SW924	SAF

SW 40MW - Based on single site analysis										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUOP_SW_Base_Zone		SUOP_SW_Zone_50MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP SE Planning zone contingency analysis summary - Zonal		
Date:	9/8/2009 13:07	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

SE 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_200MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME # TO NAME # CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5 34015 LIME CK5 1	202	109.5	221.22	112.2	226.69	SYSTEM INTACT		SAF
		126.3	255.21	130.3	263.3	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
		126.3	255.21	130.3	263.3	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
		126.3	255.21	130.3	263.3	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
		126	254.47	130	262.65	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34137 TRIBOJI5 66563 SPENCER5 1	195	101.2	197.37	103	200.78	SYSTEM INTACT		SAF
		115.5	225.15	117.9	229.81	34006 LAKEFLD3 63875 RAUN 3 1		SAF
		111.9	218.29	113.4	221.17	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
		112.6	219.65	114.5	223.29	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
		112.6	219.65	114.5	223.29	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
		112.6	219.65	114.5	223.29	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF
34325 ST.CHRT8 68713 ST CHARL 1	47	9.7	4.6	55.3	25.97	SYSTEM INTACT		NOT SAF
		32.4	15.2	106.7	50.15	34318 ELGIN 8 34319 PLAINVW8 1		SAF
34528 IAFINDP7 34532 IAFINDP8 1	31.2	71	22.2	71	22.18	SYSTEM INTACT		NOT SAF
		92.4	28.9	111.6	34.86	34072 FRNKLIN7 64239 FRANKLN5 1		SAF

Appendix D - AC Analysis

SE 200MW									
Thermal violation criteria %I > 100 and Net MW Flow > 2MW									
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_200MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	94.6	99.37	SYSTEM INTACT		NOT SAF
				103.5	108.65	108.3	113.69	60186 AS KING3 60199 CHIS CO3 1	SW917	SAF
				103.5	108.65	108.3	113.69	60186 AS KING3 60236 REDROCK3 1	SW917	SAF
				106.1	111.37	111.3	116.86	60186 AS KING3 60304 EAU CL 3 1	SW400	SAF
				103.5	108.65	108.3	113.69	60186 AS KING3 60304 EAU CL 3 1	SW917	SAF
				103.5	108.65	108.3	113.69	60304 EAU CL 3 39244 ARP 345 1	SW917	SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	74	25.14	SYSTEM INTACT		NOT SAF
				74.3	25.3	131.4	44.69	60724 HENDRSN8 60868 LESR TP8 1		SAF
				56.2	19.1	104.3	35.47	60868 LESR TP8 62349 RUSHRVR8 1		SAF
				56.1	19.1	100.2	34.06	62341 NWSWDTP8 62349 RUSHRVR8 1		SAF
68713 ST CHARL	68774 UTICA	1	47	11.7	5.5	53.7	25.23	SYSTEM INTACT		NOT SAF
				34.1	16	105	49.35	34318 ELGIN 8 34319 PLAINVW8 1		SAF

SE 150MW									
Thermal violation criteria %I > 100 and Net MW Flow > 2MW									
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_150MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	111.6	225.42	SYSTEM INTACT		SAF
				126.3	255.21	129.4	261.39	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	129.4	261.39	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	129.4	261.39	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	129.1	260.71	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	102.6	200.04	SYSTEM INTACT		SAF
				115.5	225.15	117.3	228.71	34006 LAKEFLD3 63875 RAUN 3 1		SAF
				111.9	218.29	113.1	220.53	60105 PR ISLD3 61950 BYRON 3 1	SW935	SAF
				112.6	219.65	114.1	222.41	60126 SPLT RK3 60286 NOBLES 3 1	SW957	SAF
				112.6	219.65	114.1	222.41	60131 SPLTRTB3 60126 SPLT RK3 1	SW957	SAF
				112.6	219.65	114.1	222.41	60131 SPLTRTB3 66564 SIOUXCY3 1	SW957	SAF
34528 IAFINDP7	34532 IAFINDP8	1	31.2	71	22.2	71	22.19	SYSTEM INTACT		NOT SAF
				92.4	28.9	111.2	34.74	34072 FRNKLIN7 64239 FRANKLN5 1		SAF

Appendix D - AC Analysis

SE 150MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME #	TO NAME #	CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	93.7	98.42	SYSTEM INTACT		NOT SAF
				103.5	108.65	107	112.36	60186 AS KING3 60199 CHIS CO3 1	SW917	SAF
				103.5	108.65	107	112.36	60186 AS KING3 60236 REDROCK3 1	SW917	SAF
				106.1	111.37	110	115.48	60186 AS KING3 60304 EAU CL 3 1	SW400	SAF
				103.5	108.65	107	112.36	60186 AS KING3 60304 EAU CL 3 1	SW917	SAF
				103.5	108.65	107	112.36	60304 EAU CL 3 39244 ARP 345 1	SW917	SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	65.9	22.41	SYSTEM INTACT		NOT SAF
				74.3	25.3	118	40.12	60724 HENDRSN8 60868 LESR TP8 1		SAF

SE 100MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_100MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME #	TO NAME #	CKT	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.9	224.09	SYSTEM INTACT		SAF
				126.3	255.21	128.5	259.63	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	128.5	259.63	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	128.5	259.63	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	128.2	258.93	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	102.2	199.23	SYSTEM INTACT		NOT SAF
				115.5	225.15	116.7	227.52	34006 LAKEFLD3 63875 RAUN 3 1		SAF
34528 IAFINDP7	34532 IAFINDP8	1	31.2	71	22.2	71	22.19	SYSTEM INTACT		NOT SAF
				92.4	28.9	110.7	34.61	34072 FRNKLIN7 64239 FRANKLN5 1		SAF
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	92.5	97.12	SYSTEM INTACT		NOT SAF
				103.5	108.65	105.5	110.74	60186 AS KING3 60199 CHIS CO3 1	SW917	SAF
				103.5	108.65	105.5	110.74	60186 AS KING3 60236 REDROCK3 1	SW917	SAF
				106.1	111.37	108.4	113.77	60186 AS KING3 60304 EAU CL 3 1	SW400	SAF
				103.5	108.65	105.5	110.74	60186 AS KING3 60304 EAU CL 3 1	SW917	SAF
				103.5	108.65	105.5	110.74	60304 EAU CL 3 39244 ARP 345 1	SW917	SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	57.6	19.58	SYSTEM INTACT		NOT SAF
				74.3	25.3	103.2	35.08	60724 HENDRSN8 60868 LESR TP8 1		SAF

Appendix D - AC Analysis

SE 50MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_50MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	110.3	222.73	SYSTEM INTACT		NOT SAF
				126.3	255.21	127.4	257.44	60102 ADAMS 3 34014 ADAMS 5 1	SW1058	SAF
				126.3	255.21	127.4	257.44	60102 ADAMS 3 34018 HAZLTON3 1	SW1058	SAF
				126.3	255.21	127.4	257.44	63032 PL VLLY3 60102 ADAMS 3 1	SW1058	SAF
				126	254.47	127.1	256.73	63032-63070-63073 PL VLLY3 345/161/13 1	SW1058	SAF
34528 IAFINDP7	34532 IAFINDP8	1	31.2	71	22.2	71	22.19	SYSTEM INTACT		NOT SAF
				92.4	28.9	110.3	34.47	34072 FRNKLIN7 64239 FRANKLN5 1		SAF

SE 40MW - Base on Single Site analysis								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUOP_SE_Base_Zone		SUOP_SE_Zone_50MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NW Zone contingency analysis summary		
Date:	9/8/2009 13:14	
Date of Run:	JUL 10 2009	JUL 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

NW 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_NW_Base_Zone		SUPK_NW_Zone_200MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	22.1	8.83	SYSTEM INTACT		NOT SAF
				96.9	38.7	104.3	41.73	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	19.8	7.92	SYSTEM INTACT		NOT SAF
				95.1	38	102.1	40.86	66753 RUNNING4 66760 LUND 4 1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	18.6	7.44	SYSTEM INTACT		NOT SAF
				93.9	37.6	101	40.41	66753 RUNNING4 66760 LUND 4 1		SAF
66779 RUNNINST	66780 RUNNINU8	1	70	34.7	24.3	50.9	35.6	SYSTEM INTACT		NOT SAF
				80.4	56.3	113.9	79.71	66753 RUNNING4 66760 LUND 4 1		SAF

NW 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_NW_BaseZone		SUPK_NW_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	21.4	8.58	SYSTEM INTACT		NOT SAF
				96.9	38.7	102.3	40.94	66753 RUNNING4 66760 LUND 4 1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	19.2	7.67	SYSTEM INTACT		NOT SAF
				95.1	38	100.1	40.06	66753 RUNNING4 66760 LUND 4 1		SAF

Appendix D - AC Analysis

NW 100MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUPK_NW_BaseZone			SUPK_NW_Zone_100MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK NE Zone contingency analysis summary		
Date:	9/8/2009 13:14	
Date of Run:	JUL 10 2009	JUL 02 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

NE 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_NE_BaseZone		SUPK_NE_Zone_200MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.3	1043.99	SYSTEM INTACT		NOT SAF
				108.6	1189.85	108.9	1193.18	36420 ZION ; B 39247 ARCADN3 1		SAF
37384 ZION ;	39362 LAKEVIEW	1	261	16.1	41.9	29.3	76.41	SYSTEM INTACT		NOT SAF
						104.9	273.89	36421 ZION ; R 38849 PLS PR2 1		SAF
39345 KENOSH45	39362 LAKEVIEW	1	288	23.2	66.9	38.2	109.98	SYSTEM INTACT		NOT SAF
				70.5	202.9	107.2	308.64	36421 ZION ; R 38849 PLS PR2 1		SAF

NE 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_NE_BaseZone		SUPK_NE_Zone_150MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	AFFECTED FACILITY
37384 ZION ;	39362 LAKEVIEW	1	261	16.1	41.9	29.2	76.31	SYSTEM INTACT		NOT SAF
						104.7	273.36	36421 ZION ; R 38849 PLS PR2 1		SAF
39345 KENOSH45	39362 LAKEVIEW	1	288	23.2	66.9	38.2	109.88	SYSTEM INTACT		NOT SAF
				70.5	202.9	107	308.11	36421 ZION ; R 38849 PLS PR2 1		SAF

Appendix D - AC Analysis

NE 100MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUPK_NE_Zone_Base		SUPK_NE_Zone_100MW				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
36421 ZION ; R 38849 PLS PR2 1	1096	95.1	1042.21	95.6	1047.27	SYSTEM INTACT		NOT SAF
		108.6	1189.85	109.2	1197	36420 ZION ; B 39247 ARCADN3 1		SAF
		102.4	1122.35	102.8	1127.15	39247 ARCADN3 91314 ARCADN2 1		SAF
		101.5	1112.55	101.9	1117.11	39367 OK CRK 91314 ARCADN2 1		SAF
37384 ZION ; 39362 LAKEVIEW 1	261	16.1	41.9	29.5	77.01	SYSTEM INTACT		NOT SAF
				105.4	275.09	36421 ZION ; R 38849 PLS PR2 1		SAF
39345 KENOSH45 39362 LAKEVIEW 1	288	23.2	66.9	38.4	110.57	SYSTEM INTACT		NOT SAF
		70.5	202.9	107.6	309.85	36421 ZION ; R 38849 PLS PR2 1		SAF

NE 50MW								
Thermal violation criteria %I > 100 and Net MW Flow > 2MW								
Output File:		SUPK_NE_BaseZone		SUPK_NE_Zone_50MW				SIGNIFICANTLY
CIRCUIT/WINDING TO CKT	RATEB	OVRLD	CURRENT	OVRLD	CURRENT	CONTINGENCY		AFFECTED
# NAME # NAME #	MVA	%I	MVA	%I	MVA	FROM TO CKT	SWITCH	FACILITY
36421 ZION ; R 38849 PLS PR2 1	1096	95.1	1042.21	95.4	1045.07	SYSTEM INTACT		NOT SAF
		108.6	1189.85	108.9	1193.95	36420 ZION ; B 39247 ARCADN3 1		SAF
		102.4	1122.35	102.6	1124.95	39247 ARCADN3 91314 ARCADN2 1		SAF
		101.5	1112.55	101.7	1115.03	39367 OK CRK 91314 ARCADN2 1		SAF
37384 ZION ; 39362 LAKEVIEW 1	261	16.1	41.9	29.4	76.78	SYSTEM INTACT		NOT SAF
				105.1	274.41	36421 ZION ; R 38849 PLS PR2 1		SAF
39345 KENOSH45 39362 LAKEVIEW 1	288	23.2	66.9	38.3	110.33	SYSTEM INTACT		NOT SAF
		70.5	202.9	107.4	309.17	36421 ZION ; R 38849 PLS PR2 1		SAF

Appendix D - AC Analysis

NE 40MW - Based on single site analysis											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUPK_NE_BaseZone			SUPK_NE_Zone_50MW					SIGNIFICANTLY
CIRCUIT/WINDING #	NAME	TO #	NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK WC Zone contingency analysis summary		
Date:	9/8/2009 13:14	
Date of Run:	JUL 10 2009	JUL 05 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

WC 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_WC_Base_Zone		SUPK_WC_Zone_200MW					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60234 PARKERS7	60259 BASCRK 7	1	239	92.6	221.31	93.7	223.97	SYSTEM INTACT				NOT SAF
				120.8	288.68	122	291.59	60202 COON CK3	60251 TERMINL3	1	SW953	SAF
				120.8	288.68	122	291.59	60251 TERMINL3	60221 KOLMNLK3	1	SW953	SAF
				120.8	288.68	122	291.59	61492 TERMID1Y	60251 TERMINL3	10	SW953	SAF
				120.8	288.68	122	291.59	61492 TERMID1Y	60252 TERMINL7	10	SW953	SAF
				120.8	288.68	122	291.59	61492 TERMID1Y	61187 TERTER19	10	SW953	SAF

WC 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_WC_Base_Zone		SUPK_WC_Zone_150MW					
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
60234 PARKERS7	60259 BASCRK 7	1	239	92.6	221.31	93.5	223.44	SYSTEM INTACT				NOT SAF
				120.8	288.68	121.8	291.01	60202 COON CK3	60251 TERMINL3	1	SW953	SAF
				120.8	288.68	121.8	291.01	60251 TERMINL3	60221 KOLMNLK3	1	SW953	SAF
				120.8	288.68	121.8	291.01	61492 TERMID1Y	60251 TERMINL3	10	SW953	SAF
				120.8	288.68	121.8	291.01	61492 TERMID1Y	60252 TERMINL7	10	SW953	SAF
				120.8	288.68	121.8	291.01	61492 TERMID1Y	61187 TERTER19	10	SW953	SAF

Appendix D - AC Analysis

WC 100MW											
Thermal violation criteria %I > 100 and Net MW Flow > 2MW											
Output File:			SUPK_WC_Base_Zone		SUPK_WC_Zone_100MW						
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SW Zone contingency analysis summary		
Date:	9/8/2009 13:14	
Date of Run:	JUL 10 2009	JUL 05 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

SW 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_SW_Base_Zone		SUPK_SW_Zone_200MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60234 PARKERS7	60259 BASCRK 7	1	239	92.6	221.31	93.7	223.86	SYSTEM INTACT				NOT SAF
				120.8	288.68	121.8	291.1	60202 COON CK3	60251 TERMINL3	1	SW953	SAF
				120.8	288.68	121.8	291.1	60251 TERMINL3	60221 KOLMNLK3	1	SW953	SAF
				120.8	288.68	121.8	291.1	61492 TERMID1Y	60251 TERMINL3	10	SW953	SAF
				120.8	288.68	121.8	291.1	61492 TERMID1Y	60252 TERMINL7	10	SW953	SAF
				120.8	288.68	121.8	291.1	61492 TERMID1Y	61187 TERTER19	10	SW953	SAF
60395 ERIDGE 8	62710 CHANDLR8	1	34.8	8.9	3.1	34.6	12.04	SYSTEM INTACT				NOT SAF
				45.4	15.8	117.4	40.85	60903 LYON CO8	62741 WLNTGTP8	1		SAF

SW 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:		SUPK_SW_Base_Zone		SUPK_SW_Zone_150MW					SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUPK SE Zone contingency analysis summary		
Date:	9/8/2009 13:14	
Date of Run:	JUL 10 2009	JUL 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

Tested MW Levels 200MW
150MW
100MW
50MW

SE 200MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:			SUPK_SE_Base_Zone		SUPK_SE_Zone_200MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	TLY AFFECTED FACILITY
60184 APACHET7	60185 ARDNHLS7	1	210	42.5	89.33	43.3	90.99	SYSTEM INTACT		NOT SAF
				110.2	231.42	111.4	233.99	60212 GOOSELK7 60222 KOLMNLK7 1		SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	29	9.8	56.3	19.13	SYSTEM INTACT		NOT SAF
				74.6	25.4	104.8	35.63	60108 WILMART3 60504 HELNASS3 1		SAF
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	65.6	22.32	SYSTEM INTACT		NOT SAF
				72.3	24.6	125.1	42.54	60108 WILMART3 60504 HELNASS3 1		SAF

SE 150MW

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Output File:			SUPK_SE_Base_Zone		SUPK_SE_Zone_150MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	TLY AFFECTED FACILITY
60184 APACHET7	60185 ARDNHLS7	1	210	42.5	89.33	43.5	91.27	SYSTEM INTACT		NOT SAF
				110.2	231.42	111.5	234.2	60212 GOOSELK7 60222 KOLMNLK7 1		SAF
60730 ARLNGTN8	62674 JSNLDTP8	1	34	13.6	4.64	53.8	18.28	SYSTEM INTACT		NOT SAF
				72.3	24.6	112.3	38.18	60108 WILMART3 60504 HELNASS3 1		SAF

Appendix D - AC Analysis

SE 100MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUPK_SE_Base_Zone		SUPK_SE_Zone_100MW					TLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60184 APACHET7	60185 ARDNHLS7	1	210	42.5	89.33	43.4	91.09	SYSTEM INTACT				NOT SAF
				110.2	231.42	111.4	234.03	60212 GOOSELK7	60222 KOLMNLK7	1		SAF

SE 50MW										
Thermal violation criteria %I > 100 and Net MW Flow > 2MW										
Output File:			SUPK_SE_Base_Zone		SUPK_SE_Zone_50MW					TLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY

Appendix D - AC Analysis

SUOP State contingency analysis summary

Thermal violation criteria %I > 100 and Net MW Flow > 2MW

Date:	9/8/2009 13:17	
Date of Run:	JUL 10 2009	JUL 03 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

		Output File:	SUOP_State_Base_Case		SUOP_STATE_600MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	20.9	8.4	19.7	7.87	SYSTEM INTACT				NOT SAF
				96.9	38.7	103	41.19	66753 RUNNING4	66760 LUND 4	1		SAF
9269 BIRCHDAL 6	9270 LOMAN 6	1	40	19	7.6	17.7	7.09	SYSTEM INTACT				NOT SAF
				95.1	38	101.2	40.47	66753 RUNNING4	66760 LUND 4	1		SAF
9270 LOMAN 6	67017 RUNNING8	1	40	17.7	7.1	16.5	6.58	SYSTEM INTACT				NOT SAF
				93.9	37.6	100.1	40.03	66753 RUNNING4	66760 LUND 4	1		SAF
34000 NIW 5	34015 LIME CK5	1	202	109.5	221.22	115.2	232.8	SYSTEM INTACT				SAF
				131.7	265.99			34000 NIW	5 34010 HAYWARD5	1		NOT SAF
				124.7	251.9	133.6	269.86	34018 HAZLTON3	60102 ADAMS 3	1		SAF
				126.3	255.21	135.2	273.03	60102 ADAMS 3	34014 ADAMS 5	1	SW1058	SAF
				126.3	255.21	135.2	273.03	60102 ADAMS 3	34018 HAZLTON3	1	SW1058	SAF
				126.3	255.21	135.2	273.03	63032 PL VLLY3	60102 ADAMS 3	1	SW1058	SAF
				126	254.47	134.8	272.32	63032-63070-63073 PL VLLY3	345/161/13	1	SW1058	SAF
34014 ADAMS 5	34570 ADAMS_N5	1	335	51.3	171.8	54.8	183.66	SYSTEM INTACT				NOT SAF
				86.4	289.4	100.1	335.44	60102 ADAMS 3	63032 PL VLLY3	1		SAF
34137 TRIBOJI5	66563 SPENCER5	1	195	101.2	197.37	108.6	211.79	SYSTEM INTACT				SAF
				115.5	225.15	125.2	244.11	34006 LAKEFLD3	63875 RAUN 3	1		SAF
				111.9	218.29	119.8	233.56	60105 PR ISLD3	61950 BYRON 3	1	SW935	SAF
				112.6	219.65	121.1	236.13	60126 SPLT RK3	60286 NOBLES 3	1	SW957	SAF
				112.6	219.65	121.1	236.13	60131 SPLTRTB3	60126 SPLT RK3	1	SW957	SAF
				112.6	219.65	121.1	236.13	60131 SPLTRTB3	66564 SIOUXCY3	1	SW957	SAF
34528 IAFINDP7	34532 IAFINDP8	1	31.2	71	22.19	71	22.19	SYSTEM INTACT				NOT SAF
				92.4	28.9	104.8	32.76	34072 FRNKLIN7	64239 FRANKLN5	1		SAF

Appendix D - AC Analysis

Output File:		SUOP_State_Base_Case		SUOP_STATE_600MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
34671 KLEMME 8	63727 HANCOCK8	1	36	82.5	29.71	86.7	31.2	SYSTEM INTACT		NOT SAF
				144.9	52.17	153.7	55.32	34016 EMERY 5 63774 SHEFFLD5 1		SAF
38364 SGL 69	39242 SGL 138	1	70	55.9	39.1	57	39.88	SYSTEM INTACT		NOT SAF
				104.1	72.84	108	75.58	39241 POE 138 39243 LPV 138 1		SAF
				106.4	74.47	110.7	77.51	39242 SGL 138 39243 LPV 138 1		SAF
38590 SHOTO	39641 SHOTO	1	72	66.3	47.77	68.7	49.44	SYSTEM INTACT		NOT SAF
				120.8	86.99	125.1	90.04	38590 SHOTO 39641 SHOTO 2		SAF
39033 DAR 138	39036 NOM 138	1	105	90.7	95.2	97.8	102.72	SYSTEM INTACT		NOT SAF
				110.3	115.85	118.5	124.43	36406 WEMPL; B 36407 WEMPL; R 1		SAF
				110.3	115.85	118.4	124.3	36407 WEMPL; R 39058 PAD 345 1		SAF
				114.6	120.38	122.5	128.58	38007 DAR 69 39033 DAR 138 1		SAF
				106.2	111.52			39034 EEN 138 39115 WYV 138 1		NOT SAF
				120.8	126.84	127.2	133.54	39058 PAD 345 39059 PAD 138 1		SAF
				107.8	113.2	117	122.87	60186 AS KING3 60304 EAU CL 3 1	SW400	SAF
39901 COC DPC	68843 T TC	1	47	102.2	48.02	120.5	56.66	SYSTEM INTACT		SAF
				146.4	68.82	168.8	79.32	39244 ARP 345 60304 EAU CL 3 1		SAF
				145.4	68.32	167.7	78.84	60304 EAU CL 3 39244 ARP 345 1	SW918	SAF
				131.2	61.64	148.5	69.8	69507 SENECA 5 69511 BELLCTR5 1		SAF
				135.3	63.6	156.2	73.4	69507 SENECA 5 69523 GENOA 5 1		SAF
				130.8	61.46	151.7	71.3	69523 GENOA 5 69507 SENECA 5 1	SW1133	SAF
58190 HOPE MD8	63719 HOPE 5	1	84	84.9	71.34	85.5	71.82	SYSTEM INTACT		NOT SAF
				116.1	97.5	119.4	100.27	58188 WRI MID8 64220 WRIGHT 5 1		SAF
58190 HOPE MD8	63720 HOPE 8	1	84	84.9	71.34	85.5	71.82	SYSTEM INTACT		NOT SAF
				116.1	97.5	119.4	100.27	58188 WRI MID8 64220 WRIGHT 5 1		SAF
60104 CANNFLS7	60801 CNFLSTR8	1	112	63.4	71.04	64.5	72.2	SYSTEM INTACT		NOT SAF
				111.2	124.52	113	126.57	60104 CANNFLS7 60801 CNFLSTR8 2		SAF
60104 CANNFLS7	60801 CNFLSTR8	2	112	63.4	71.04	64.5	72.2	SYSTEM INTACT		NOT SAF
				111.2	124.52	113	126.57	60104 CANNFLS7 60801 CNFLSTR8 1		SAF
60683 MINNVAL8	60684 YELWMED8	1	34	11.2	3.8	18.9	6.43	SYSTEM INTACT		NOT SAF
				88.9	30.2	118.1	40.14	60119 LKYNKTN7 60171 LYON 1	SW924	SAF
				88.9	30.2	118.1	40.14	60119 LKYNKTN7 60853 LK YANK8 2	SW924	SAF
				88.9	30.2	118.1	40.14	60170 MARSHAL7 60171 LYON 1	SW924	SAF
				88.9	30.2	118.1	40.14	60502 LYON CO3 60171 LYON C1	SW924	SAF

Appendix D - AC Analysis

			Output File:	SUOP_State_Base_Case		SUOP_STATE_600MW				SIGNIFICANTLY
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	AFFECTED FACILITY
60728 FRANKLN8	60771 RDWDFLTG	1	24	26.8	6.4	50.7	12.16	SYSTEM INTACT				NOT SAF
				95.6	22.9	142.6	34.23	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				95.6	22.9	142.6	34.23	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				95.6	22.9	142.6	34.23	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				64.9	15.6	100.8	24.2	60171 LYON	60502 LYON CO3	C1		SAF
				95.6	22.9	142.6	34.23	60502 LYON CO3	60171 LYON	C1	SW924	SAF
60730 ARLNGTN8	60731 GRENISL8	1	34	41.6	14.1	64.2	21.81	SYSTEM INTACT				NOT SAF
				74.3	25.3	116.6	39.64	60724 HENDRSN8	60868 LESR TP8	1		SAF
60751 SAUKCMU8	62820 W UNION8	1	39.6	46.1	18.2	73.8	29.21	SYSTEM INTACT				NOT SAF
				70.2	27.8	101.4	40.16	63050-62427-62443	WILLMAR4 230/69/12	1	SW1054	SAF
60771 RDWDFLTG	62735 REDWOOD8	1	34.8	18.5	6.5	36.3	12.65	SYSTEM INTACT				NOT SAF
				68.6	23.9	101.1	35.17	60119 LKYNKTN7	60171 LYON	1	SW924	SAF
				68.6	23.9	101.1	35.17	60119 LKYNKTN7	60853 LK YANK8	2	SW924	SAF
				68.6	23.9	101.1	35.17	60170 MARSHAL7	60171 LYON	1	SW924	SAF
				68.6	23.9	101.1	35.17	60502 LYON CO3	60171 LYON	C1	SW924	SAF
60823 REDWING8	62387 SPRNGCK8	2	92.4	72.9	67.4	74.5	68.85	SYSTEM INTACT				NOT SAF
				98.1	90.6	100.3	92.64	60823 REDWING8	62387 SPRNGCK8	1		SAF
61625 BLCKBRY4	61626 BOSWELL4	2	438	65.8	287.99	67	293.4	SYSTEM INTACT				NOT SAF
				108.8	476.38	110.9	485.5	61625 BLCKBRY4	61626 BOSWELL4	1		SAF
66753 RUNNING4	66779 RUNNINST	1	81	30	24.3	52.8	42.8	SYSTEM INTACT				NOT SAF
				69.5	56.3	103.9	84.2	66753 RUNNING4	66760 LUND 4	1		SAF
66779 RUNNINST	66780 RUNNINU8	1	70	34.7	24.3	61.1	42.8	SYSTEM INTACT				NOT SAF
				80.4	56.3	120.2	84.2	66753 RUNNING4	66760 LUND 4	1		SAF
34008 FOX LK 5	34012 FOXLAKE8	1	74.7	104.6	78.17	106.4	79.5	SYSTEM INTACT				NOT SAF
				102.2	76.4	109.5	81.8	34000 NIW 5	34015 LIME CK5	1		SAF

Number of Limiters	**26**

Appendix D - AC Analysis

SUPK State contingency analysis summary		
Thermal violation criteria %I > 100 and Net MW Flow > 2MW		
Date:	9/9/2009 10:03	
Date of Run:	JUL 11 2009	JUL 04 2009
Line Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Transformer Overload: System Intact	100.0%	100.0%
Contingency	100.0%	100.0%
Number of Violations Monitored:	5	5

		Output File:	SUPK_State_Base_Case		SUPK_STATE_600MW				
CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	OVRLD %I	CURRENT MVA	OVRLD %I	CURRENT MVA	CONTINGENCY FROM	TO	CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
9269 BIRCHDAL 6	66801 LUND 8	1	40	22.8	9.1	21.5	8.61	SYSTEM INTACT				NOT SAF
				91.3	36.5	100.7	40.27	66753 RUNNING4	66760 LUND 4	1		SAF
34423 MONONA_8	68748 POST	1	28	25.6	7.2	28.8	8.08	SYSTEM INTACT				NOT SAF
				82	23	107.5	30.1	34022 LANSING5	34023 LANSING8	1		SAF
34528 IAFINDP7	34532 IAFINDP8	1	31.2	83	25.93	82	25.61	SYSTEM INTACT				NOT SAF
				79.7	24.9	101.2	31.63	34077 IA FALS7	34527 IAFINDT7	1		SAF
34671 KLEMME 8	63727 HANCOCK8	1	36	72.4	26.05	77.4	27.85	SYSTEM INTACT				NOT SAF
				164.6	59.24	174.8	62.92	34016 EMERY 5	63774 SHEFFLD5	1		SAF
				101.8	36.66	107.6	38.73	36242 SHEFFLD8	63774 SHEFFLD5	1		SAF
36242 SHEFFLD8	63731 HAMPTON8	2	36	57.9	20.86	60.8	21.9	SYSTEM INTACT				NOT SAF
				124.8	44.93	133.2	47.94	63730 HAMPTON5	63774 SHEFFLD5	1		SAF
36242 SHEFFLD8	63774 SHEFFLD5	1	84	56.9	47.79	58.3	48.94	SYSTEM INTACT				NOT SAF
				108.9	91.45	114.2	95.89	63730 HAMPTON5	63774 SHEFFLD5	1		SAF
36421 ZION ; R	38849 PLS PR2	1	1096	95.1	1042.21	95.5	1046.91	SYSTEM INTACT				NOT SAF
				108.6	1189.85	109.4	1198.88	36420 ZION ; B	39247 ARCADN3	1		SAF
				101.2	1109.24	101.7	1114.72	36908 LAKEH; B	37326 WAUKE; B	1		SAF
				102.4	1121.79	102.8	1126.63	39345 KENOSH45	39362 LAKEVIEW	1		SAF
				101.5	1112.55	101.7	1115.14	39367 OK CRK 91314	ARCADN2	1		SAF
37384 ZION ;	39362 LAKEVIEW	1	261	29.3	76.6	29.4	76.72	SYSTEM INTACT				NOT SAF
				not converged	not converged	105.4	275.22	36421 ZION ; R	38849 PLS PR2	1		not converged
38141 NST 69	38142 STM 69	1	71	73.3	52.1	80.2	56.97	SYSTEM INTACT				NOT SAF
				97.3	69.1	105.1	74.65	33534 VERONA	33651 OAKRIDGE	1		SAF
				97.3	69.1	105.2	74.67	33534 VERONA	38137 VER 69	1		SAF

Appendix D - AC Analysis

CIRCUIT/WINDING # NAME	TO # NAME	CKT #	RATEB MVA	Output File: SUPK_State_Base_Case OVRLD %I	SUPK_State_Base_Case CURRENT MVA	SUPK_STATE_600MW OVRLD %I	SUPK_STATE_600MW CURRENT MVA	CONTINGENCY FROM TO CKT	SWITCH	SIGNIFICANTLY AFFECTED FACILITY
39283 CONCRD 4	91343 CONCRD G	1	400	101.9	407.49	102.3	409.23	SYSTEM INTACT		NOT SAF
				102.6	410.22	103.1	412.31	39283 CONCRD 4 39375 CRWFSH R 1		SAF
				102.7	410.74	103.2	412.81	39340 JEFRSN4 91331 JEFRSN5 1		SAF
				103.1	412.46	103.7	414.75	39375 CRWFSH R 91331 JEFRSN5 1		SAF
				102.6	410.3	103.1	412.35	39415 PLSNT VL 39482 SAUKVL5 1		SAF
39328 GRANVL 6	91318 GRANVL3	1	478	49.8	237.9	52.1	249.25	SYSTEM INTACT		NOT SAF
				96.2	459.9	101.3	484.26	38870 GRANVL2 39329 GRANVL1 1		SAF
39345 KENOSH45	39362 LAKEVIEW	1	288	38.2	110.1	38.3	110.23	SYSTEM INTACT		NOT SAF
				not converged	not converged	107.6	309.99	36421 ZION ; R 38849 PLS PR2 1		not converged
39901 COC DPC	68843 T TC	1	47	58.3	27.4	72.9	34.24	SYSTEM INTACT		NOT SAF
				87.6	41.2	103.3	48.55	69507 SENECA 5 69511 BELLCTR5 1		SAF
60184 APACHET7	60185 ARDNHLS7	1	210	42.5	89.33	44.6	93.58	SYSTEM INTACT		NOT SAF
				110.2	231.42	112.2	235.62	60212 GOOSELK7 60222 KOLMNLK7 1		SAF
60190 BLK DOG7	60258 WILSON 7	1	239	60.3	144.01	61.3	146.49	SYSTEM INTACT		NOT SAF
				105.1	251.27	107	255.66	60190 BLK DOG7 60258 WILSON 7 3		SAF
60234 PARKERS7	60259 BASCRK 7	1	239	92.6	221.31	93.6	223.73	SYSTEM INTACT		NOT SAF
				120.8	288.68	122.1	291.79	60202 COON CK3 60251 TERMINL3 1	SW953	SAF
				120.8	288.68	122.1	291.79	60251 TERMINL3 60221 KOLMNLK3 1	SW953	SAF
				120.8	288.68	122.1	291.79	61492 TERMID1Y 60251 TERMINL3 10	SW953	SAF
				120.8	288.68	122.1	291.79	61492 TERMID1Y 60252 TERMINL7 10	SW953	SAF
				120.8	288.68	122.1	291.79	61492 TERMID1Y 61187 TERTER19 10	SW953	SAF
60307 JACKSON5	60966 JACKCO 8	1	47	82.6	38.81	85.9	40.35	SYSTEM INTACT		NOT SAF
				102.4	48.12	106.9	50.24	60308 LACROSS5 60310 MONROCO5 1		SAF
60321 HYDROLN7	61006 WISSOTAG	1	48	51.5	24.73	52	24.96	SYSTEM INTACT		NOT SAF
				103.9	49.88	108.9	52.28	60320 HYDROLN5 60321 HYDROLN7 1		SAF
				103.9	49.86	109	52.3	60320 HYDROLN5 69229 GRAVL ISLE 1		SAF

Number of limiters	**18**

Appendix E – Loss Analysis

DRG II – SUOP Base Case

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:17
MTEP06 - 2011 SUMMER PEAK PHASE 3 CONTRACTUAL DISPATCH CASE ZONE TOTALS
MTEP-2013_SUOP_FINAL(V1)_TOPOLOGY-(052307) IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13592.1	3700.4	0.0	0.0	0.0	9706.9	156.7
PJM500KV	3606.2	996.9	-708.7	0.0	3902.6	1405.2	5806.2
2	0.0	6272.4	0.0	0.0	0.0	-6303.5	31.0
NORTHERN	0.0	1172.3	-122.9	0.0	74.4	-1133.5	158.5
3	0.0	1604.0	0.0	0.0	0.0	-1633.0	29.0
ROCK RIV	76.8	220.7	-57.0	0.0	74.6	-193.2	181.0
4	0.0	3087.7	0.0	0.0	0.0	-3114.6	26.9
SOUTHERN	0.0	996.2	-240.2	0.0	56.5	-816.4	116.9
5	265.0	136.6	0.0	0.0	0.0	-194.9	293.7
345KV	59.0	50.1	99.9	0.0	3086.2	-1448.8	4432.4
6	305.5	35.4	0.0	0.0	0.0	222.3	47.9
PEAKERS	-28.0	14.1	-279.1	0.0	264.6	-303.3	804.9
7	17335.2	487.1	0.0	6.0	0.0	16802.2	40.0
GEN BUS	4015.5	72.4	-31.0	41.2	0.0	2378.4	1554.5
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.1
TR MIDPT	0.0	723.1	-687.8	0.0	0.0	-1322.8	1280.2
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4444.8	0.0	0.0	4156.7	8.0
10	4053.5	108.9	0.1	0.0	0.0	3942.8	1.8
CHI-ESS	774.9	59.8	-11.9	0.0	7.9	592.3	142.7
11	9106.0	0.0	0.0	0.0	0.0	9075.5	30.5
IPP GEN	2431.5	0.0	0.0	0.0	224.0	1874.0	781.5
12	0.0	1745.4	0.0	0.0	0.0	-1751.8	6.4
C-N	0.0	493.2	0.0	0.0	480.2	-68.5	55.5
14	567.5	2092.1	0.0	0.1	0.0	-1550.2	22.4
C-S	78.1	575.0	-204.2	0.0	133.7	-417.0	257.7
15	8.0	1388.8	0.0	0.0	0.0	-1401.4	20.6
YORK 115	2.0	186.5	-35.8	0.0	72.2	-181.8	105.3
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.2	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.3	38.5

18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-87.0	76.1
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.9	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.5	39.0
NO-ESS	1140.3	421.9	-87.8	0.0	196.5	272.3	672.7
21	1073.7	645.0	0.0	0.0	0.0	411.9	16.7
	565.0	165.4	-98.7	0.0	43.3	386.4	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.5	4.6
	0.0	305.6	0.0	0.0	20.7	-328.0	43.1
23	765.0	6607.3	0.0	0.0	0.0	-5999.6	113.9
N-R	200.8	2128.3	-1684.9	0.0	51.0	-1052.9	881.0
24	1157.0	2326.7	0.0	0.0	0.0	-1259.1	89.4
N-S	370.3	542.9	-339.9	0.0	147.8	-728.7	1043.7
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.8	0.0	0.0	-498.0	713.6
26	2254.5	393.2	0.0	0.0	0.0	1844.8	16.5
JCSO 230	681.2	101.8	-543.2	0.0	90.5	776.8	436.3
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.3	21.1
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.6	43.1
32	13.0	183.6	-1.5	0.0	0.0	-280.3	111.2
	0.0	51.1	-637.8	0.0	372.8	-1143.3	2102.8
33	8502.5	40.5	0.0	0.0	0.0	8455.0	7.0
	1567.7	6.0	0.0	0.0	0.0	1502.0	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1057.8	8.8
NORTHEAS	18.6	134.0	-144.8	0.0	29.5	15.6	43.3
35	0.0	1539.0	-22.7	0.0	0.0	-1523.4	7.1
	0.0	706.2	-744.4	0.0	3.3	-5.6	47.1
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.2	14.7
	0.0	407.8	-369.6	0.0	0.4	-115.9	78.1
38	0.0	1923.0	-7.1	0.0	0.0	-1933.8	17.8
	0.0	594.9	-392.5	0.0	12.6	-309.7	119.9
40	196.7	681.0	0.0	0.0	0.0	-485.9	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-263.3	11.8

41	0.0	1594.2	-0.4	0.0	0.0	-1699.4	105.6
PECO	0.0	605.4	-1682.8	0.0	459.3	-255.0	1791.6
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-109.1	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.7	0.0	0.0	-260.1	92.2
44	4107.4	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	257.8	78.6	-93.8	0.0	0.0	101.7	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	508.8	0.0	0.0	0.0	0.0	261.3	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.8	0.0	0.2	-11.6	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.3	0.0	0.0	-541.8	236.1
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-112.0	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1060.6	65.1
PS NORTH	906.3	703.8	0.0	0.0	1670.3	92.3	1751.1
51	2113.7	2698.7	0.0	0.0	0.0	-545.5	33.6
PS CENTR	553.9	233.7	-887.4	0.0	115.8	537.6	842.3
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	629.6	64.4	-453.0	0.0	158.3	360.0	789.5
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.4	6599.6	0.0	0.0	0.0	-3139.2	116.3
BGE 115	934.9	3991.4	-4556.2	0.0	467.0	-96.7	2037.6
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-112.1	0.0	0.0	-17.4	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-284.4	0.0	0.0	-46.2	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.5	6963.1	0.0	0.0	0.0	-1282.0	110.5
PEPCO	1696.4	1558.7	-971.2	0.0	1192.2	-35.0	2336.0

77	1501.9	1575.1	0.0	0.0	0.0	-1543.9	91.6
RIVER	446.6	102.4	-410.4	0.0	112.0	-301.3	1072.2
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	92.4	118.5	-32.9	0.0	10.0	-173.9	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	2.0	7.1	-5.6	0.0	0.0	0.5	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	7.3	32.4	-26.1	0.0	0.4	-4.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1387.7	88.0
DPL COMP	453.2	610.6	-1171.2	0.0	240.0	55.3	1198.6
90	521.2	85.3	148.1	0.0	0.0	319.6	19.9
	85.9	12.2	0.0	0.0	268.2	69.8	277.8
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.5	21.6
96	46.7	186.0	0.0	0.0	0.0	-142.9	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-55.8	48.6
101	11453.2	12787.3	0.1	0.3	0.0	-1552.6	218.1
CPL-E	2845.2	2805.5	-1774.4	-917.2	1402.9	670.9	3463.3
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2
CPL-W	117.6	174.1	-205.9	-16.0	62.1	83.6	143.8
110	21271.0	20975.5	11.6	3.4	0.0	-102.3	482.8
DUKE.DUK	5112.5	9083.6	-7729.3	-1202.3	1822.9	15.6	6853.8
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.2	157.3	-104.2	-15.9	38.7	2.1	24.6
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.1
113	5.7	4.0	0.0	0.0	0.0	0.2	1.5
YADKIN	-10.4	2.0	0.0	0.0	1.7	-13.0	2.3
114	427.5	0.0	0.0	0.0	0.0	426.0	1.6
HARTWELL	185.6	0.0	0.0	0.0	0.0	124.4	61.2
115	6114.3	5184.0	0.0	0.0	0.0	835.6	94.7
SCEG	1425.2	2219.9	-1403.5	0.0	419.7	-176.7	1205.2
120	0.0	1628.9	0.0	0.1	0.0	-1650.2	21.2
SC-SO	0.0	614.7	-392.7	-80.7	100.7	-165.3	122.2

Appendix E – Loss Analysis

121	3198.3	1321.2	0.1	0.0	0.0	1812.5	64.5
SC-NO	597.8	495.3	-444.8	-48.4	271.7	-128.2	995.6
122	1757.0	1818.4	0.0	-0.1	0.0	-102.3	41.0
SC-EA	468.4	515.0	-374.1	-26.8	135.1	-61.4	550.8
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.6	51.7
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3549.9	8.0	0.0	0.0	0.0	3507.9	34.0
AECI	771.2	2.6	-115.6	105.1	724.1	916.5	639.3
131	27.0	347.4	0.0	0.0	0.0	-352.9	14.7
AECI-NW	-1.6	87.1	-2.7	0.0	66.2	-72.0	47.7
132	24.0	241.7	0.0	0.0	0.0	-222.9	7.7
AECI-NE	0.0	59.8	-16.5	0.0	31.4	-28.7	17.6
133	0.0	862.4	0.1	0.0	0.0	-899.5	36.9
AECI-CNT	0.0	216.1	-25.9	0.0	92.4	-289.6	191.8
134	15.0	637.2	0.0	0.0	0.0	-693.0	33.1
AECI-KMO	-4.2	159.7	-84.0	0.0	65.7	-122.5	98.9
135	0.0	631.1	0.0	0.0	0.0	-643.8	12.7
AECI-KOK	0.0	158.2	-78.2	0.0	47.1	-95.4	62.5
136	0.0	924.8	0.1	0.0	0.0	-951.5	26.7
AECI-SMP	0.0	231.7	-81.7	52.6	101.4	-195.5	146.9
137	0.0	390.8	0.0	0.0	0.0	-410.8	20.0
AECI-M&A	0.0	98.0	-4.5	0.0	40.4	-124.9	71.8
138	2108.4	1021.0	0.0	0.0	0.0	1058.0	29.5
LAGN	322.2	328.6	0.0	0.0	143.8	-260.0	397.5
140	28541.9	30306.1	19.6	3.3	0.0	-2325.3	538.2
GA-ITS	6531.2	12635.5	-10408.8	-834.0	4550.0	-34.4	9723.0
141	16564.1	13418.4	8.2	0.3	0.0	2840.4	240.9
APC	3443.8	3598.5	-2162.3	-162.6	1525.2	-289.8	3980.0
142	2083.0	2655.8	2.2	0.0	0.0	-640.3	53.8
GULF	-183.5	796.7	-1532.7	-42.5	193.7	147.0	641.5
143	3073.0	2653.2	3.5	0.0	0.0	340.8	75.5
MPC	986.4	938.2	-658.6	-6.3	516.3	116.5	1112.9

Appendix E – Loss Analysis

144	2084.0	1111.6	2.6	0.0	0.0	939.5	30.3
SAV	563.9	427.0	-391.5	0.0	55.1	72.9	510.5
145	855.0	790.7	0.0	0.0	0.0	42.3	22.0
SMEPA	114.6	265.5	-185.9	0.0	116.9	37.7	114.2
147	0.7	0.0	0.0	0.0	0.0	0.7	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.5	2058.2	0.0	0.0	0.0	1547.9	75.7
AEC	602.4	325.8	-411.8	0.0	294.0	217.8	769.1
155	6224.7	5901.4	1.9	0.5	0.0	154.3	166.5
EES_WEST	1500.9	2235.9	-1492.1	58.4	1013.4	48.1	1664.1
156	8945.6	9770.0	0.1	2.1	0.0	-918.7	92.0
EES_SOU	2013.2	2719.3	-1208.4	-573.0	857.5	101.6	1831.3
157	5443.0	5006.3	0.0	1.0	0.0	383.7	78.6
EES-ASNO	1241.3	1873.2	-618.4	-361.7	797.9	-349.7	1506.6
158	909.8	1767.3	0.0	0.7	0.0	-903.6	45.5
EES_CNTR	192.6	477.0	-304.3	-70.9	456.6	-9.8	557.1
159	8721.2	7791.3	0.0	106.4	0.0	688.5	135.0
EES_NOR	1023.9	2331.1	-947.6	-153.6	2112.5	-242.6	2149.1
165	3026.5	5549.8	0.0	0.0	0.0	-2638.9	115.6
TVA_WEST	1137.2	1662.5	-1940.9	100.7	1169.6	1026.1	1458.4
166	17516.3	15266.6	0.1	0.0	0.0	1942.9	306.6
TVA_CENT	4016.5	5590.8	-3192.9	102.2	3312.9	-180.8	5010.1
167	11513.7	9894.8	0.0	0.0	0.0	1461.8	157.0
TVA_EAST	2750.6	3523.9	-1850.3	212.4	2173.9	775.0	2263.5
168	0.0	3539.8	0.0	0.0	0.0	-3556.9	17.1
TVA_MEMP	0.0	1035.2	-177.2	0.0	104.3	-914.1	160.3
169	108.5	0.0	0.0	0.0	0.0	108.2	0.3
TVA_IPP	37.5	0.0	0.0	0.0	80.3	105.7	12.1
181	99.5	1772.1	0.0	0.0	0.0	-1676.8	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.2	49.8
182	0.0	3191.7	0.0	0.0	0.0	-3219.3	27.6
FAIRFAX	0.0	712.2	-990.5	0.0	104.2	-194.5	577.0
183	2665.0	1076.7	0.1	0.0	0.0	1571.9	16.2
WOODBRDG	50.4	294.2	-264.2	0.0	46.1	-138.4	205.0
184	275.0	483.0	0.0	0.0	0.0	-212.4	4.5
NOR NECK	65.9	100.9	-52.5	0.0	30.1	10.5	37.1
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-0.6	568.9	-317.7	0.0	60.4	-398.0	206.6

186	1144.0	1510.4	0.0	0.0	0.0	-379.2	12.8
YORKTOWN	-27.4	378.2	-473.2	0.0	66.5	22.8	111.3
187	2514.2	1730.7	0.0	0.0	0.0	769.8	13.6
CHESTERF	180.3	500.7	-286.9	0.0	99.8	-61.8	128.1
188	1411.0	637.6	1.3	0.0	0.0	754.0	18.2
SOUTHSDE	-152.6	156.6	-235.2	0.0	47.7	-135.7	109.5
189	710.0	2837.7	0.0	0.0	0.0	-2151.8	24.1
VA BEACH	180.0	690.0	-565.9	0.0	122.4	-200.0	378.3
190	1414.0	1111.3	0.0	0.0	0.0	298.9	44.6
SUFFOLK	51.5	251.4	-485.6	0.0	201.0	130.2	363.4
191	0.0	640.2	0.3	0.0	0.0	-665.7	8.3
OUTBANKS	0.0	161.1	-247.2	0.0	64.2	88.5	61.7
192	994.0	1116.2	0.3	0.0	0.0	-154.0	31.4
CAROLINA	48.2	296.5	-336.5	0.0	133.4	-7.8	229.3
193	1020.0	1831.2	0.0	0.0	0.0	-843.2	32.0
GORDONSV	-54.8	375.5	-237.9	0.0	164.9	-343.7	316.3
194	0.0	1211.1	0.0	0.0	0.0	-1231.2	17.4
VALLEY	0.0	326.6	-353.8	0.0	85.4	-116.8	228.8
195	1704.0	708.9	0.0	0.0	0.0	941.2	39.1
LEXINGTN	237.0	198.1	-131.2	0.0	189.9	-81.6	438.9
196	9293.0	816.3	0.0	0.0	0.0	8344.3	132.4
500KV	352.9	150.6	-689.3	0.0	2660.6	884.9	2667.3
197	1055.3	171.7	0.0	0.0	0.0	861.3	22.3
	337.6	34.7	0.0	0.0	181.3	220.0	264.2
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.5	45.3
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.4
201	9051.5	11383.3	0.0	0.0	0.0	-2543.7	219.3
AP	1472.7	2884.8	-2362.7	0.0	2230.6	-638.8	3822.0
202	1857.0	362.0	0.0	0.0	0.0	1465.4	22.3
	315.9	66.1	-35.2	0.0	145.1	115.3	313.5
203	151.0	472.3	0.0	0.0	0.0	-338.6	17.3
	48.7	97.1	-142.8	0.0	236.8	235.2	95.9
204	748.0	748.9	0.0	0.0	0.0	-24.8	29.9
	109.7	149.4	-146.1	0.0	258.8	166.2	200.5
205	0.0	43.0	0.0	0.0	0.0	-64.9	15.9
	0.0	15.2	0.0	0.0	8.9	-39.4	30.9

206	2045.8	61.7	0.0	0.0	0.0	1975.1	9.1
OVEC	-266.5	6.2	0.0	0.0	559.9	189.1	98.2
207	1086.2	598.4	0.0	0.0	0.0	494.8	21.1
HE	13.1	184.9	-149.2	0.0	125.6	-55.3	167.5
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.5	1.7
209	3787.6	3668.4	0.0	0.0	0.0	-293.1	100.8
DPL	171.7	663.9	-1419.8	0.0	393.3	159.8	1115.9
210	530.0	1085.5	0.0	0.0	0.0	-627.1	27.3
SIGE	233.7	348.6	-279.3	-0.7	48.9	-104.3	300.9
211	7700.5	8208.8	0.0	0.0	0.0	-740.3	232.0
LGEE	2802.6	2800.2	-1117.8	74.3	950.3	-545.5	2541.8
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.7	39.2	-21.9	0.0	10.4	-65.4	53.5
213	171.0	77.1	0.0	0.0	0.0	109.9	0.8
	51.1	5.4	0.0	0.0	5.2	28.5	22.4
214	1453.9	1769.8	0.0	0.0	0.0	-324.5	8.6
BREC	347.2	725.6	-293.3	0.0	108.9	-37.1	60.9
215	3253.4	3139.2	0.0	0.0	0.0	90.6	22.2
DLCO	464.7	438.2	-123.9	0.0	676.2	231.6	594.8
216	3116.3	2585.5	0.0	3.6	0.0	477.9	53.0
IPL	116.0	513.3	-472.6	21.1	325.6	-497.6	876.8
217	2482.2	2844.3	0.0	0.0	0.0	-395.8	44.9
NIPS	452.9	927.1	-460.6	0.0	375.5	-165.5	529.6
218	8441.7	129.1	0.0	0.0	0.0	8177.3	135.3
METC	543.6	58.1	-248.3	0.0	1976.1	987.3	1722.3
219	1126.0	3771.3	0.0	0.0	0.0	-2788.2	146.6
ITC	12.3	1431.5	-419.0	0.0	1988.5	-1430.0	2418.8
220	2876.7	2302.3	0.0	4.1	0.0	455.7	114.6
EKPC	722.9	879.9	-932.3	10.7	230.4	51.1	943.9
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	11748.6	748.4	0.0	0.0	0.0	10962.6	37.6
FE-GEN	1851.0	503.9	0.0	0.0	151.2	80.6	1417.7
231	0.0	350.9	0.0	0.0	0.0	-352.6	1.6
FE-AK-23	0.0	79.2	0.0	0.0	0.1	-103.9	24.8
232	0.0	1198.0	0.0	0.0	0.0	-1221.0	29.5
FE-AK	0.0	249.2	-371.1	0.0	301.7	71.0	354.0

Appendix E – Loss Analysis

233	0.0	552.8	0.0	0.0	0.0	-558.6	5.7
FE-LAKE	0.0	127.7	-146.9	0.0	46.1	-13.7	79.0
234	0.0	203.7	0.0	0.0	0.0	-210.8	7.1
FE-MASS	0.0	24.6	0.0	0.0	12.1	-42.7	30.1
235	174.5	837.2	0.0	0.0	0.0	-685.8	20.8
FE-PP	16.4	213.5	-210.4	0.0	121.0	-80.1	213.8
236	0.0	94.6	0.0	0.0	0.0	-95.8	1.3
FE-ALL	0.0	30.2	0.0	0.0	8.0	-30.7	8.5
237	0.0	401.9	0.0	0.0	0.0	-404.2	2.4
FE-WARR	0.0	128.9	-67.6	0.0	27.1	-67.8	33.6
238	4.5	1085.8	0.0	0.0	0.0	-1116.8	29.0
FE-YNG	-3.6	261.0	-60.2	0.0	245.3	-207.0	246.6
239	48.0	3287.0	-3.3	0.0	0.0	-3270.0	34.3
FE-CEI	16.0	1218.6	-1209.0	0.0	412.7	-71.8	490.9
240	0.0	241.1	0.0	0.0	0.0	-243.4	2.3
FE-CPP	0.0	49.3	-49.3	0.0	0.0	-9.2	9.3
241	1995.0	892.1	0.0	0.4	0.0	1096.3	33.4
FE-MN	175.2	161.3	-103.2	2.3	255.5	10.2	366.6
242	1091.0	758.0	0.0	0.4	0.0	304.0	27.9
FE-MR	230.4	184.3	-80.9	0.8	195.5	40.9	277.4
243	7.0	950.2	0.0	0.2	0.0	-969.1	25.2
FE-SP	-25.2	188.9	-129.4	1.2	70.2	-159.3	141.5
244	1197.2	664.8	0.0	0.1	0.0	506.6	21.4
FE-BAY	358.1	173.1	-128.6	0.8	224.3	308.9	224.4
245	2212.8	4566.6	0.0	3.6	0.0	-2444.4	90.3
FE-TE	755.1	1194.9	-457.6	7.5	605.1	-319.9	933.2
246	26.0	862.0	0.0	0.6	0.0	-874.3	8.9
	10.5	170.8	0.0	-16.6	87.5	-175.5	104.3
250	7545.5	6638.7	0.0	0.0	0.0	736.9	169.8
AEP-AP	-244.6	1829.0	-1747.9	1625.8	3664.6	-612.1	2325.3
251	10848.6	5388.7	0.0	0.0	0.0	5250.6	209.2
AEP-OP	-488.5	836.3	-1488.1	2786.5	5556.0	281.2	2651.5
252	6499.6	4801.8	0.0	0.0	0.0	1531.0	166.8
AEP-IM	-250.2	732.1	-760.4	1495.0	3486.0	-331.3	2100.5
253	2449.0	5404.9	0.0	0.0	0.0	-3094.6	101.5
AEP-CS	216.8	1277.3	-1529.3	0.0	708.3	183.5	975.5
254	265.6	1403.2	0.0	0.0	0.0	-1190.1	52.5
AEP-KP	190.7	366.0	-429.5	0.0	73.8	14.0	314.0

255	363.3	1628.6	0.0	0.0	0.0	-1278.4	13.1
AEP-OP-I	56.4	669.3	-59.4	0.0	33.0	-600.6	80.2
256	0.0	573.6	0.0	0.0	0.0	-578.6	5.0
AEP-IM-I	0.0	104.3	-35.4	0.0	40.8	-55.2	27.2
257	450.0	330.3	0.0	0.0	0.0	105.2	10.9
	76.4	92.0	-13.5	0.0	75.0	-57.4	130.3
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.0
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.1	3.9
	119.0	84.6	-36.3	0.0	3.5	34.6	39.6
261	3001.6	105.2	0.0	0.0	0.0	2895.1	1.2
ITC-GN	6.5	15.0	0.0	0.0	34.8	3.5	22.8
262	6157.3	783.0	0.0	0.0	0.0	5335.8	38.6
ITC-GS	721.5	176.9	-193.5	0.0	138.5	656.3	220.3
263	1607.7	5711.7	0.0	0.1	0.0	-4157.8	53.7
ITC-DIS	395.0	2217.9	-3065.6	125.5	421.6	1122.1	416.7
264	8.0	615.0	0.0	0.0	0.0	-634.6	35.4
	7.8	185.6	-74.9	0.0	91.5	-233.8	224.5
265	2273.4	1221.8	0.0	0.0	0.0	990.4	60.4
	339.8	275.7	-187.6	1.4	481.7	159.1	571.8
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.7	93.3	-111.6	0.0	36.7	18.9	126.1
267	481.0	522.5	0.0	0.0	0.0	-62.8	21.3
	202.2	186.5	-148.6	0.3	125.0	89.5	199.3
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	55.0	219.7	0.0	0.0	0.0	-165.9	1.2
MUNI	7.7	49.3	0.0	0.0	1.9	-52.7	13.0
271	507.0	364.3	0.0	0.0	0.0	141.2	1.5
LANSING	-114.9	146.0	-87.1	0.0	5.3	-178.2	9.7
272	81.0	601.7	0.0	0.0	0.0	-538.8	18.1
WOLVERIN	15.2	137.2	-103.0	0.0	40.7	-44.3	66.0
273	196.8	6595.4	-1.1	0.0	0.0	-6457.7	60.2
CE	-4.4	1567.4	-1176.5	0.0	79.2	-766.0	449.9

280	270.0	5413.2	0.3	5.8	0.0	-5476.3	210.4
DEI	-42.3	1065.0	-1655.2	-6.4	1158.9	-602.3	2253.9
281	0.0	270.6	0.0	0.0	0.0	-218.5	6.1
HE IN DE	0.0	91.3	0.0	0.0	56.2	-35.2	24.0
282	0.0	705.8	0.0	0.0	0.0	-681.7	2.6
DEI IND	0.0	198.1	-14.6	-0.3	14.0	-171.8	13.2
283	5223.1	360.0	0.0	0.0	0.0	4829.1	0.0
DEI GENS	1631.9	233.2	0.0	0.0	0.0	1343.0	39.6
284	0.0	3336.5	0.5	2.1	0.0	-3402.8	87.5
DEO	0.0	386.7	-629.4	-81.7	516.2	-156.9	1007.3
285	0.0	383.0	0.0	0.0	0.0	-403.7	0.9
DEO IND	0.0	71.0	0.0	0.0	0.9	-83.9	2.9
286	4147.6	0.0	0.0	0.2	0.0	4139.6	7.9
DEO GENS	446.6	0.0	0.0	1.1	0.0	123.4	322.0
287	0.0	310.4	0.1	0.0	0.0	-313.4	2.7
DEK	0.0	37.2	-141.4	0.0	3.1	90.0	16.6
288	0.0	11.8	0.0	0.0	0.0	-16.7	0.2
DEK IND	0.0	7.7	0.0	0.0	0.3	-10.8	1.0
290	88.3	105.0	0.0	0.0	0.0	48.3	0.0
	132.0	56.0	0.0	0.0	0.0	101.9	14.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	241.9	150.0	-21.2	0.0	0.0	64.0	49.2
301	0.0	0.0	0.0	0.0	0.0	-1.2	1.2
CIL345	0.0	0.0	0.0	0.0	48.2	6.4	41.8
302	0.0	242.8	0.0	0.0	0.0	-249.4	6.6
302	0.0	70.8	0.0	0.0	31.6	-104.0	64.8
303	690.0	65.0	0.0	0.0	0.0	624.8	0.2
CILGEN	283.6	40.3	0.0	0.0	0.0	237.4	5.9
304	0.0	342.1	0.0	0.0	0.0	-343.3	1.1
PEORIA	0.0	88.1	-31.2	0.0	0.3	-62.0	5.3
305	0.0	79.2	0.0	0.0	0.0	-79.7	0.4
PEKIN	0.0	20.6	0.0	0.0	0.0	-22.2	1.6
306	0.0	52.1	1.2	0.0	0.0	-53.3	0.1
EASTERN	0.0	9.4	0.0	0.0	0.0	-9.6	0.2
307	0.0	29.8	0.1	0.0	0.0	-30.0	0.0
WESTERN	0.0	6.6	0.0	0.0	0.0	-6.8	0.1
308	0.0	45.8	0.7	0.0	0.0	-46.5	0.0
LACON	0.0	11.1	-3.2	0.0	0.0	-8.2	0.2

309	0.0	25.3	0.0	0.0	0.0	-25.3	0.0
HOMER	0.0	7.4	0.0	0.0	0.0	-7.4	0.0
310	31.7	797.1	0.0	0.0	0.0	-814.9	21.0
REG E-IL	13.2	174.7	-61.5	0.0	113.0	-124.8	134.6
311	850.0	585.4	0.0	0.0	0.0	257.2	7.4
FRKNJEFF	385.0	134.2	0.0	0.0	173.3	301.8	122.3
312	712.0	554.1	0.0	0.0	0.0	131.6	26.3
ST FRAN	202.9	192.6	0.0	0.0	194.3	-14.8	219.5
313	618.0	852.8	0.0	0.0	0.0	-255.4	20.6
STCHMOED	154.9	138.1	0.0	0.0	248.5	39.2	226.1
314	1260.3	598.8	0.0	0.0	0.0	636.9	24.7
LKSDMP&L	524.0	75.5	58.6	0.0	509.5	575.3	324.1
315	0.0	81.3	0.0	0.0	0.0	-81.6	0.4
GREENHIL	0.0	5.7	0.0	0.0	0.0	-9.2	3.4
316	5.0	758.2	5.1	0.0	0.0	-769.2	10.9
SEMO	5.4	200.7	102.7	0.0	86.1	-311.7	99.8
317	9.0	1534.0	0.0	0.0	0.0	-1528.9	3.9
N METRO	0.0	142.1	0.0	0.0	60.2	-155.5	73.6
318	496.0	1820.8	0.0	0.0	0.0	-1332.4	7.6
S METRO	28.7	281.9	-248.3	0.0	43.3	-46.7	85.1
319	95.7	120.3	0.0	0.0	0.0	83.1	0.2
ILL-IOWA	16.2	22.8	0.0	0.0	0.0	9.5	4.3
320	701.0	2.3	0.0	0.0	0.0	700.5	0.5
MOGENINILL	22.3	0.4	0.0	0.0	0.0	-4.2	26.5
321	0.0	443.5	0.0	0.0	0.0	-449.3	5.8
SOUTHERN	0.0	110.4	0.0	-0.3	94.2	-70.1	54.1
322	52.0	585.0	0.0	0.0	0.0	-571.8	8.9
357	0.0	125.1	0.0	0.0	105.8	-89.3	74.1
323	415.9	1297.1	0.0	0.0	0.0	-909.7	28.5
EASTERN	1.8	276.4	-37.8	0.0	338.8	-249.6	351.5
329	2392.9	207.4	0.0	0.0	0.0	2182.5	2.9
GEN&LOAD	327.4	91.7	0.0	0.0	0.0	88.8	146.9
331	0.0	0.0	0.0	0.0	0.0	-41.9	0.4
CHICAGO	0.0	0.0	0.0	0.0	2.3	-9.3	2.0
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.0	0.0	5.9	16.0	1.0
342	0.0	14.8	0.0	0.0	0.0	-15.6	0.8
C-N	0.0	3.6	0.0	0.0	3.8	-5.1	5.3

Appendix E – Loss Analysis

344	0.0	39.8	0.0	0.0	0.0	-40.5	0.6
NO-ESS	0.0	13.6	-15.0	0.0	8.9	7.8	2.4
345	0.0	109.0	0.0	0.0	0.0	-112.3	3.3
N-R	0.0	30.1	0.0	0.0	12.0	-38.6	20.6
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.5	0.2
RR-ESS	0.0	2.8	0.0	0.0	5.5	1.9	0.8
348	0.0	162.3	0.0	0.0	0.0	-165.7	3.4
R-S	0.0	55.9	-15.0	0.0	20.4	-38.1	17.6
349	489.5	24.3	0.0	0.0	0.0	457.6	7.7
SO-ESS	81.1	6.5	88.4	60.5	211.1	-9.3	146.1
351	0.0	51.6	0.0	0.0	0.0	-52.0	0.5
EEC	0.0	18.4	-16.3	-5.8	7.6	9.0	2.2
352	0.0	90.9	0.0	0.0	0.0	-93.9	3.0
SEIEC	0.0	44.8	-24.6	-8.2	22.5	-5.8	16.3
353	0.0	24.8	0.0	0.0	0.0	-24.8	0.0
SIEC	0.0	9.4	-16.3	-0.6	0.0	7.5	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	4357.9	3291.3	0.0	0.0	0.0	987.8	78.8
357	635.2	707.1	-559.0	0.0	606.3	39.3	1054.0
360	408.1	343.0	0.0	0.0	0.0	63.3	1.8
360	0.0	103.3	-119.4	0.0	8.4	1.6	23.0
361	3007.6	1750.1	0.0	2.0	0.0	1206.8	47.4
SIPC	685.6	414.8	-127.8	11.4	131.5	-113.6	625.0
362	1102.2	635.3	0.0	0.1	0.0	428.6	20.5
EEI	432.3	126.2	-27.1	0.7	160.6	201.2	288.0
363	551.0	703.5	0.0	0.6	0.0	-134.4	9.8
PJM500KV	43.7	115.3	-115.4	2.4	146.2	47.8	139.2
364	1388.7	575.7	0.0	0.8	0.0	780.8	30.4
SEAST	346.7	94.2	-88.7	6.7	206.4	161.9	374.6
365	1555.4	2285.6	0.0	1.8	0.0	-784.0	50.5
	160.3	404.8	-242.8	7.0	352.5	-237.2	571.4
366	1990.2	1937.9	0.0	0.3	0.0	-13.4	65.5
WPS	115.1	493.0	-805.3	0.9	498.4	159.5	765.4
367	61.1	586.1	0.0	0.9	0.0	-546.7	10.3
MGE	-1.4	182.4	-183.8	1.5	99.0	-46.2	140.8

368	18.0	98.6	0.0	0.0	0.0	-84.1	3.5
UPPC	-2.9	41.4	-46.8	0.0	33.8	23.5	12.9
371	2438.6	2513.0	0.0	0.4	0.0	-326.0	94.9
WPL	404.2	690.2	-922.2	0.4	454.8	119.3	909.9
372	0.0	258.7	0.0	0.0	0.0	-14.8	0.1
WPL-WPPI	0.0	94.0	-8.3	0.0	2.8	6.0	1.1
375	31.3	100.3	0.0	0.0	0.0	-70.7	1.7
ED SAULT	5.6	43.4	-10.4	0.0	56.2	19.7	9.0
376	5236.2	3890.5	0.0	1.5	0.0	1275.5	68.8
WE-MKR	1577.6	1260.8	-686.2	4.4	633.8	208.0	1424.3
377	0.0	679.1	0.0	0.0	0.0	-700.7	17.1
WE-FV	0.0	190.5	-100.6	0.0	184.9	-47.6	141.8
378	35.1	148.0	0.0	0.0	0.0	-115.4	2.5
WE-IR	12.0	54.4	-15.1	0.0	46.0	-0.6	19.3
379	556.7	338.4	0.0	0.0	0.0	206.3	12.0
WE-PI	7.4	51.3	-41.2	0.0	97.1	-22.8	117.2
380	69.7	704.6	0.0	0.0	0.0	-715.1	7.4
WE-WPPI	-15.8	138.5	-126.9	0.0	13.5	-112.7	74.1
381	0.0	16.2	0.0	0.0	0.0	-16.3	0.1
WRWL-WPS	0.0	6.5	0.0	0.0	0.1	-6.6	0.2
382	38.2	279.6	0.0	0.0	0.0	-245.0	3.6
CWP-WPS	22.9	127.3	0.0	0.0	0.0	-135.3	30.9
383	0.0	54.9	0.0	0.0	0.0	-55.1	0.3
MEWD-WPS	0.0	11.9	-26.0	0.0	2.3	15.0	1.3
384	26.1	84.2	0.0	0.0	0.0	-58.6	0.5
MPU-WPS	0.4	16.1	-10.1	0.0	0.4	-8.8	3.5
385	0.0	61.6	0.0	0.0	0.0	-61.7	0.1
WPPI-WPS	0.0	19.6	-34.9	0.0	0.9	15.9	0.2
386	17.1	23.4	0.0	0.0	0.0	-6.3	0.0
ESCANABA	0.2	2.1	0.0	0.0	0.3	-1.7	0.0
390	382.9	551.8	0.0	0.0	0.0	-222.8	21.7
	61.5	204.1	-263.2	0.0	133.8	92.2	143.4
391	1780.7	180.1	0.0	0.0	0.0	447.6	35.4
ALTW_391	529.4	67.4	-424.9	0.0	314.5	343.3	445.6
392	2.7	22.3	0.0	0.0	0.0	-934.7	15.0
ALTW_392	3.6	5.9	-40.9	0.0	51.0	-231.3	38.3
393	1247.4	74.8	0.0	0.0	0.0	1109.3	26.6
ALTW_393	-125.7	6.6	63.6	0.0	184.1	-317.8	287.8

Appendix E – Loss Analysis

394	579.6	2763.8	0.0	0.0	0.0	-324.3	26.0
ALTW_394	-203.7	864.8	-109.2	-58.8	60.6	-269.9	91.5
395	0.0	53.0	0.0	0.0	0.0	-21.3	0.4
	0.0	17.4	-16.5	0.0	0.5	16.1	2.3
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-318.7	36.2
	470.1	652.1	-286.7	0.0	125.3	-122.0	351.1
401	20561.6	23603.4	0.0	0.0	0.0	-3659.3	621.0
FPLSOUTH	4430.4	6865.8	-6919.9	0.0	4250.9	111.3	8624.0
402	9883.3	11593.8	0.0	0.0	0.0	-1993.6	283.0
FPC GENS	2928.6	4004.9	-3213.5	0.0	1149.4	45.1	3241.5
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.4	5.7
	123.4	102.5	-24.8	0.0	12.4	-15.8	74.0
405	272.2	512.4	0.0	0.0	0.0	-241.6	1.4
HST	95.0	152.0	0.0	0.0	14.3	-63.0	20.3
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1068.0	1247.3	-493.6	0.0	229.1	-209.3	752.8
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.3	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3672.5	90.0	0.0	0.0	0.0	3554.8	27.6
NSB	1037.3	8.9	0.0	0.0	302.7	689.4	641.7
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	299.9	311.4	-51.7	0.0	253.4	-174.0	467.6
412	2239.6	1110.2	0.0	0.0	0.0	1079.3	50.2
SECI	484.7	276.2	-50.5	0.0	180.7	-332.4	772.1
413	866.9	1311.7	0.0	0.0	0.0	-459.4	14.5
MP-GEN	140.9	231.7	-123.1	0.0	30.0	-104.2	166.5
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.1	0.0	32.5	-364.5	156.1
415	629.3	669.5	0.0	0.0	0.0	-88.8	16.2
	161.7	209.0	-130.9	0.0	48.1	-10.0	131.0

416	4916.2	4567.2	0.0	0.0	0.0	227.2	121.8
GENERATN	1574.9	397.3	-825.4	0.0	234.2	278.3	1958.9
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.5
	84.8	36.4	-10.6	0.0	1.8	31.4	29.3
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	125.4	67.0	0.0	0.0	16.1	49.9	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	236.1	0.0	0.0	0.0	0.0	195.5	40.6
428	100.1	0.0	0.0	0.0	0.0	100.0	0.1
PLANTCTY	17.7	0.0	0.0	0.0	0.0	13.0	4.7
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-112.3	9.1
	17.8	58.2	-24.3	0.0	19.0	-45.2	55.0
442	309.5	102.7	0.0	0.0	0.0	201.7	5.1
	26.0	11.4	0.0	0.0	10.3	-11.0	36.0
443	0.0	93.7	0.0	0.0	0.0	-97.9	3.4
	0.0	15.7	-43.5	0.0	8.4	21.9	10.2
444	575.0	244.5	0.0	0.0	0.0	318.8	9.4
	101.7	59.4	-35.0	0.0	10.5	-21.1	112.6
445	190.0	144.7	0.0	0.0	0.0	44.0	5.9
	30.8	29.1	-18.1	0.0	14.2	-19.6	49.9
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.6	0.0	10.6	-14.0	13.5
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.5	7.4
449	16.0	138.5	0.0	0.0	0.0	-130.1	0.9
	2.8	16.0	0.0	0.0	7.8	-12.8	4.7
450	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	3.0	-3.7	6.7
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.9	1.1

Appendix E – Loss Analysis

452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.2	11.4
	374.1	204.4	-25.7	0.0	47.1	86.8	155.7
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.3	3.4
WERE	10.9	57.1	-3.5	0.0	2.2	-32.4	5.8
600	5135.9	384.5	0.0	0.0	0.0	4740.8	11.6
608	511.2	228.4	0.0	0.0	1.3	-165.3	460.1
601	1783.0	5359.0	0.0	0.0	0.0	-3998.4	206.0
XEL_MN	94.8	731.2	-2111.7	592.0	2276.7	904.4	2197.3
602	1.5	273.7	0.0	0.0	0.0	-313.3	8.2
XEL_ND	-0.4	54.7	-41.8	0.2	27.9	-36.3	47.5
603	0.0	345.3	0.0	0.0	0.0	-384.4	10.3
XEL_SD	0.0	67.9	-113.9	0.0	22.5	-2.6	62.7
604	164.7	1052.9	0.0	0.0	0.0	-926.8	62.8
XEL_WI	29.9	212.0	-568.3	0.0	248.3	141.7	497.7
605	118.7	493.3	0.0	0.0	0.0	-297.5	3.9
NON-XEL	-33.7	98.7	-70.1	0.0	9.4	-49.8	10.2
608	766.7	336.6	0.0	0.2	0.0	268.8	63.8
MP_608	-32.0	114.3	-858.8	0.8	243.7	-25.1	950.4
609	-99.2	1010.8	0.0	0.0	0.0	-1029.1	3.3
MP-INDUS	117.8	367.3	-62.0	0.0	6.7	-207.8	54.2
610	1179.6	81.9	0.0	0.0	0.0	1093.3	1.8
MP-SSL	114.2	44.2	-5.2	0.0	0.3	-16.1	89.7

Appendix E – Loss Analysis

611	0.0	6.7	0.0	0.0	0.0	-6.7	0.0
	0.0	3.1	0.0	0.0	0.0	-3.6	0.5
613	0.0	194.4	0.0	0.0	0.0	-1.1	1.1
SMPA_613	0.0	48.6	-25.0	0.0	1.1	18.2	7.9
614	6.6	35.8	0.0	0.1	0.0	-38.3	0.2
SMPA_614	7.0	8.9	0.0	0.4	0.6	-6.0	1.4
615	5.9	46.7	0.0	0.0	0.0	-336.4	5.2
SMPA_615	4.0	10.7	-31.5	0.0	31.6	-101.0	48.3
616	136.4	409.2	0.0	0.0	0.0	-3.6	13.7
SMPA_616	-17.6	138.5	-220.7	0.5	94.2	126.8	138.1
617	32.5	59.0	0.0	0.0	0.0	-31.0	0.2
SMPA_617	11.1	14.7	0.0	0.0	3.5	-5.4	3.3
618	0.0	97.9	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	2.4	0.0	0.0	0.0	0.0	0.0
619	44.4	1054.1	0.0	0.3	0.0	-1045.5	25.8
GRE-GRE	-16.0	186.8	-655.2	0.7	144.0	456.2	135.7
620	0.0	172.0	0.0	0.2	0.0	-167.3	5.0
GRE-MP	0.0	26.2	-33.4	0.5	61.5	44.9	24.2
621	50.0	131.9	0.0	0.1	0.0	-83.4	9.0
GRE-OTP	-11.7	22.8	-6.3	0.2	25.6	-39.7	37.9
622	156.8	781.5	0.0	0.2	0.0	-652.1	46.5
GRE-NSP	-65.4	101.2	-9.9	0.7	122.3	-232.5	200.7
623	248.3	97.1	0.0	0.0	0.0	150.4	6.9
GRE-ALT	-102.8	12.6	0.0	0.0	11.8	-114.9	12.5
624	1434.8	0.0	0.0	0.7	0.0	1289.2	55.2
GRE-ND	261.5	0.0	-564.3	4.2	58.2	-642.1	1519.6
625	790.0	4.1	0.0	0.5	0.0	785.7	3.4
GRE-S	-99.9	0.0	0.0	0.7	6.7	-167.5	73.3
626	186.5	163.5	0.0	0.1	0.0	-47.4	25.2
OTP_626	9.1	52.5	-86.4	0.0	110.4	19.7	122.3
627	18.9	162.3	0.0	0.1	0.0	-202.5	22.4
OTP_627	-1.0	36.0	43.8	28.3	321.8	1.2	202.5
628	515.0	43.2	0.0	0.0	0.0	459.0	12.6
OTP_628	27.4	16.6	0.0	0.0	27.5	-52.7	90.9
630	11.5	199.2	0.0	0.2	0.0	-228.8	2.2
	-3.0	37.1	-29.2	0.1	9.6	-21.9	9.3
631	10.0	294.0	0.0	0.0	0.0	-481.0	2.6
RPU_631	6.6	73.7	0.0	0.0	14.0	-118.2	16.6

Appendix E – Loss Analysis

633	164.3	200.5	0.0	0.0	0.0	-37.1	0.9
MPW_633	85.4	48.1	0.0	0.0	9.1	26.6	19.8
635	49.0	156.2	0.0	0.0	0.0	-318.7	5.1
MEC_635	27.5	17.5	-61.2	0.0	32.0	28.3	33.4
636	3319.2	1660.2	0.0	0.0	0.0	1874.8	42.1
MEC_636	779.4	466.5	-147.9	0.0	218.6	159.6	571.7
637	864.8	2122.7	0.0	0.0	0.0	-1275.1	53.2
MEC_637	56.1	318.1	-322.2	0.0	705.7	173.8	600.4
638	1023.1	1434.6	0.0	0.0	0.0	-501.9	23.1
MEC_638	272.6	369.4	-157.4	0.0	263.7	23.9	279.0
639	246.6	380.9	0.0	0.0	0.0	-143.2	0.9
MEC_639	49.4	55.7	0.0	0.0	6.7	-3.8	2.6
640	2616.2	2470.5	0.0	0.0	0.0	-140.8	107.9
NPPD_640	256.7	797.5	-654.5	26.0	1076.9	23.9	1096.6
641	132.0	218.1	0.0	0.0	0.0	13.6	0.9
HAST_641	36.9	72.0	0.0	0.0	3.3	-11.6	11.0
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.8
GRIS_642	22.9	11.3	0.0	0.0	2.6	-8.6	22.8
645	2477.1	2370.6	0.0	0.0	0.0	34.2	29.5
OPPD_645	432.7	414.8	-137.7	14.9	380.6	-27.4	522.8
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.5
OPPD_FRE	41.3	35.1	0.0	0.0	1.0	-11.7	11.5
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	-81.5	600.0	0.0	0.0	0.0	-688.5	7.0
LES_650	17.0	103.8	-218.3	0.0	88.9	104.8	115.6
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	12.1	0.0	-119.5	0.0	1.5	38.2	94.9
652	203.7	148.5	0.0	0.0	0.0	-14.4	6.8
WAPA_652	0.2	31.9	-133.5	0.0	114.9	15.6	181.3
653	93.9	97.5	0.0	0.0	0.0	-192.7	18.7
WAPA_653	-62.4	22.8	-7.9	-0.3	169.6	-62.9	112.4
654	1327.8	370.2	0.0	0.0	0.0	200.8	121.9
WAPA_654	358.4	61.7	-281.7	154.0	1031.3	231.2	1109.5

Appendix E – Loss Analysis

655	554.1	30.5	0.0	0.0	0.0	418.0	33.1
WAPA_655	-41.6	5.6	11.5	0.0	286.4	-34.1	252.6
656	0.0	415.1	0.0	0.0	0.0	-54.6	3.8
WAPA_656	0.0	117.9	-30.7	0.0	85.9	44.5	49.6
657	751.0	109.4	0.0	0.1	0.0	607.6	30.4
MPC-657	174.1	34.0	-97.9	0.0	185.8	126.3	293.1
659	75.1	1293.6	0.0	0.0	0.0	-457.6	65.3
BEPC_659	-22.6	243.9	-3.5	551.3	1197.7	-325.7	819.9
660	2282.3	202.5	0.0	0.0	0.0	2075.8	4.0
ZONE_660	392.0	126.2	0.0	0.0	0.7	58.2	208.3
661	698.3	320.7	0.0	0.0	0.0	272.7	25.6
MDU_661	100.4	92.3	29.8	3.4	255.2	10.2	229.0
663	75.7	320.0	0.0	0.0	0.0	-231.1	10.7
NWPS_663	17.9	70.2	-20.7	0.0	23.3	-50.3	44.0
665	122.9	409.4	0.0	0.0	0.0	-102.0	1.2
MRES_665	-8.5	129.3	0.0	0.0	4.0	-64.5	16.7
666	0.0	15.8	0.0	0.0	0.0	0.0	0.0
	0.0	3.5	0.0	0.0	0.0	0.0	0.0
667	0.0	556.0	0.0	0.0	0.0	-573.1	8.1
MHSUBWPG	0.0	123.5	-139.0	0.0	152.9	74.9	94.1
668	958.0	779.2	0.0	0.0	0.0	9.5	174.1
MHRURALS	835.1	162.6	-1396.0	268.5	806.3	-1183.3	3783.9
669	126.6	321.3	0.0	0.0	0.0	-212.1	17.4
MHWPGHYD	11.7	126.5	-51.9	0.0	32.6	-120.3	90.0
670	3447.8	51.0	0.0	0.0	0.0	3366.9	29.9
MHRURALN	1115.4	9.6	-799.3	150.8	353.6	1629.5	478.4
671	0.0	683.9	0.0	0.0	0.0	-683.4	3.6
MH INDUS	0.0	124.3	0.0	0.0	11.0	-124.9	16.8
672	0.0	2182.1	0.0	0.0	0.0	-2391.7	88.4
SPC	95.8	523.4	-329.5	86.1	995.3	121.4	643.1
674	0.0	641.5	0.0	0.0	0.0	-533.2	12.9
SPC-IND	0.0	127.0	5.5	0.0	122.7	-30.4	67.4
675	2648.9	138.0	0.0	0.0	0.0	2510.9	0.0
SPC-SSL	67.4	33.7	-52.2	0.0	0.0	-146.1	232.0
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	84.2	20.3	0.0	0.0	0.0	26.5	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix E – Loss Analysis

680	61.7	543.2	0.0	0.0	0.0	-511.4	29.7
DPC_680	11.7	141.8	-61.4	-6.0	88.1	-54.9	80.8
681	642.0	29.3	0.0	0.0	0.0	598.7	19.9
DPC_681	-21.6	9.2	-56.7	0.3	104.2	-31.4	162.7
682	0.0	33.9	0.0	0.0	0.0	-34.7	0.1
DPC_682	0.0	13.6	0.0	0.0	0.2	-13.6	0.1
683	0.0	4.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.9	0.0	0.0	0.0	0.0	0.0
684	0.0	10.2	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
685	0.0	13.2	0.0	0.0	0.0	0.0	0.0
	0.0	4.1	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28157.1	29430.7	6.4	213.3	0.0	-2153.7	660.3
MEPCO	5844.6	5450.6	-6972.5	29.9	4708.1	849.4	11195.1
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0

737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-417.2	57.2
NMPC WES	525.4	747.5	-104.0	-46.2	347.0	-440.4	715.4
752	4633.2	1634.8	4.5	0.0	0.0	2921.2	72.7
NMPC CEN	1197.1	759.9	-192.3	-21.2	472.8	-168.2	1291.6
753	1214.0	599.0	0.5	0.0	0.0	462.4	152.1
NMPC MVN	187.9	222.6	-783.9	-4.1	1264.0	-78.1	2095.5
754	2286.2	1954.6	7.2	0.1	0.0	237.6	86.7
NMPC EAS	852.7	866.7	-1066.6	-17.7	283.6	414.1	939.8
755	684.8	463.2	-3.1	0.0	0.0	207.3	17.4
NYSEG WE	200.4	247.5	-148.8	-7.3	299.6	179.3	229.3
756	752.4	1284.1	3.4	2.1	0.0	-604.3	67.1
NYSEG CE	214.0	630.7	-452.8	-183.1	350.3	-189.4	758.9
757	0.0	264.1	1.2	0.5	0.0	-269.1	3.2
NYSEG EA	0.0	122.6	-71.0	-77.2	17.4	28.2	14.8
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.5
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.7	32.0
RG&E	71.4	534.8	-639.8	-87.2	264.7	136.9	391.4
760	1369.2	1213.9	0.0	0.2	0.0	73.2	82.0
CENT HUD	432.6	340.7	-421.9	-3.3	185.5	-319.0	1021.6
761	1879.0	1067.6	0.1	0.3	0.0	792.3	18.6
O&R	721.7	363.7	-2.7	-62.4	23.6	104.9	341.7
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	641.4	2017.7	-805.1	-0.8	1813.9	231.1	1012.3
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	503.0	245.3	-1.9	0.0	0.9	95.2	165.4
764	906.5	532.4	0.0	0.0	0.0	368.8	5.3
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.6
765	7959.5	11796.5	0.0	0.0	0.0	-3975.6	138.5
CON ED C	3398.5	5697.1	-2296.4	0.0	3995.8	-552.6	4546.2
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	10.4	16.7	0.0	0.0	0.0	-6.3	0.0

769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.2
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.5	15.6
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.8	33.2
CON ED N	568.9	167.3	-355.4	0.0	333.8	290.7	800.1
775	0.0	1483.2	0.0	0.0	0.0	-1519.0	35.8
CON ED C	0.0	686.3	-196.0	0.0	1494.2	-109.7	1113.6
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.6	0.0	0.0	0.0	0.0	43.1	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.8	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-344.6	31.6
NMPC GNS	18.2	113.0	-187.0	-5.2	24.9	11.1	111.2
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.5
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.8	0.4	292.1	48.0	74.6
782	0.0	0.0	0.0	0.0	0.0	-14.5	14.5
CE UPNY	0.0	0.0	0.0	0.0	466.5	155.1	311.3
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.4	59.8
	29.2	882.6	-703.7	38.2	359.8	-392.7	564.6
787	0.0	2168.8	0.0	4.3	0.0	-2194.8	21.7
	0.0	1124.8	-757.0	21.4	267.4	-558.2	436.4
788	350.2	2183.2	0.0	8.2	0.0	-1872.7	31.6
	136.1	1086.4	-940.6	53.2	70.1	-454.7	461.8
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-175.3	7.7	10.3	-33.8	68.4
790	350.6	1327.4	0.0	5.8	0.0	-1014.5	31.8
	-12.0	631.9	-640.5	27.9	65.8	-290.9	325.4

Appendix E – Loss Analysis

791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	5.3	251.6	-20.8	41.9	170.2	-228.1	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.1
	48.4	402.4	-28.7	29.1	192.1	-435.4	273.3
793	1612.7	1718.2	0.0	8.4	0.0	-152.9	39.0
	270.9	850.1	-183.5	68.5	507.6	-608.5	652.0
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.8
	22.9	363.0	-213.1	5.4	122.9	-109.1	99.7
795	28.1	3513.3	0.0	7.1	0.0	-3538.5	46.2
	0.0	1589.8	-1808.5	49.9	131.3	-828.3	1128.5
796	166.2	2162.1	0.0	4.2	0.0	-2018.6	18.5
N-RICHVW	-13.7	1026.6	-719.1	28.6	146.3	-941.2	737.7
797	0.0	3286.0	0.0	6.9	0.0	-3334.1	41.1
W-RICHVW	0.0	1613.3	-1707.5	31.1	256.1	-567.7	887.0
798	0.0	904.1	0.0	7.6	0.0	-946.6	34.9
	0.0	420.9	313.2	18.4	307.0	-900.2	454.7
799	1271.6	1490.6	0.0	6.5	0.0	-274.1	48.7
	435.5	727.4	-386.2	31.6	339.9	-496.7	899.4
800	441.0	1549.0	0.0	10.6	0.0	-1159.7	41.0
	68.8	742.7	-826.7	33.8	502.9	-77.5	699.2
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	173.5	32.5	0.0	7.8	47.3	18.6	161.9
802	949.0	426.0	0.0	6.1	0.0	489.4	27.5
	-46.3	208.4	-192.7	51.5	243.6	-225.5	355.6
803	0.0	0.0	0.0	0.0	0.0	-9.9	9.9
	0.0	0.0	0.0	0.0	349.9	286.5	63.4
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	559.4	30.4	0.0	3.6	0.0	286.5	238.8
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.0
	1242.0	124.0	0.0	23.7	6.4	638.1	462.6
806	3082.7	96.0	0.0	2.3	0.0	2977.3	7.1
	1145.9	56.0	0.0	15.9	2.9	682.8	394.1
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.9	0.0	0.0	95.9	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1422.4	200.0	0.0	10.1	0.0	656.5	555.8

Appendix E – Loss Analysis

811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1438.9	48.0	0.0	9.4	0.0	946.4	435.2
812	215.6	60.0	0.0	1.1	0.0	153.8	0.7
	231.0	30.4	0.0	4.6	0.0	170.2	25.8
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-39.3	6.0	0.0	2.1	0.0	-67.1	19.7
814	315.9	20.0	0.0	0.3	0.0	294.9	0.7
	212.6	10.0	0.0	2.7	0.0	159.7	40.2
815	0.0	0.0	0.0	0.5	0.0	-136.7	136.2
	0.0	0.0	0.0	250.6	5103.7	3256.1	1597.0
816	285.1	244.2	0.0	0.4	0.0	31.3	9.2
	101.6	112.4	0.0	4.5	67.5	-12.0	64.3
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.9	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7

837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.5	586.5	-1117.7	0.0	186.5	-290.7	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2

857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2

881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.3	0.3
	0.0	0.0	0.0	0.0	0.0	-4.3	4.3
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.5
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.4	0.0	-1.9	0.0	0.0	16.2	1.2
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.9	65.4	0.0	-1.6	5.7	-42.1	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-223.1	0.0	260.3	4.8	446.1
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	30.4	0.0	0.0	-30.4	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-80.6	3.3
	0.0	0.0	0.0	0.0	26.7	-36.1	38.7
1636	36.0	0.0	0.0	0.0	0.0	33.0	3.0
	-11.8	0.0	0.0	0.0	14.9	-18.8	21.9

```
1666              0.0      1.4      0.0      0.0      0.0     -2.3      0.9
                  0.0      0.4      0.0      0.0      3.6     -2.8      6.0

TOTALS       659262.1 642693.7    211.4    491.9      0.0      0.0  15852.6
             130358.4 191178.4-131833.3   4505.4 166289.8      0.0 232836.6
```

DRG II – SUOP Post 2013 Case

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     PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E      WED, AUG 05 2009  10:26
MTEP06 - 2011 SUMMER PEAK PHASE 3 CONTRACTUAL DISPATCH CASE         ZONE TOTALS
MTEP-2013_SUOP_FINAL(V1)_TOPOLOGY-(052307)                           IN MW/MVAR

                FROM      TO    TO BUS  TO LINE     FROM      TO
X-- ZONE --X GENERATION  LOAD    SHUNT    SHUNT CHARGING  NET INT   LOSSES

   1         13592.1   3700.4      0.0      0.0      0.0   9706.9    156.7
PJM500KV      3606.9    996.9   -708.7      0.0   3902.9   1405.5   5806.9

   2            0.0   6272.4      0.0      0.0      0.0  -6303.5     31.1
NORTHERN        0.0   1172.3   -123.0      0.0     74.5  -1133.7    158.8

   3            0.0   1604.0      0.0      0.0      0.0  -1632.8     28.7
ROCK RIV       76.8    220.7    -57.0      0.0     74.7   -190.7    178.5

   4            0.0   3087.7      0.0      0.0      0.0  -3114.5     26.8
SOUTHERN        0.0    996.2   -240.3      0.0     56.5   -815.9    116.5

   5          265.0    136.6      0.0      0.0      0.0   -190.2    289.0
345KV          59.1     50.1    100.0      0.0   3087.8  -1370.7   4355.9

   6          305.5     35.4      0.0      0.0      0.0    222.2     47.9
PEAKERS       -28.0     14.1   -279.0      0.0    264.6   -303.8    805.4

   7        17335.2    487.1      0.0      6.0      0.0  16802.2     40.0
GEN BUS      3943.1     72.4    -31.0     41.2      0.0   2307.8   1552.8

   8            0.0   1509.7      7.0      0.0      0.0  -1544.5     13.1
TR MIDPT        0.0    723.1   -687.8      0.0      0.0  -1322.5   1279.8

   9            0.0    665.0      2.6      0.0      0.0   -650.4      0.4
TR TERT         0.0    288.0  -4447.3      0.0      0.0   4159.2      8.0

  10         4053.5    108.9      0.1      0.0      0.0   3942.8      1.8
CHI-ESS       775.2     59.8    -11.9      0.0      7.9    592.7    142.6

  11         9106.0      0.0      0.0      0.0      0.0   9075.8     30.1
IPP GEN      2397.5      0.0      0.0      0.0    224.1   1845.8    775.7

  12            0.0   1745.4      0.0      0.0      0.0  -1751.8      6.4
C-N             0.0    493.2      0.0      0.0    480.6    -68.0     55.4

  14          567.5   2092.1      0.0      0.1      0.0  -1550.2     22.4
C-S            78.1    575.0   -204.4      0.0    133.7   -416.5    257.5

  15            8.0   1388.8      0.0      0.0      0.0  -1399.8     19.0
YORK 115        2.0    186.5    -36.0      0.0     72.8   -171.8     96.2
```

16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.2	0.0	0.5	21.1	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.3	38.5
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-87.0	76.1
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.9	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.4	39.0
NO-ESS	1140.6	421.9	-87.8	0.0	196.5	272.4	672.8
21	1073.7	645.0	0.0	0.0	0.0	411.9	16.7
	565.0	165.4	-98.7	0.0	43.3	386.4	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.5	4.6
	0.0	305.6	0.0	0.0	20.7	-327.9	43.0
23	765.0	6607.3	0.0	0.0	0.0	-6000.0	114.3
N-R	200.8	2128.3	-1685.1	0.0	51.0	-1054.6	882.9
24	1157.0	2326.7	0.0	0.0	0.0	-1258.7	89.1
N-S	370.3	542.9	-339.9	0.0	147.8	-726.1	1041.3
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.8	0.0	0.0	-498.0	713.6
26	2254.5	393.2	0.0	0.0	0.0	1844.8	16.5
JCSO 230	681.1	101.8	-543.2	0.0	90.5	776.7	436.3
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.3	21.1
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.6	43.1
32	13.0	183.6	-1.5	0.0	0.0	-280.3	111.2
	0.0	51.1	-637.8	0.0	372.8	-1143.4	2102.9
33	8502.5	40.5	0.0	0.0	0.0	8455.0	7.0
	1568.0	6.0	0.0	0.0	0.0	1502.3	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1057.9	8.9
NORTHEAS	18.6	134.0	-144.8	0.0	29.5	15.2	43.7
35	0.0	1539.0	-22.7	0.0	0.0	-1523.4	7.1
	0.0	706.2	-744.4	0.0	3.3	-5.6	47.1
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.2	14.7
	0.0	407.8	-369.6	0.0	0.4	-115.9	78.1

38	0.0	1923.0	-7.1	0.0	0.0	-1933.8	17.8
	0.0	594.9	-392.5	0.0	12.6	-309.7	120.0
40	196.7	681.0	0.0	0.0	0.0	-485.9	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-263.3	11.8
41	0.0	1594.2	-0.4	0.0	0.0	-1699.4	105.6
PECO	0.0	605.4	-1682.8	0.0	459.3	-254.8	1791.5
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-109.0	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.7	0.0	0.0	-260.1	92.2
44	4107.4	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	257.8	78.6	-93.8	0.0	0.0	101.7	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	508.8	0.0	0.0	0.0	0.0	261.3	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.8	0.0	0.2	-11.6	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.3	0.0	0.0	-541.8	236.1
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-112.0	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1060.2	64.7
PS NORTH	906.2	703.8	0.0	0.0	1670.3	97.4	1745.9
51	2113.7	2698.7	0.0	0.0	0.0	-545.5	33.6
PS CENTR	553.8	233.7	-887.5	0.0	115.8	537.5	842.2
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	629.6	64.4	-453.0	0.0	158.3	360.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.4	6599.6	0.0	0.0	0.0	-3139.2	116.4
BGE 115	935.1	3991.4	-4556.4	0.0	467.0	-96.6	2038.0
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-112.1	0.0	0.0	-17.4	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0

	0.0	313.1	-284.4	0.0	0.0	-46.2	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.5	6963.1	0.0	0.0	0.0	-1282.0	110.5
PEPCO	1696.4	1558.7	-971.1	0.0	1192.1	-34.8	2335.8
77	1501.9	1575.1	0.0	0.0	0.0	-1543.9	91.6
RIVER	446.6	102.4	-410.4	0.0	112.0	-301.3	1072.2
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	92.4	118.5	-32.9	0.0	10.0	-173.9	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	2.0	7.1	-5.6	0.0	0.0	0.5	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	7.3	32.4	-26.1	0.0	0.4	-4.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1387.7	88.0
DPL COMP	453.2	610.6	-1171.2	0.0	240.0	55.3	1198.6
90	521.2	85.3	148.1	0.0	0.0	319.9	19.6
	71.0	12.2	0.0	0.0	268.6	58.5	274.5
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.5	21.6
96	46.7	186.0	0.0	0.0	0.0	-142.9	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-55.7	48.6
101	11453.2	12787.3	0.1	0.3	0.0	-1552.3	217.8
CPL-E	2843.2	2805.5	-1774.5	-917.2	1403.0	671.3	3461.0
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2
CPL-W	117.9	174.1	-205.9	-16.0	62.1	83.8	143.9
110	21271.0	20975.5	11.6	3.4	0.0	-102.2	482.7
DUKE.DUK	5112.4	9083.6	-7729.5	-1202.3	1822.8	13.8	6855.5
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.2	157.3	-104.2	-15.9	38.7	1.9	24.8
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.1
113	5.7	4.0	0.0	0.0	0.0	0.2	1.5
YADKIN	-10.5	2.0	0.0	0.0	1.7	-13.0	2.2
114	427.5	0.0	0.0	0.0	0.0	426.0	1.6

Appendix E – Loss Analysis

HARTWELL	186.2	0.0	0.0	0.0	0.0	124.9	61.3
115	6114.3	5184.0	0.0	0.0	0.0	835.8	94.5
SCEG	1423.8	2219.9	-1403.5	0.0	419.7	-176.1	1203.3
120	0.0	1628.9	0.0	0.1	0.0	-1650.2	21.2
SC-SO	0.0	614.7	-392.7	-80.8	100.7	-165.3	122.3
121	3198.3	1321.2	0.1	0.0	0.0	1812.6	64.4
SC-NO	597.5	495.3	-444.8	-48.4	271.7	-127.7	994.8
122	1757.0	1818.4	0.0	-0.1	0.0	-102.3	41.0
SC-EA	468.1	515.0	-374.1	-26.8	135.1	-61.7	550.8
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.6	51.7
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3549.9	8.0	0.0	0.0	0.0	3508.3	33.6
AECI	770.6	2.6	-115.6	105.1	724.3	920.2	635.3
131	27.0	347.4	0.0	0.0	0.0	-352.6	14.3
AECI-NW	-1.8	87.1	-2.7	0.0	66.2	-70.5	46.1
132	24.0	241.7	0.0	0.0	0.0	-222.7	7.5
AECI-NE	0.0	59.8	-16.5	0.0	31.4	-28.2	17.1
133	0.0	862.4	0.1	0.0	0.0	-899.4	36.8
AECI-CNT	0.0	216.1	-25.9	0.0	92.4	-289.0	191.1
134	15.0	637.2	0.0	0.0	0.0	-692.6	32.8
AECI-KMO	-4.2	159.7	-84.1	0.0	65.7	-121.6	98.0
135	0.0	631.1	0.0	0.0	0.0	-643.8	12.7
AECI-KOK	0.0	158.2	-78.2	0.0	47.1	-95.5	62.6
136	0.0	924.8	0.1	0.0	0.0	-951.7	26.9
AECI-SMP	0.0	231.7	-81.7	52.5	101.4	-196.4	147.8
137	0.0	390.8	0.0	0.0	0.0	-411.0	20.2
AECI-M&A	0.0	98.0	-4.5	0.0	40.4	-125.4	72.2
138	2108.4	1021.0	0.0	0.0	0.0	1057.9	29.5
LAGN	322.6	328.6	0.0	0.0	143.8	-259.7	397.5
140	28541.9	30306.1	19.6	3.3	0.0	-2325.5	538.4
GA-ITS	6533.1	12635.5	-10408.5	-834.0	4549.9	-35.2	9725.2
141	16564.1	13418.4	8.2	0.3	0.0	2840.6	240.6

Appendix E – Loss Analysis

APC	3440.5	3598.5	-2162.4	-162.6	1525.2	-289.9	3976.8
142	2083.0	2655.8	2.2	0.0	0.0	-640.2	53.8
GULF	-184.2	796.7	-1532.7	-42.5	193.7	147.0	640.8
143	3073.0	2653.2	3.5	0.0	0.0	340.7	75.5
MPC	987.1	938.2	-658.7	-6.3	516.3	116.1	1114.0
144	2084.0	1111.6	2.6	0.0	0.0	939.5	30.3
SAV	564.4	427.0	-391.5	0.0	55.1	73.1	510.8
145	855.0	790.7	0.0	0.0	0.0	42.3	22.0
SMEPA	114.6	265.5	-185.9	0.0	116.9	37.5	114.4
147	0.7	0.0	0.0	0.0	0.0	0.7	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.5	2058.2	0.0	0.0	0.0	1548.0	75.6
AEC	601.8	325.8	-411.8	0.0	294.0	217.5	768.7
155	6224.7	5901.4	1.9	0.5	0.0	154.3	166.6
EES_WEST	1501.3	2235.9	-1492.1	58.4	1013.4	48.1	1664.4
156	8945.6	9770.0	0.1	2.1	0.0	-918.7	92.0
EES_SOU	2013.2	2719.3	-1208.4	-573.0	857.5	101.6	1831.2
157	5443.0	5006.3	0.0	1.0	0.0	383.7	78.6
EES-ASNO	1241.1	1873.2	-618.4	-361.7	797.9	-349.7	1506.5
158	909.8	1767.3	0.0	0.7	0.0	-903.6	45.4
EES_CNTR	192.6	477.0	-304.3	-70.9	456.6	-9.7	557.0
159	8721.2	7791.3	0.0	106.4	0.0	688.5	135.0
EES_NOR	1023.1	2331.1	-947.6	-153.6	2112.5	-242.8	2148.4
165	3026.5	5549.8	0.0	0.0	0.0	-2639.1	115.8
TVA_WEST	1137.6	1662.5	-1940.9	100.8	1169.7	1024.6	1460.3
166	17444.1	15266.6	0.1	0.0	0.0	1871.1	306.4
TVA_CENT	4012.1	5590.8	-3193.0	102.2	3313.3	-169.9	4995.3
167	11513.7	9894.8	0.0	0.0	0.0	1461.8	157.1
TVA_EAST	2751.9	3523.9	-1850.1	212.4	2173.7	777.0	2262.4
168	0.0	3539.8	0.0	0.0	0.0	-3556.9	17.1
TVA_MEMP	0.0	1035.2	-177.2	0.0	104.3	-914.1	160.3
169	108.5	0.0	0.0	0.0	0.0	108.2	0.3
TVA_IPP	37.3	0.0	0.0	0.0	80.3	105.5	12.1
181	99.5	1772.1	0.0	0.0	0.0	-1676.8	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.2	49.8
182	0.0	3191.7	0.0	0.0	0.0	-3219.3	27.6
FAIRFAX	0.0	712.2	-990.5	0.0	104.2	-194.5	576.9

183	2665.0	1076.7	0.1	0.0	0.0	1572.0	16.2
WOODBRDG	50.5	294.2	-264.2	0.0	46.1	-138.3	204.9
184	275.0	483.0	0.0	0.0	0.0	-212.5	4.5
NOR NECK	65.9	100.9	-52.5	0.0	30.1	10.5	37.1
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-0.6	568.9	-317.7	0.0	60.4	-398.1	206.8
186	1144.0	1510.4	0.0	0.0	0.0	-379.2	12.8
YORKTOWN	-27.2	378.2	-473.2	0.0	66.5	22.9	111.4
187	2514.2	1730.7	0.0	0.0	0.0	769.8	13.7
CHESTERF	180.9	500.7	-286.9	0.0	99.8	-61.3	128.2
188	1411.0	637.6	1.3	0.0	0.0	753.9	18.2
SOUTHSDE	-152.3	156.6	-235.2	0.0	47.7	-135.5	109.5
189	710.0	2837.7	0.0	0.0	0.0	-2151.8	24.1
VA BEACH	180.2	690.0	-565.9	0.0	122.4	-199.9	378.4
190	1414.0	1111.3	0.0	0.0	0.0	298.9	44.6
SUFFOLK	51.3	251.4	-485.6	0.0	201.1	129.8	363.5
191	0.0	640.2	0.3	0.0	0.0	-665.7	8.3
OUTBANKS	0.0	161.1	-247.2	0.0	64.2	88.4	61.8
192	994.0	1116.2	0.3	0.0	0.0	-154.1	31.5
CAROLINA	48.7	296.5	-336.4	0.0	133.4	-7.9	229.9
193	1020.0	1831.2	0.0	0.0	0.0	-843.2	32.0
GORDONSV	-54.7	375.5	-237.9	0.0	164.9	-343.9	316.6
194	0.0	1211.1	0.0	0.0	0.0	-1231.2	17.4
VALLEY	0.0	326.6	-353.8	0.0	85.4	-116.7	228.7
195	1704.0	708.9	0.0	0.0	0.0	941.1	39.1
LEXINGTN	237.2	198.1	-131.2	0.0	189.9	-81.8	439.3
196	9293.0	816.3	0.0	0.0	0.0	8344.2	132.5
500KV	357.6	150.6	-689.3	0.0	2660.5	886.7	2670.0
197	1055.3	171.7	0.0	0.0	0.0	861.3	22.3
	337.6	34.7	0.0	0.0	181.3	220.0	264.2
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.5	45.3
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.4
201	9051.5	11383.3	0.0	0.0	0.0	-2543.9	219.5
AP	1475.0	2884.8	-2362.5	0.0	2230.5	-641.1	3826.4
202	1857.0	362.0	0.0	0.0	0.0	1465.4	22.3
	315.1	66.1	-35.2	0.0	145.1	114.6	313.4

203	151.0	472.3	0.0	0.0	0.0	-338.6	17.3
	48.9	97.1	-142.8	0.0	236.8	234.9	96.4
204	748.0	748.9	0.0	0.0	0.0	-24.8	29.8
	109.6	149.4	-146.2	0.0	258.8	166.4	200.2
205	0.0	43.0	0.0	0.0	0.0	-64.9	15.9
	0.0	15.2	0.0	0.0	8.9	-39.5	31.0
206	2045.8	61.7	0.0	0.0	0.0	1975.1	9.1
OVEC	-269.2	6.2	0.0	0.0	559.9	186.4	98.1
207	1086.2	598.4	0.0	0.0	0.0	494.7	21.1
HE	13.4	184.9	-149.2	0.0	125.6	-55.2	167.7
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.5	1.7
209	3787.6	3668.4	0.0	0.0	0.0	-292.9	100.6
DPL	170.0	663.9	-1420.1	0.0	393.3	160.7	1113.8
210	530.0	1085.5	0.0	0.0	0.0	-627.2	27.4
SIGE	233.8	348.6	-279.2	-0.7	48.9	-106.0	302.7
211	7700.5	8208.8	0.0	0.0	0.0	-741.6	233.3
LGEE	2812.3	2800.2	-1117.4	74.3	950.1	-546.7	2552.1
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.7	39.2	-21.9	0.0	10.4	-65.3	53.5
213	171.0	77.1	0.0	0.0	0.0	109.9	0.9
	51.1	5.4	0.0	0.0	5.2	28.5	22.4
214	1453.9	1769.8	0.0	0.0	0.0	-324.5	8.6
BREC	347.6	725.6	-293.3	0.0	108.9	-36.8	61.0
215	3253.4	3139.2	0.0	0.0	0.0	90.6	22.2
DLCO	464.7	438.2	-123.9	0.0	676.2	231.4	595.1
216	3116.3	2585.5	0.0	3.6	0.0	478.1	52.9
IPL	113.6	513.3	-472.6	21.1	325.6	-498.6	875.5
217	2482.2	2844.3	0.0	0.0	0.0	-395.6	44.7
NIPS	446.9	927.1	-460.7	0.0	375.6	-168.8	527.0
218	8441.7	129.1	0.0	0.0	0.0	8177.3	135.3
METC	544.8	58.1	-248.3	0.0	1976.1	986.9	1723.9
219	1126.0	3771.3	0.0	0.0	0.0	-2788.1	146.5
ITC	12.3	1431.5	-419.0	0.0	1988.5	-1429.3	2418.2
220	2876.7	2302.3	0.0	4.1	0.0	455.0	115.3
EKPC	726.8	879.9	-932.0	10.7	230.4	50.6	947.9
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0

230	11748.6	748.4	0.0	0.0	0.0	10962.6	37.6
FE-GEN	1849.1	503.9	0.0	0.0	151.2	78.8	1417.5
231	0.0	350.9	0.0	0.0	0.0	-352.6	1.6
FE-AK-23	0.0	79.2	0.0	0.0	0.1	-103.9	24.8
232	0.0	1198.0	0.0	0.0	0.0	-1221.0	29.4
FE-AK	0.0	249.2	-371.2	0.0	301.8	71.7	353.3
233	0.0	552.8	0.0	0.0	0.0	-558.5	5.7
FE-LAKE	0.0	127.7	-146.9	0.0	46.1	-13.6	78.9
234	0.0	203.7	0.0	0.0	0.0	-210.8	7.1
FE-MASS	0.0	24.6	0.0	0.0	12.1	-42.5	30.0
235	174.5	837.2	0.0	0.0	0.0	-685.8	20.8
FE-PP	16.4	213.5	-210.4	0.0	121.0	-80.0	213.7
236	0.0	94.6	0.0	0.0	0.0	-95.8	1.3
FE-ALL	0.0	30.2	0.0	0.0	8.0	-30.7	8.5
237	0.0	401.9	0.0	0.0	0.0	-404.2	2.4
FE-WARR	0.0	128.9	-67.6	0.0	27.1	-67.8	33.6
238	4.5	1085.8	0.0	0.0	0.0	-1116.7	29.0
FE-YNG	-3.6	261.0	-60.2	0.0	245.3	-206.5	246.1
239	48.0	3287.0	-3.3	0.0	0.0	-3270.0	34.3
FE-CEI	16.0	1218.6	-1209.0	0.0	412.7	-71.6	490.7
240	0.0	241.1	0.0	0.0	0.0	-243.4	2.3
FE-CPP	0.0	49.3	-49.3	0.0	0.0	-9.2	9.3
241	1995.0	892.1	0.0	0.4	0.0	1096.2	33.5
FE-MN	175.3	161.3	-103.2	2.3	255.5	9.6	367.3
242	1091.0	758.0	0.0	0.4	0.0	304.0	27.8
FE-MR	229.9	184.3	-80.9	0.8	195.6	41.1	276.8
243	7.0	950.2	0.0	0.2	0.0	-969.1	25.2
FE-SP	-25.2	188.9	-129.4	1.2	70.2	-159.2	141.4
244	1197.2	664.8	0.0	0.1	0.0	506.5	21.5
FE-BAY	358.5	173.1	-128.6	0.8	224.3	309.1	224.6
245	2212.8	4566.6	0.0	3.6	0.0	-2444.4	90.2
FE-TE	754.4	1194.9	-457.7	7.5	605.1	-320.2	932.8
246	26.0	862.0	0.0	0.6	0.0	-874.2	8.9
	10.5	170.8	0.0	-16.6	87.5	-175.1	104.0
250	7545.5	6638.7	0.0	0.0	0.0	735.6	171.2
AEP-AP	-231.4	1829.0	-1747.6	1624.8	3663.0	-622.6	2347.9
251	10848.6	5388.7	0.0	0.0	0.0	5251.2	208.7
AEP-OP	-490.6	836.3	-1488.2	2787.1	5556.9	289.6	2641.5

252	6499.6	4801.8	0.0	0.0	0.0	1532.1	165.7
AEP-IM	-265.2	732.1	-760.6	1495.5	3487.1	-327.9	2082.7
253	2449.0	5404.9	0.0	0.0	0.0	-3094.5	101.5
AEP-CS	215.0	1277.3	-1529.6	0.0	708.4	183.1	974.6
254	265.6	1403.2	0.0	0.0	0.0	-1190.4	52.8
AEP-KP	192.0	366.0	-429.5	0.0	73.8	13.7	315.6
255	363.3	1628.6	0.0	0.0	0.0	-1278.4	13.1
AEP-OP-I	56.4	669.3	-59.4	0.0	33.0	-600.5	80.2
256	0.0	573.6	0.0	0.0	0.0	-578.6	5.0
AEP-IM-I	0.0	104.3	-35.4	0.0	40.8	-55.2	27.1
257	450.0	330.3	0.0	0.0	0.0	105.2	10.9
	76.5	92.0	-13.5	0.0	75.0	-57.6	130.5
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.0
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.1	3.9
	119.0	84.6	-36.3	0.0	3.5	34.6	39.6
261	3001.6	105.2	0.0	0.0	0.0	2895.1	1.2
ITC-GN	6.5	15.0	0.0	0.0	34.8	3.5	22.8
262	6157.3	783.0	0.0	0.0	0.0	5336.0	38.4
ITC-GS	720.6	176.9	-193.5	0.0	138.6	656.4	219.4
263	1607.7	5711.7	0.0	0.1	0.0	-4157.4	53.4
ITC-DIS	392.1	2217.9	-3065.6	125.7	422.1	1123.0	413.1
264	8.0	615.0	0.0	0.0	0.0	-634.6	35.3
	7.8	185.6	-74.9	0.0	91.5	-233.8	224.5
265	2273.4	1221.8	0.0	0.0	0.0	990.5	60.3
	338.9	275.7	-187.6	1.4	481.7	158.5	571.6
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.7	93.3	-111.6	0.0	36.7	18.9	126.1
267	481.0	522.5	0.0	0.0	0.0	-62.8	21.3
	202.1	186.5	-148.6	0.3	125.0	89.5	199.4
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	55.0	219.7	0.0	0.0	0.0	-165.9	1.2

MUNI	7.7	49.3	0.0	0.0	1.9	-52.7	13.0
271	507.0	364.3	0.0	0.0	0.0	141.2	1.5
LANSING	-114.9	146.0	-87.1	0.0	5.3	-178.2	9.7
272	81.0	601.7	0.0	0.0	0.0	-538.8	18.1
WOLVERIN	15.2	137.2	-103.0	0.0	40.7	-44.3	66.0
273	196.8	6595.4	-1.1	0.0	0.0	-6457.7	60.2
CE	-4.4	1567.4	-1176.5	0.0	79.2	-766.0	449.9
280	270.0	5413.2	0.3	5.8	0.0	-5475.8	210.0
DEI	-44.2	1065.0	-1655.5	-6.4	1159.0	-600.6	2250.8
281	0.0	270.6	0.0	0.0	0.0	-218.5	6.1
HE IN DE	0.0	91.3	0.0	0.0	56.2	-35.5	24.3
282	0.0	705.8	0.0	0.0	0.0	-681.7	2.6
DEI IND	0.0	198.1	-14.6	-0.3	14.0	-171.8	13.2
283	5223.1	360.0	0.0	0.0	0.0	4829.1	0.0
DEI GENS	1629.3	233.2	0.0	0.0	0.0	1340.5	39.6
284	0.0	3336.5	0.5	2.1	0.0	-3402.7	87.3
DEO	0.0	386.7	-629.5	-81.7	516.2	-155.3	1005.7
285	0.0	383.0	0.0	0.0	0.0	-403.7	0.9
DEO IND	0.0	71.0	0.0	0.0	0.9	-83.9	2.9
286	4147.6	0.0	0.0	0.2	0.0	4139.6	7.9
DEO GENS	444.4	0.0	0.0	1.1	0.0	121.3	322.0
287	0.0	310.4	0.1	0.0	0.0	-313.4	2.7
DEK	0.0	37.2	-141.4	0.0	3.1	90.1	16.6
288	0.0	11.8	0.0	0.0	0.0	-16.7	0.2
DEK IND	0.0	7.7	0.0	0.0	0.3	-10.8	1.0
290	88.3	105.0	0.0	0.0	0.0	48.3	0.0
	132.0	56.0	0.0	0.0	0.0	101.9	14.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	242.3	150.0	-21.2	0.0	0.0	64.3	49.2
301	0.0	0.0	0.0	0.0	0.0	-1.2	1.2
CIL345	0.0	0.0	0.0	0.0	48.2	6.8	41.5
302	0.0	242.8	0.0	0.0	0.0	-249.3	6.5
302	0.0	70.8	0.0	0.0	31.6	-103.7	64.5
303	690.0	65.0	0.0	0.0	0.0	624.8	0.2
CILGEN	283.7	40.3	0.0	0.0	0.0	237.5	5.9
304	0.0	342.1	0.0	0.0	0.0	-343.3	1.1
PEORIA	0.0	88.1	-31.2	0.0	0.3	-62.0	5.3
305	0.0	79.2	0.0	0.0	0.0	-79.7	0.4

Appendix E – Loss Analysis

PEKIN	0.0	20.6	0.0	0.0	0.0	-22.2	1.6
306	0.0	52.1	1.2	0.0	0.0	-53.3	0.1
EASTERN	0.0	9.4	0.0	0.0	0.0	-9.6	0.2
307	0.0	29.8	0.1	0.0	0.0	-30.0	0.0
WESTERN	0.0	6.6	0.0	0.0	0.0	-6.8	0.1
308	0.0	45.8	0.7	0.0	0.0	-46.5	0.0
LACON	0.0	11.1	-3.2	0.0	0.0	-8.2	0.2
309	0.0	25.3	0.0	0.0	0.0	-25.3	0.0
HOMER	0.0	7.4	0.0	0.0	0.0	-7.4	0.0
310	31.7	797.1	0.0	0.0	0.0	-814.7	20.8
REG E-IL	13.3	174.7	-61.5	0.0	113.1	-124.4	134.5
311	850.0	585.4	0.0	0.0	0.0	257.2	7.4
FRKNJEFF	385.2	134.2	0.0	0.0	173.3	301.9	122.5
312	712.0	554.1	0.0	0.0	0.0	131.3	26.6
ST FRAN	204.5	192.6	0.0	0.0	194.3	-16.0	222.2
313	618.0	852.8	0.0	0.0	0.0	-255.8	21.1
STCHMOED	156.3	138.1	0.0	0.0	248.5	37.0	229.9
314	1260.3	598.8	0.0	0.0	0.0	637.0	24.6
LKSDMP&L	525.0	75.5	58.6	0.0	509.6	577.0	323.4
315	0.0	81.3	0.0	0.0	0.0	-81.6	0.4
GREENHIL	0.0	5.7	0.0	0.0	0.0	-9.2	3.5
316	5.0	758.2	5.1	0.0	0.0	-769.3	11.0
SEMO	5.6	200.7	102.7	0.0	86.1	-312.6	100.9
317	9.0	1534.0	0.0	0.0	0.0	-1528.9	3.9
N METRO	0.0	142.1	0.0	0.0	60.2	-155.2	73.4
318	496.0	1820.8	0.0	0.0	0.0	-1332.4	7.6
S METRO	29.2	281.9	-248.3	0.0	43.3	-46.3	85.1
319	95.7	120.3	0.0	0.0	0.0	83.1	0.2
ILL-IOWA	16.1	22.8	0.0	0.0	0.0	9.4	4.3
320	701.0	2.3	0.0	0.0	0.0	700.5	0.5
MOGENINILL	22.9	0.4	0.0	0.0	0.0	-3.6	26.5
321	0.0	443.5	0.0	0.0	0.0	-449.3	5.8
SOUTHERN	0.0	110.4	0.0	-0.3	94.2	-70.2	54.2
322	52.0	585.0	0.0	0.0	0.0	-572.2	9.3
357	0.0	125.1	0.0	0.0	105.8	-92.4	77.1
323	415.9	1297.1	0.0	0.0	0.0	-910.0	28.8
EASTERN	1.4	276.4	-37.8	0.0	338.8	-253.9	355.5
329	2392.9	207.4	0.0	0.0	0.0	2182.5	2.9

Appendix E – Loss Analysis

GEN&LOAD	333.7	91.7	0.0	0.0	0.0	95.0	147.1
331	0.0	0.0	0.0	0.0	0.0	-41.9	0.4
CHICAGO	0.0	0.0	0.0	0.0	2.3	-9.2	1.9
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.0	0.0	5.9	16.1	1.0
342	0.0	14.8	0.0	0.0	0.0	-15.6	0.8
C-N	0.0	3.6	0.0	0.0	3.8	-5.0	5.2
344	0.0	39.8	0.0	0.0	0.0	-40.4	0.6
NO-ESS	0.0	13.6	-15.0	0.0	8.9	8.0	2.3
345	0.0	109.0	0.0	0.0	0.0	-112.3	3.3
N-R	0.0	30.1	0.0	0.0	12.0	-38.5	20.5
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.5	0.2
RR-ESS	0.0	2.8	0.0	0.0	5.5	1.9	0.8
348	0.0	162.3	0.0	0.0	0.0	-165.7	3.3
R-S	0.0	55.9	-15.0	0.0	20.4	-37.9	17.4
349	489.5	24.3	0.0	0.0	0.0	457.9	7.3
SO-ESS	77.4	6.5	88.6	60.7	211.7	-8.1	141.3
351	0.0	51.6	0.0	0.0	0.0	-52.0	0.5
EEC	0.0	18.4	-16.3	-5.8	7.6	9.0	2.2
352	0.0	90.9	0.0	0.0	0.0	-94.0	3.0
SEIEC	0.0	44.8	-24.6	-8.2	22.5	-5.9	16.4
353	0.0	24.8	0.0	0.0	0.0	-24.8	0.0
SIEC	0.0	9.4	-16.3	-0.6	0.0	7.5	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	4357.9	3291.3	0.0	0.0	0.0	987.1	79.5
357	637.9	707.1	-559.0	0.0	606.3	32.9	1063.2
360	408.1	343.0	0.0	0.0	0.0	63.3	1.9
360	0.0	103.3	-119.4	0.0	8.4	1.6	23.0
361	3007.6	1750.1	0.0	2.0	0.0	1207.0	47.2
SIPC	682.7	414.8	-127.9	11.4	131.6	-115.2	623.9
362	1102.2	635.3	0.0	0.1	0.0	428.7	20.5
EEI	433.6	126.2	-27.1	0.7	160.7	203.2	287.4
363	551.0	703.5	0.0	0.6	0.0	-134.4	9.8
PJM500KV	43.0	115.3	-115.4	2.4	146.3	46.9	139.6

364	1388.7	575.7	0.0	0.8	0.0	781.1	30.2
SEAST	345.5	94.2	-88.8	6.7	206.5	163.6	371.9
365	1555.4	2285.6	0.0	1.8	0.0	-783.8	50.3
	158.5	404.8	-242.8	7.0	352.6	-237.6	570.2
366	1990.2	1937.9	0.0	0.3	0.0	-7.8	59.8
WPS	37.2	493.0	-807.2	0.9	502.3	157.3	695.5
367	61.1	586.1	0.0	0.9	0.0	-547.6	11.2
MGE	-1.4	182.4	-184.2	1.5	99.1	-55.7	150.7
368	18.0	98.6	0.0	0.0	0.0	-84.1	3.5
UPPC	-2.9	41.4	-46.8	0.0	33.8	23.4	12.9
371	2438.6	2513.0	0.0	0.5	0.0	-320.4	89.2
WPL	380.8	690.2	-928.3	0.4	497.7	170.8	883.9
372	0.0	258.7	0.0	0.0	0.0	-14.9	0.2
WPL-WPPI	0.0	94.0	-8.5	0.0	2.8	5.9	1.4
375	31.3	100.3	0.0	0.0	0.0	-70.8	1.8
ED SAULT	5.5	43.4	-10.4	0.0	56.2	19.3	9.4
376	5236.2	3890.5	0.0	1.5	0.0	1275.4	68.8
WE-MKR	1565.6	1260.8	-686.3	4.4	633.8	193.3	1427.1
377	0.0	679.1	0.0	0.0	0.0	-699.8	16.2
WE-FV	0.0	190.5	-100.8	0.0	185.2	-39.0	133.6
378	35.1	148.0	0.0	0.0	0.0	-115.4	2.5
WE-IR	11.9	54.4	-15.1	0.0	46.0	-1.1	19.7
379	556.7	338.4	0.0	0.0	0.0	206.3	12.0
WE-PI	6.6	51.3	-41.2	0.0	97.1	-23.6	117.3
380	69.7	704.6	0.0	0.0	0.0	-715.3	7.6
WE-WPPI	-16.1	138.5	-127.0	0.0	13.5	-113.4	74.7
381	0.0	16.2	0.0	0.0	0.0	-16.3	0.1
WRWL-WPS	0.0	6.5	0.0	0.0	0.1	-6.6	0.1
382	38.2	279.6	0.0	0.0	0.0	-244.9	3.5
CWP-WPS	22.2	127.3	0.0	0.0	0.0	-135.4	30.3
383	0.0	54.9	0.0	0.0	0.0	-55.1	0.2
MEWD-WPS	0.0	11.9	-26.3	0.0	2.3	15.5	1.2
384	26.1	84.2	0.0	0.0	0.0	-58.6	0.5
MPU-WPS	0.3	16.1	-10.1	0.0	0.4	-8.8	3.5
385	0.0	61.6	0.0	0.0	0.0	-61.7	0.1
WPPI-WPS	0.0	19.6	-34.9	0.0	0.9	16.0	0.2
386	17.1	23.4	0.0	0.0	0.0	-6.3	0.0
ESCANABA	0.2	2.1	0.0	0.0	0.3	-1.7	0.0

390	382.9	551.8	0.0	0.0	0.0	-222.5	21.5
	60.1	204.1	-263.4	0.0	133.9	92.2	142.3
391	1780.7	180.1	0.0	0.0	0.0	448.6	34.4
ALTW_391	517.3	67.4	-425.4	0.0	315.1	338.7	439.2
392	2.7	22.3	0.0	0.0	0.0	-934.4	14.7
ALTW_392	3.5	5.9	-41.0	0.0	51.0	-230.6	37.7
393	1247.4	74.8	0.0	0.0	0.0	1110.1	25.8
ALTW_393	-142.4	6.6	64.0	0.0	184.6	-330.1	283.5
394	579.6	2763.8	0.0	0.0	0.0	-323.3	25.0
ALTW_394	-205.5	864.8	-109.5	-59.0	60.8	-268.1	88.5
395	0.0	53.0	0.0	0.0	0.0	-21.3	0.4
	0.0	17.4	-16.6	0.0	0.5	16.2	2.3
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-318.4	35.9
	467.5	652.1	-286.8	0.0	125.3	-122.8	349.6
401	20561.6	23603.4	0.0	0.0	0.0	-3659.3	621.1
FPLSOUTH	4430.4	6865.8	-6919.9	0.0	4250.8	111.3	8624.1
402	9883.3	11593.8	0.0	0.0	0.0	-1993.6	283.0
FPC GENS	2928.6	4004.9	-3213.5	0.0	1149.4	45.2	3241.4
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.8
404	521.4	512.3	0.0	0.0	0.0	3.4	5.7
	123.4	102.5	-24.8	0.0	12.4	-15.8	74.0
405	272.2	512.4	0.0	0.0	0.0	-241.6	1.4
HST	92.1	152.0	0.0	0.0	14.3	-65.7	20.1
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1068.3	1247.3	-493.6	0.0	229.1	-209.1	752.8
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.3	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3672.5	90.0	0.0	0.0	0.0	3555.3	27.1
NSB	1030.0	8.9	0.0	0.0	302.9	687.3	636.6
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	299.3	311.4	-51.7	0.0	253.5	-174.5	467.6

412	2239.6	1110.2	0.0	0.0	0.0	1079.3	50.1
SECI	484.8	276.2	-50.5	0.0	180.7	-331.8	771.7
413	866.9	1311.7	0.0	0.0	0.0	-459.1	14.3
MP-GEN	140.9	231.7	-123.1	0.0	30.0	-103.5	165.8
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.2	0.0	32.6	-364.1	155.7
415	629.3	669.5	0.0	0.0	0.0	-88.8	16.2
	161.6	209.0	-130.9	0.0	48.1	-10.6	131.4
416	4916.2	4567.2	0.0	0.0	0.0	227.2	121.7
GENERATN	1574.4	397.3	-825.4	0.0	234.2	278.2	1958.6
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.5
	84.7	36.4	-10.6	0.0	1.8	31.3	29.3
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	124.9	67.0	0.0	0.0	16.1	49.3	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	236.1	0.0	0.0	0.0	0.0	195.5	40.6
428	100.1	0.0	0.0	0.0	0.0	100.0	0.1
PLANTCTY	17.7	0.0	0.0	0.0	0.0	13.0	4.7
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-112.3	9.1
	17.7	58.2	-24.3	0.0	19.0	-45.1	54.8
442	309.5	102.7	0.0	0.0	0.0	201.8	5.1
	26.0	11.4	0.0	0.0	10.3	-10.9	35.9
443	0.0	93.7	0.0	0.0	0.0	-97.9	3.4
	0.0	15.7	-43.5	0.0	8.4	22.0	10.1
444	575.0	244.5	0.0	0.0	0.0	318.8	9.4
	101.3	59.4	-35.0	0.0	10.5	-21.3	112.5
445	190.0	144.7	0.0	0.0	0.0	44.0	5.9
	30.6	29.1	-18.1	0.0	14.2	-19.6	49.7
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2

	0.0	34.0	-22.6	0.0	10.6	-14.0	13.5
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.5	7.4
449	16.0	138.5	0.0	0.0	0.0	-130.1	0.9
	2.8	16.0	0.0	0.0	7.8	-12.8	4.7
450	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	3.0	-3.7	6.7
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.9	1.1
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.2	11.4
	373.9	204.4	-25.7	0.0	47.2	86.7	155.6
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.3	3.4
WERE	10.2	57.1	-3.5	0.0	2.2	-33.1	5.8
600	5135.9	384.5	0.0	0.0	0.0	4734.0	18.4
608	470.9	228.4	0.0	0.0	155.0	-129.8	538.0
601	1783.0	5359.0	0.0	0.0	0.0	-3994.8	202.4
XEL_MN	35.1	731.2	-2101.8	592.8	2278.3	870.5	2162.5
602	1.5	273.7	0.0	0.0	0.0	-310.4	5.3
XEL_ND	-0.4	54.7	-42.9	0.2	28.4	-18.6	31.5
603	0.0	345.3	0.0	0.0	0.0	-384.2	10.0
XEL_SD	0.0	67.9	-114.5	0.0	22.6	-0.2	60.9
604	164.7	1052.9	0.0	0.0	0.0	-915.7	51.7

XEL_WI	15.7	212.0	-574.5	0.0	251.1	227.7	406.4
605	118.7	493.3	0.0	0.0	0.0	-297.4	3.8
NON-XEL	-33.7	98.7	-70.2	0.0	9.4	-49.3	9.9
608	766.7	336.6	0.0	0.2	0.0	271.5	61.0
MP_608	-40.0	114.3	-866.7	0.9	245.8	-5.1	932.4
609	-99.2	1010.8	0.0	0.0	0.0	-1029.1	3.4
MP-INDUS	102.3	367.3	-62.6	0.0	6.7	-222.7	54.1
610	1179.6	81.9	0.0	0.0	0.0	1093.3	1.8
MP-SSL	95.2	44.2	-5.3	0.0	0.3	-34.8	89.5
611	0.0	6.7	0.0	0.0	0.0	-6.7	0.0
	0.0	3.1	0.0	0.0	0.0	-3.6	0.5
613	0.0	194.4	0.0	0.0	0.0	-0.4	0.4
SMPA_613	0.0	48.6	-25.7	0.0	1.2	23.6	3.2
614	6.6	35.8	0.0	0.1	0.0	-38.3	0.2
SMPA_614	7.0	8.9	0.0	0.4	0.6	-6.1	1.5
615	5.9	46.7	0.0	0.0	0.0	-336.1	4.9
SMPA_615	3.9	10.7	-31.7	0.0	31.8	-97.6	45.2
616	136.4	409.2	0.0	0.0	0.0	-2.3	12.3
SMPA_616	-19.5	138.5	-225.1	0.3	91.5	145.1	119.9
617	32.5	59.0	0.0	0.0	0.0	-31.0	0.2
SMPA_617	8.2	14.7	0.0	0.0	3.6	-8.0	3.0
618	0.0	97.9	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	2.4	0.0	0.0	0.0	0.0	0.0
619	44.4	1054.1	0.0	0.3	0.0	-1046.1	26.5
GRE-GRE	-16.0	186.8	-654.1	0.7	144.2	450.1	141.0
620	0.0	172.0	0.0	0.2	0.0	-166.7	4.4
GRE-MP	0.0	26.2	-34.2	0.5	62.3	50.1	20.6
621	50.0	131.9	0.0	0.1	0.0	-81.3	6.9
GRE-OTP	-17.4	22.8	-6.5	0.2	26.1	-35.1	28.2
622	156.8	781.5	0.0	0.2	0.0	-650.7	45.1
GRE-NSP	-65.4	101.2	-9.9	0.7	122.9	-220.2	188.9
623	248.3	97.1	0.0	0.0	0.0	150.4	6.8
GRE-ALT	-102.8	12.6	0.0	0.0	11.8	-114.7	12.3
624	1434.8	0.0	0.0	0.7	0.0	1289.1	55.3
GRE-ND	262.8	0.0	-564.3	4.2	58.2	-641.6	1520.5
625	790.0	4.1	0.0	0.6	0.0	786.8	2.3
GRE-S	-101.8	0.0	0.0	0.7	6.9	-163.1	67.2
626	186.5	163.5	0.0	0.1	0.0	-41.5	19.3

Appendix E – Loss Analysis

OTP_626	-10.5	52.5	-87.6	0.0	112.0	29.7	95.5
627	18.9	162.3	0.0	0.1	0.0	-205.5	25.4
OTP_627	-1.0	36.0	44.0	28.3	325.1	-40.3	247.1
628	515.0	43.2	0.0	0.0	0.0	459.4	12.2
OTP_628	10.9	16.6	0.0	0.0	27.6	-65.4	87.1
630	11.5	199.2	0.0	0.2	0.0	-228.7	2.1
	-3.0	37.1	-29.7	0.1	9.8	-21.1	9.2
631	10.0	294.0	0.0	0.0	0.0	-480.7	2.3
RPU_631	6.6	73.7	0.0	0.2	14.5	-124.0	22.7
633	164.3	200.5	0.0	0.0	0.0	-37.1	0.9
MPW_633	85.3	48.1	0.0	0.0	9.1	26.2	20.1
635	49.0	156.2	0.0	0.0	0.0	-318.3	4.8
MEC_635	27.5	17.5	-61.5	0.0	32.1	30.1	32.0
636	3319.2	1660.2	0.0	0.0	0.0	1876.8	40.0
MEC_636	725.6	466.5	-148.4	0.0	218.9	118.6	559.7
637	864.8	2122.7	0.0	0.0	0.0	-1271.8	49.9
MEC_637	42.8	318.1	-322.7	0.0	706.9	189.1	573.6
638	1023.1	1434.6	0.0	0.0	0.0	-502.6	23.8
MEC_638	271.8	369.4	-157.4	0.0	263.8	14.9	287.3
639	246.6	380.9	0.0	0.0	0.0	-143.2	0.9
MEC_639	48.8	55.7	0.0	0.0	6.7	-4.5	2.7
640	2616.2	2470.5	0.0	0.0	0.0	-138.3	105.4
NPPD_640	234.9	797.5	-656.8	26.0	1079.7	26.8	1077.0
641	132.0	218.1	0.0	0.0	0.0	13.7	0.8
HAST_641	35.9	72.0	0.0	0.0	3.3	-12.5	10.9
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.8
GRIS_642	19.7	11.3	0.0	0.0	2.6	-11.8	22.8
645	2477.1	2370.6	0.0	0.0	0.0	34.9	28.7
OPPD_645	423.9	414.8	-137.7	14.9	380.9	-28.3	515.3
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.5
OPPD_FRE	40.7	35.1	0.0	0.0	1.0	-12.2	11.5
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	-81.5	600.0	0.0	0.0	0.0	-688.5	7.0

Appendix E – Loss Analysis

LES_650	17.0	103.8	-218.8	0.0	89.1	105.1	116.0
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	8.3	0.0	-120.2	0.0	1.5	33.1	96.9
652	203.7	148.5	0.0	0.0	0.0	-14.2	6.5
WAPA_652	-0.6	31.9	-129.8	0.0	115.1	12.5	180.2
653	93.9	97.5	0.0	0.0	0.0	-191.9	17.9
WAPA_653	-63.0	22.8	-7.9	-0.3	169.9	-58.0	107.3
654	1327.8	370.2	0.0	0.0	0.0	211.4	111.4
WAPA_654	279.9	61.7	-281.2	154.8	1035.3	246.8	1018.3
655	554.1	30.5	0.0	0.0	0.0	418.5	32.6
WAPA_655	-52.4	5.6	11.1	0.0	288.8	-46.1	256.7
656	0.0	415.1	0.0	0.0	0.0	-54.4	3.6
WAPA_656	0.0	117.9	-30.7	0.0	86.3	46.4	48.1
657	751.0	109.4	0.0	0.1	0.0	607.6	30.4
MPC-657	175.5	34.0	-97.6	0.0	186.9	130.6	291.1
659	75.1	1293.6	0.0	0.0	0.0	-453.3	61.1
BEPC_659	-28.1	243.9	-3.6	553.7	1201.1	-266.9	756.7
660	2282.3	202.5	0.0	0.0	0.0	2075.7	4.0
ZONE_660	345.5	126.2	0.0	0.0	0.7	10.2	209.8
661	698.3	320.7	0.0	0.0	0.0	274.7	23.7
MDU_661	100.8	92.3	30.2	3.4	256.4	24.5	215.8
663	75.7	320.0	0.0	0.0	0.0	-230.1	9.7
NWPS_663	11.6	70.2	-20.8	0.0	23.4	-52.6	40.1
665	122.9	409.4	0.0	0.0	0.0	-101.8	1.0
MRES_665	-10.3	129.3	0.0	0.0	4.0	-65.1	15.6
666	0.0	15.8	0.0	0.0	0.0	0.0	0.0
	0.0	3.5	0.0	0.0	0.0	0.0	0.0
667	0.0	556.0	0.0	0.0	0.0	-573.1	8.1
MHSUBWPG	0.0	123.5	-139.0	0.0	152.9	74.4	94.6
668	958.0	779.2	0.0	0.0	0.0	8.9	174.8
MHRURALS	815.2	162.6	-1395.8	268.4	806.1	-1204.6	3784.9
669	126.6	321.3	0.0	0.0	0.0	-212.1	17.4
MHWPGHYD	11.7	126.5	-51.9	0.0	32.6	-120.3	90.0
670	3447.8	51.0	0.0	0.0	0.0	3366.9	29.9
MHRURALN	1115.8	9.6	-799.3	150.8	353.6	1629.9	478.4
671	0.0	683.9	0.0	0.0	0.0	-683.4	3.6
MH INDUS	0.0	124.3	0.0	0.0	11.0	-124.9	16.8

672	0.0	2182.1	0.0	0.0	0.0	-2391.8	88.5
SPC	95.8	523.4	-329.5	86.0	995.3	121.0	643.4
674	0.0	641.5	0.0	0.0	0.0	-533.2	12.9
SPC-IND	0.0	127.0	5.5	0.0	122.7	-30.4	67.4
675	2648.9	138.0	0.0	0.0	0.0	2510.9	0.0
SPC-SSL	68.0	33.7	-52.2	0.0	0.0	-145.5	232.0
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	84.2	20.3	0.0	0.0	0.0	26.5	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	61.7	543.2	0.0	0.0	0.0	-503.3	21.6
DPC_680	7.0	141.8	-55.9	-6.1	89.0	-42.4	59.0
681	642.0	29.3	0.0	0.0	0.0	587.9	30.6
DPC_681	-90.2	9.2	-58.5	0.3	238.6	-107.6	306.5
682	0.0	33.9	0.0	0.0	0.0	-34.7	0.1
DPC_682	0.0	13.6	0.0	0.0	0.2	-13.6	0.1
683	0.0	4.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.9	0.0	0.0	0.0	0.0	0.0
684	0.0	10.2	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
685	0.0	13.2	0.0	0.0	0.0	0.0	0.0
	0.0	4.1	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28157.1	29430.7	6.4	213.3	0.0	-2153.7	660.4
MEPCO	5845.0	5450.6	-6972.4	29.9	4708.0	849.5	11195.4
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0

732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-417.3	57.3
NMPC WES	525.6	747.5	-104.0	-46.2	347.0	-441.1	716.3
752	4633.2	1634.8	4.5	0.0	0.0	2921.2	72.7
NMPC CEN	1197.5	759.9	-192.3	-21.2	472.8	-168.2	1292.0
753	1214.0	599.0	0.5	0.0	0.0	462.2	152.3
NMPC MVN	188.7	222.6	-785.4	-4.1	1264.0	-78.3	2098.0
754	2286.2	1954.6	7.2	0.1	0.0	237.5	86.8
NMPC EAS	853.8	866.7	-1066.6	-17.7	283.6	414.7	940.3
755	684.8	463.2	-3.1	0.0	0.0	207.3	17.4
NYSEG WE	200.6	247.5	-148.8	-7.3	299.6	179.2	229.5
756	752.4	1284.1	3.4	2.1	0.0	-604.3	67.1
NYSEG CE	214.1	630.7	-452.7	-183.1	350.3	-189.7	759.2
757	0.0	264.1	1.2	0.5	0.0	-269.1	3.2
NYSEG EA	0.0	122.6	-71.0	-77.2	17.4	28.2	14.8
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.5
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.7	32.0
RG&E	71.5	534.8	-639.8	-87.2	264.7	136.8	391.6
760	1369.2	1213.9	0.0	0.2	0.0	73.2	82.1
CENT HUD	433.4	340.7	-421.8	-3.3	185.5	-318.9	1022.3
761	1879.0	1067.6	0.1	0.3	0.0	792.2	18.6
O&R	721.8	363.7	-2.7	-62.4	23.6	105.0	341.8

762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	641.5	2017.7	-805.1	-0.8	1813.8	231.2	1012.3
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	502.3	245.3	-1.9	0.0	0.9	94.5	165.4
764	906.5	532.4	0.0	0.0	0.0	368.8	5.3
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.6
765	7959.5	11796.5	0.0	0.0	0.0	-3975.6	138.5
CON ED C	3398.6	5697.1	-2296.4	0.0	3995.8	-552.3	4546.0
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	10.4	16.7	0.0	0.0	0.0	-6.3	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.2
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.5	15.6
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.8	33.2
CON ED N	568.9	167.3	-355.4	0.0	333.8	290.5	800.3
775	0.0	1483.2	0.0	0.0	0.0	-1519.0	35.8
CON ED C	0.0	686.3	-196.0	0.0	1494.1	-110.0	1113.9
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.6	0.0	0.0	0.0	0.0	43.1	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.8	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-344.6	31.7
NMPC GNS	18.2	113.0	-187.0	-5.2	24.9	11.0	111.4
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.5
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.8	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.5	14.5
CE UPNY	0.0	0.0	0.0	0.0	466.4	154.9	311.5
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0

Appendix E – Loss Analysis

CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.4	59.8
	28.9	882.6	-704.0	38.2	359.4	-393.4	564.8
787	0.0	2168.8	0.0	4.3	0.0	-2194.8	21.7
	0.0	1124.8	-757.9	21.4	267.7	-556.4	435.9
788	350.2	2183.2	0.0	8.2	0.0	-1872.7	31.6
	135.9	1086.4	-941.3	53.3	70.1	-453.7	461.4
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-175.6	7.7	10.3	-33.4	68.3
790	350.6	1327.4	0.0	5.8	0.0	-1014.5	31.8
	-12.1	631.9	-640.8	27.9	65.9	-290.6	325.2
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	5.8	251.6	-20.6	41.8	170.1	-227.1	130.0
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.1
	48.9	402.4	-28.6	29.1	192.1	-434.9	273.2
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	270.2	850.1	-183.7	68.5	507.8	-608.3	651.4
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.8
	22.8	363.0	-213.3	5.4	123.0	-108.9	99.6
795	28.1	3513.3	0.0	7.1	0.0	-3538.4	46.1
	0.0	1589.8	-1810.3	49.9	131.4	-825.4	1127.5
796	166.2	2162.1	0.0	4.2	0.0	-2018.6	18.5
N-RICHVW	-15.0	1026.6	-719.8	28.6	146.4	-941.2	737.2
797	0.0	3286.0	0.0	6.9	0.0	-3334.0	41.0
W-RICHVW	0.0	1613.3	-1709.5	31.1	256.4	-564.2	885.7
798	0.0	904.1	0.0	7.6	0.0	-946.6	34.9
	0.0	420.9	313.2	18.4	307.3	-899.6	454.4
799	1271.6	1490.6	0.0	6.5	0.0	-274.1	48.7
	434.5	727.4	-386.6	31.6	340.1	-496.9	899.2
800	441.0	1549.0	0.0	10.6	0.0	-1159.7	41.1
	68.5	742.7	-827.0	33.8	503.1	-78.0	700.0
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	169.8	32.5	0.0	7.9	47.4	15.2	161.6
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-33.9	208.4	-190.5	51.4	241.8	-218.3	356.9
803	0.0	0.0	0.0	0.0	0.0	-10.0	10.0
	0.0	0.0	0.0	0.0	349.5	285.6	63.9
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8

Appendix E – Loss Analysis

	556.9	30.4	0.0	3.6	0.0	284.2	238.7
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.0
	1234.9	124.0	0.0	23.7	6.4	631.5	462.1
806	3082.7	96.0	0.0	2.3	0.0	2977.3	7.1
	1139.1	56.0	0.0	15.9	2.9	676.5	393.5
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-96.0	0.0	0.0	96.0	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1417.1	200.0	0.0	10.1	0.0	651.6	555.5
811	3539.6	90.3	0.0	1.8	0.0	3438.2	9.3
	1435.1	48.0	0.0	9.4	0.0	942.9	434.9
812	215.6	60.0	0.0	1.1	0.0	153.8	0.7
	230.7	30.4	0.0	4.6	0.0	170.0	25.7
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-39.4	6.0	0.0	2.1	0.0	-67.1	19.7
814	315.9	20.0	0.0	0.3	0.0	294.9	0.8
	213.1	10.0	0.0	2.7	0.0	160.2	40.2
815	0.0	0.0	0.0	0.5	0.0	-136.5	136.0
	0.0	0.0	0.0	252.3	5111.0	3264.0	1594.7
816	285.1	244.2	0.0	0.4	0.0	31.3	9.3
	104.9	112.4	0.0	4.5	67.3	-9.3	64.6
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.6	-1.6	0.0	1.0	7.6	0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8

OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.5	586.5	-1117.7	0.0	186.5	-290.7	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1

ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6

875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	0.0	-7.3	7.3
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.5
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14.6	0.0	-1.9	0.0	0.0	15.4	1.1
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.9	65.4	0.0	-1.6	5.7	-42.1	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2

999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-223.0	0.0	260.3	4.5	446.4
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	30.5	0.0	0.0	-30.5	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-80.4	3.1
	0.0	0.0	0.0	0.0	26.9	-33.7	36.5
1636	36.0	0.0	0.0	0.0	0.0	33.1	2.9
	-11.8	0.0	0.0	0.0	15.1	-17.7	21.0
1666	0.0	1.4	0.0	0.0	0.0	-2.2	0.8
	0.0	0.4	0.0	0.0	3.6	-2.1	5.3
TOTALS	659189.9	642693.6	211.3	492.1	0.0	0.0	15780.3
	129500.2	191178.3	-131864.5	4511.6	166671.2	0.0	232384.8

DRG II – SUOP Base Case + 600 MW

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:30
MTEP06 - 2011 SUMMER PEAK PHASE 3 CONTRACTUAL DISPATCH CASE ZONE TOTALS
MTEP-2013_SUOP_FINAL(V1)_TOPOLOGY-(052307) IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13592.1	3700.4	0.0	0.0	0.0	9707.1	156.5
PJM500KV	3602.9	996.9	-708.8	0.0	3903.0	1408.4	5800.2
2	0.0	6272.4	0.0	0.0	0.0	-6303.5	31.0
NORTHERN	0.0	1172.3	-122.9	0.0	74.4	-1133.8	158.7
3	0.0	1604.0	0.0	0.0	0.0	-1634.5	30.5
ROCK RIV	76.8	220.7	-56.8	0.0	74.5	-201.9	189.4
4	0.0	3087.7	0.0	0.0	0.0	-3114.4	26.7
SOUTHERN	0.0	996.2	-240.2	0.0	56.5	-815.7	116.2
5	265.0	136.6	0.0	0.0	0.0	-198.1	296.9
345KV	58.5	50.1	99.9	0.0	3086.0	-1498.3	4481.3
6	305.5	35.4	0.0	0.0	0.0	222.3	47.8
PEAKERS	-28.0	14.1	-279.1	0.0	264.6	-303.0	804.6
7	17335.2	487.1	0.0	6.0	0.0	16802.1	40.0
GEN BUS	4085.3	72.4	-31.0	41.2	0.0	2447.0	1555.6
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.1

TR MIDPT	0.0	723.1	-687.7	0.0	0.0	-1322.5	1279.8
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4444.1	0.0	0.0	4156.0	8.0
10	4053.5	108.9	0.1	0.0	0.0	3942.8	1.8
CHI-ESS	774.1	59.8	-11.9	0.0	7.9	591.5	142.6
11	9106.0	0.0	0.0	0.0	0.0	9075.5	30.4
IPP GEN	2481.8	0.0	0.0	0.0	224.0	1923.6	782.2
12	0.0	1745.4	0.0	0.0	0.0	-1751.8	6.4
C-N	0.0	493.2	0.0	0.0	480.2	-68.5	55.5
14	567.5	2092.1	0.0	0.1	0.0	-1550.2	22.5
C-S	78.1	575.0	-204.2	0.0	133.7	-416.8	257.5
15	64.0	1388.8	0.0	0.0	0.0	-1349.1	24.3
YORK 115	-15.2	186.5	-37.3	0.0	72.5	-201.7	109.8
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.2	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.3	38.5
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-87.0	76.1
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.9	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.5	38.9
NO-ESS	1139.4	421.9	-87.8	0.0	196.5	271.6	672.5
21	1073.7	645.0	0.0	0.0	0.0	411.9	16.7
	564.9	165.4	-98.7	0.0	43.3	386.3	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.5	4.6
	0.0	305.6	0.0	0.0	20.7	-328.1	43.2
23	765.0	6607.3	0.0	0.0	0.0	-6000.0	114.4
N-R	200.8	2128.3	-1684.6	0.0	51.0	-1056.0	883.8
24	1157.0	2326.7	0.0	0.0	0.0	-1259.0	89.3
N-S	370.3	542.9	-339.9	0.0	147.8	-727.7	1042.8
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.8	0.0	0.0	-498.0	713.6
26	2254.5	393.2	0.0	0.0	0.0	1844.8	16.5
JCSO 230	681.1	101.8	-543.2	0.0	90.5	776.7	436.3
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.3	21.1
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0

RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.7	43.1
32	13.0	183.6	-1.5	0.0	0.0	-280.2	111.1
	0.0	51.1	-637.8	0.0	372.8	-1142.6	2102.2
33	8502.5	40.5	0.0	0.0	0.0	8455.0	7.0
	1565.5	6.0	0.0	0.0	0.0	1499.9	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.0	9.1
NORTHEAS	18.6	134.0	-144.8	0.0	29.4	14.6	44.3
35	0.0	1539.0	-22.7	0.0	0.0	-1523.4	7.1
	0.0	706.2	-744.4	0.0	3.3	-5.5	47.1
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.2	14.7
	0.0	407.8	-369.6	0.0	0.4	-115.9	78.1
38	0.0	1923.0	-7.1	0.0	0.0	-1933.8	17.8
	0.0	594.9	-392.5	0.0	12.6	-309.7	119.9
40	196.7	681.0	0.0	0.0	0.0	-485.9	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-263.4	11.9
41	0.0	1594.2	-0.4	0.0	0.0	-1699.4	105.6
PECO	0.0	605.4	-1682.8	0.0	459.3	-254.9	1791.6
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-109.0	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.7	0.0	0.0	-260.0	92.2
44	4107.4	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	257.3	78.6	-93.8	0.0	0.0	101.2	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	508.7	0.0	0.0	0.0	0.0	261.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.8	0.0	0.2	-11.6	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.4	0.0	0.0	-541.8	236.1
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-112.0	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1061.1	65.7
PS NORTH	906.1	703.8	0.0	0.0	1670.3	84.9	1758.3

51	2113.7	2698.7	0.0	0.0	0.0	-545.5	33.6
PS CENTR	553.9	233.7	-887.5	0.0	115.8	537.5	842.4
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	629.6	64.4	-453.0	0.0	158.3	360.0	789.5
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.4	6599.6	0.0	0.0	0.0	-3139.1	116.2
BGE 115	934.5	3991.4	-4555.7	0.0	467.1	-96.9	2037.0
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-112.1	0.0	0.0	-17.4	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-284.3	0.0	0.0	-46.2	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.5	6963.1	0.0	0.0	0.0	-1282.1	110.5
PEPCO	1696.2	1558.7	-971.2	0.0	1192.2	-35.6	2336.5
77	1501.9	1575.1	0.0	0.0	0.0	-1543.9	91.6
RIVER	446.6	102.4	-410.4	0.0	112.0	-301.3	1072.3
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	92.4	118.5	-32.9	0.0	10.0	-173.9	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	2.0	7.1	-5.6	0.0	0.0	0.5	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	7.3	32.4	-26.1	0.0	0.4	-4.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1387.7	88.0
DPL COMP	453.2	610.6	-1171.2	0.0	240.0	55.2	1198.6
90	521.2	85.3	147.9	0.0	0.0	320.1	19.7
	82.5	12.2	0.0	0.0	269.0	69.4	275.4
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.5	21.6
96	46.7	186.0	0.0	0.0	0.0	-142.9	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-55.8	48.6

Appendix E – Loss Analysis

101	11453.2	12787.3	0.1	0.3	0.0	-1553.1	218.6
CPL-E	2849.5	2805.5	-1774.3	-917.1	1402.9	670.2	3468.1
106	811.6	846.3	0.0	0.0	0.0	-43.8	9.2
CPL-W	117.0	174.1	-206.0	-16.0	62.1	83.2	143.7
110	21271.0	20975.5	11.6	3.4	0.0	-102.5	483.0
DUKE.DUK	5113.8	9083.6	-7728.8	-1202.3	1823.0	18.8	6851.6
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.2	157.3	-104.2	-15.9	38.7	2.5	24.3
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.1
113	5.7	4.0	0.0	0.0	0.0	0.2	1.5
YADKIN	-10.3	2.0	0.0	0.0	1.7	-12.9	2.3
114	427.5	0.0	0.0	0.0	0.0	426.0	1.6
HARTWELL	184.7	0.0	0.0	0.0	0.0	123.5	61.2
115	6114.3	5184.0	0.0	0.0	0.0	835.3	95.1
SCEG	1427.9	2219.9	-1403.3	0.0	419.6	-177.7	1208.7
120	0.0	1628.9	0.0	0.1	0.0	-1650.2	21.2
SC-SO	0.0	614.7	-392.7	-80.7	100.7	-165.3	122.2
121	3198.3	1321.2	0.1	0.0	0.0	1812.3	64.6
SC-NO	598.4	495.3	-444.7	-48.4	271.7	-129.3	997.2
122	1757.0	1818.4	0.0	-0.1	0.0	-102.3	41.0
SC-EA	468.9	515.0	-374.1	-26.8	135.1	-60.8	550.6
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.6	51.7
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3549.9	8.0	0.0	0.0	0.0	3506.8	35.1
AECI	777.7	2.6	-115.6	105.2	723.9	912.3	649.8
131	27.0	347.4	0.0	0.0	0.0	-353.9	15.7
AECI-NW	-1.3	87.1	-2.7	0.0	66.0	-75.6	51.5
132	24.0	241.7	0.0	0.0	0.0	-223.5	8.3
AECI-NE	0.0	59.8	-16.5	0.0	31.3	-30.1	18.8
133	0.0	862.4	0.1	0.0	0.0	-900.1	37.5
AECI-CNT	0.0	216.1	-25.8	0.0	92.3	-292.4	194.4

134	15.0	637.2	0.0	0.0	0.0	-693.7	33.9
AECI-KMO	-4.2	159.7	-84.0	0.0	65.7	-124.9	101.2
135	0.0	631.1	0.0	0.0	0.0	-643.7	12.6
AECI-KOK	0.0	158.2	-78.2	0.0	47.1	-95.1	62.3
136	0.0	924.8	0.1	0.0	0.0	-951.3	26.5
AECI-SMP	0.0	231.7	-81.6	52.6	101.3	-194.3	145.5
137	0.0	390.8	0.0	0.0	0.0	-410.5	19.7
AECI-M&A	0.0	98.0	-4.5	0.0	40.3	-123.9	70.7
138	2108.4	1021.0	0.0	0.0	0.0	1058.0	29.5
LAGN	321.3	328.6	0.0	0.0	143.8	-260.8	397.4
140	28541.9	30306.1	19.6	3.3	0.0	-2325.0	537.9
GA-ITS	6527.9	12635.5	-10409.4	-834.0	4550.1	-32.8	9718.8
141	16564.1	13418.4	8.2	0.3	0.0	2839.9	241.3
APC	3450.5	3598.5	-2162.3	-162.6	1525.2	-289.5	3986.2
142	2083.0	2655.8	2.2	0.0	0.0	-640.4	54.0
GULF	-182.0	796.7	-1532.6	-42.5	193.7	147.0	642.8
143	3073.0	2653.2	3.5	0.0	0.0	340.9	75.3
MPC	984.9	938.2	-658.6	-6.3	516.3	117.4	1110.5
144	2084.0	1111.6	2.6	0.0	0.0	939.6	30.2
SAV	562.9	427.0	-391.5	0.0	55.1	72.5	510.0
145	855.0	790.7	0.0	0.0	0.0	42.4	22.0
SMEPA	114.6	265.5	-185.9	0.0	116.9	38.0	113.9
147	0.7	0.0	0.0	0.0	0.0	0.7	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.5	2058.2	0.0	0.0	0.0	1547.8	75.9
AEC	606.8	325.8	-411.7	0.0	294.0	221.1	770.0
155	6224.7	5901.4	1.9	0.5	0.0	154.5	166.4
EES_WEST	1499.8	2235.9	-1492.1	58.4	1013.4	48.0	1663.1
156	8945.6	9770.0	0.1	2.1	0.0	-918.7	92.0
EES_SOU	2013.4	2719.3	-1208.4	-573.0	857.5	101.6	1831.4
157	5443.0	5006.3	0.0	1.0	0.0	383.6	78.7
EES-ASNO	1242.0	1873.2	-618.4	-361.7	797.9	-349.9	1507.5
158	909.8	1767.3	0.0	0.7	0.0	-903.6	45.5
EES_CNTR	192.4	477.0	-304.3	-70.8	456.6	-9.7	556.9
159	8721.2	7791.3	0.0	106.4	0.0	688.6	134.9
EES_NOR	1027.0	2331.1	-947.5	-153.7	2112.5	-241.0	2150.6
165	3026.5	5549.8	0.0	0.0	0.0	-2638.3	115.0

TVA_WEST	1136.1	1662.5	-1940.9	100.7	1169.6	1029.4	1454.0
166	17641.8	15266.6	0.1	0.0	0.0	2067.9	307.2
TVA_CENT	4026.1	5590.8	-3192.6	102.0	3312.1	-199.9	5037.8
167	11513.7	9894.8	0.0	0.0	0.0	1461.9	157.0
TVA_EAST	2749.8	3523.9	-1850.6	212.4	2174.2	771.8	2266.7
168	0.0	3539.8	0.0	0.0	0.0	-3556.9	17.1
TVA_MEMP	0.0	1035.2	-177.2	0.0	104.3	-914.1	160.4
169	108.5	0.0	0.0	0.0	0.0	108.2	0.3
TVA_IPP	37.9	0.0	0.0	0.0	80.3	106.1	12.1
181	99.5	1772.1	0.0	0.0	0.0	-1676.8	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.2	49.8
182	0.0	3191.7	0.0	0.0	0.0	-3219.3	27.6
FAIRFAX	0.0	712.2	-990.6	0.0	104.2	-194.7	577.2
183	2665.0	1076.7	0.1	0.0	0.0	1571.9	16.2
WOODBRDG	50.2	294.2	-264.2	0.0	46.1	-138.7	205.0
184	275.0	483.0	0.0	0.0	0.0	-212.4	4.4
NOR NECK	65.8	100.9	-52.5	0.0	30.1	10.6	36.9
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-0.8	568.9	-317.8	0.0	60.4	-397.7	206.2
186	1144.0	1510.4	0.0	0.0	0.0	-379.2	12.8
YORKTOWN	-27.8	378.2	-473.2	0.0	66.5	22.6	111.1
187	2514.2	1730.7	0.0	0.0	0.0	769.9	13.6
CHESTERF	179.2	500.7	-286.9	0.0	99.8	-62.7	128.0
188	1411.0	637.6	1.3	0.0	0.0	754.0	18.1
SOUTHSDE	-153.0	156.6	-235.2	0.0	47.7	-136.1	109.5
189	710.0	2837.7	0.0	0.0	0.0	-2151.8	24.1
VA BEACH	179.6	690.0	-566.0	0.0	122.4	-200.1	378.0
190	1414.0	1111.3	0.0	0.0	0.0	299.0	44.6
SUFFOLK	52.1	251.4	-485.6	0.0	201.0	130.9	363.2
191	0.0	640.2	0.3	0.0	0.0	-665.7	8.3
OUTBANKS	0.0	161.1	-247.2	0.0	64.2	88.6	61.7
192	994.0	1116.2	0.3	0.0	0.0	-153.8	31.3
CAROLINA	47.1	296.5	-336.5	0.0	133.4	-7.6	228.2
193	1020.0	1831.2	0.0	0.0	0.0	-843.1	31.9
GORDONSV	-55.0	375.5	-237.9	0.0	164.9	-343.4	315.8
194	0.0	1211.1	0.0	0.0	0.0	-1231.2	17.5
VALLEY	0.0	326.6	-353.8	0.0	85.4	-117.0	229.1
195	1704.0	708.9	0.0	0.0	0.0	941.3	38.9

LEXINGTN	236.4	198.1	-131.2	0.0	189.9	-81.0	437.8
196	9293.0	816.3	0.0	0.0	0.0	8344.5	132.1
500KV	343.4	150.6	-689.3	0.0	2660.8	881.3	2661.5
197	1055.3	171.7	0.0	0.0	0.0	861.3	22.3
	337.9	34.7	0.0	0.0	181.3	220.0	264.5
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.6	45.4
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.4
201	9051.5	11383.3	0.0	0.0	0.0	-2543.1	218.7
AP	1467.5	2884.8	-2363.1	0.0	2230.7	-633.7	3812.3
202	1857.0	362.0	0.0	0.0	0.0	1465.4	22.3
	318.0	66.1	-35.2	0.0	145.1	117.1	313.7
203	151.0	472.3	0.0	0.0	0.0	-338.5	17.2
	48.5	97.1	-142.8	0.0	236.8	236.0	95.0
204	748.0	748.9	0.0	0.0	0.0	-24.9	29.9
	110.1	149.4	-146.1	0.0	258.8	165.8	201.2
205	0.0	43.0	0.0	0.0	0.0	-64.7	15.7
	0.0	15.2	0.0	0.0	8.9	-39.3	30.8
206	2045.8	61.7	0.0	0.0	0.0	1974.9	9.2
OVEC	-264.5	6.2	0.0	0.0	559.9	188.9	100.3
207	1086.2	598.4	0.0	0.0	0.0	494.8	21.1
HE	12.6	184.9	-149.2	0.0	125.5	-56.2	167.9
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.5	1.7
209	3787.6	3668.4	0.0	0.0	0.0	-293.5	101.2
DPL	172.4	663.9	-1420.5	0.0	393.3	157.1	1120.1
210	530.0	1085.5	0.0	0.0	0.0	-626.8	27.0
SIGE	233.5	348.6	-279.4	-0.7	48.9	-101.6	298.0
211	7700.5	8208.8	0.0	0.0	0.0	-738.1	229.8
LGEE	2787.1	2800.2	-1118.5	74.3	950.7	-543.3	2525.2
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.8	39.2	-21.9	0.0	10.4	-65.4	53.5
213	171.0	77.1	0.0	0.0	0.0	109.9	0.8
	51.2	5.4	0.0	0.0	5.2	28.6	22.3
214	1453.9	1769.8	0.0	0.0	0.0	-324.5	8.6
BREC	346.5	725.6	-293.3	0.0	108.9	-37.5	60.7
215	3253.4	3139.2	0.0	0.0	0.0	90.7	22.1

Appendix E – Loss Analysis

DLCO	465.3	438.2	-123.9	0.0	676.3	233.6	593.5
216	3068.3	2585.5	0.0	3.6	0.0	429.8	53.1
IPL	125.4	513.3	-472.5	21.1	325.5	-491.9	880.4
217	2482.2	2844.3	0.0	0.0	0.0	-395.7	44.8
NIPS	450.7	927.1	-460.5	0.0	375.5	-166.2	527.8
218	8406.2	129.1	0.0	0.0	0.0	8140.5	136.6
METC	595.3	58.1	-248.0	0.0	1974.5	1023.1	1736.3
219	1096.0	3771.3	0.0	0.0	0.0	-2820.1	148.5
ITC	11.7	1431.5	-418.7	0.0	1987.5	-1460.7	2447.6
220	2876.7	2302.3	0.0	4.1	0.0	457.1	113.1
EKPC	715.4	879.9	-932.9	10.7	230.5	52.6	935.6
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	11731.6	748.4	0.0	0.0	0.0	10945.5	37.7
FE-GEN	1889.3	503.9	0.0	0.0	151.2	118.1	1418.5
231	0.0	350.9	0.0	0.0	0.0	-352.6	1.6
FE-AK-23	0.0	79.2	0.0	0.0	0.1	-103.9	24.8
232	0.0	1198.0	0.0	0.0	0.0	-1221.7	30.1
FE-AK	0.0	249.2	-371.0	0.0	301.6	63.3	361.4
233	0.0	552.8	0.0	0.0	0.0	-558.7	5.9
FE-LAKE	0.0	127.7	-146.9	0.0	46.0	-16.3	81.5
234	0.0	203.7	0.0	0.0	0.0	-211.0	7.3
FE-MASS	0.0	24.6	0.0	0.0	12.1	-43.2	30.7
235	173.5	837.2	0.0	0.0	0.0	-686.9	20.8
FE-PP	14.0	213.5	-210.3	0.0	121.0	-83.4	214.8
236	0.0	94.6	0.0	0.0	0.0	-95.8	1.3
FE-ALL	0.0	30.2	0.0	0.0	8.0	-30.8	8.6
237	0.0	401.9	0.0	0.0	0.0	-404.2	2.4
FE-WARR	0.0	128.9	-67.6	0.0	27.1	-68.0	33.7
238	3.5	1085.8	0.0	0.0	0.0	-1118.0	29.3
FE-YNG	-10.1	261.0	-60.2	0.0	245.2	-216.6	249.7
239	24.0	3287.0	-3.3	0.0	0.0	-3294.0	34.4
FE-CEI	7.0	1218.6	-1208.2	0.0	412.7	-84.7	494.0
240	0.0	241.1	0.0	0.0	0.0	-243.4	2.3
FE-CPP	0.0	49.3	-49.3	0.0	0.0	-9.2	9.3
241	1995.0	892.1	0.0	0.4	0.0	1096.6	33.2
FE-MN	175.2	161.3	-103.2	2.3	255.5	11.9	364.8

242	1091.0	758.0	0.0	0.4	0.0	303.7	28.1
FE-MR	231.8	184.3	-80.9	0.8	195.5	40.1	279.6
243	3.5	950.2	0.0	0.2	0.0	-972.8	25.5
FE-SP	-12.6	188.9	-130.4	1.2	70.3	-146.7	142.6
244	1197.2	664.8	0.0	0.1	0.0	506.7	21.3
FE-BAY	357.3	173.1	-128.5	0.8	224.3	308.5	223.9
245	2212.8	4566.6	0.0	3.6	0.0	-2444.0	89.9
FE-TE	756.0	1194.9	-457.7	7.5	605.0	-316.1	930.3
246	26.0	862.0	0.0	0.6	0.0	-874.4	9.0
	10.5	170.8	0.0	-16.6	87.5	-176.5	105.3
250	7545.5	6638.7	0.0	0.0	0.0	739.2	167.5
AEP-AP	-266.2	1829.0	-1748.4	1627.3	3667.5	-593.5	2286.9
251	10848.6	5388.7	0.0	0.0	0.0	5249.5	210.4
AEP-OP	-487.1	836.3	-1487.8	2786.0	5555.2	262.2	2671.4
252	6499.6	4801.8	0.0	0.0	0.0	1530.1	167.6
AEP-IM	-244.4	732.1	-760.1	1494.9	3485.5	-335.4	2109.7
253	2449.0	5404.9	0.0	0.0	0.0	-3094.8	101.8
AEP-CS	216.7	1277.3	-1529.5	0.0	708.3	181.6	977.6
254	265.6	1403.2	0.0	0.0	0.0	-1189.6	52.0
AEP-KP	188.4	366.0	-429.7	0.0	73.8	14.6	311.2
255	363.3	1628.6	0.0	0.0	0.0	-1278.5	13.2
AEP-OP-I	56.5	669.3	-59.4	0.0	33.0	-600.7	80.4
256	0.0	573.6	0.0	0.0	0.0	-578.6	5.0
AEP-IM-I	0.0	104.3	-35.4	0.0	40.8	-55.4	27.3
257	450.0	330.3	0.0	0.0	0.0	105.3	10.8
	76.1	92.0	-13.5	0.0	75.0	-57.2	129.7
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.0
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.1	3.9
	119.0	84.6	-36.3	0.0	3.5	34.6	39.6
261	3001.6	105.2	0.0	0.0	0.0	2895.1	1.2
ITC-GN	19.6	15.0	0.0	0.0	34.8	16.6	22.8
262	6157.3	783.0	0.0	0.0	0.0	5335.5	38.9
ITC-GS	742.4	176.9	-193.4	0.0	138.5	675.1	222.3
263	1548.7	5711.7	0.0	0.1	0.0	-4217.7	54.7
ITC-DIS	400.9	2217.9	-3061.7	125.1	420.7	1116.1	424.1

264	8.0	615.0	0.0	0.0	0.0	-634.6	35.4
	7.8	185.6	-74.9	0.0	91.5	-233.8	224.5
265	2273.4	1221.8	0.0	0.0	0.0	990.3	60.6
	341.6	275.7	-187.5	1.4	481.7	160.3	572.3
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.8	93.3	-111.6	0.0	36.7	19.0	126.1
267	481.0	522.5	0.0	0.0	0.0	-62.8	21.3
	202.2	186.5	-148.6	0.3	125.0	89.6	199.3
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	55.0	219.7	0.0	0.0	0.0	-165.9	1.2
MUNI	7.6	49.3	0.0	0.0	1.9	-52.7	13.0
271	507.0	364.3	0.0	0.0	0.0	141.2	1.5
LANSING	-113.8	146.0	-87.1	0.0	5.3	-177.2	9.7
272	81.0	601.7	0.0	0.0	0.0	-539.0	18.3
WOLVERIN	15.3	137.2	-102.7	0.0	40.5	-45.1	66.5
273	187.5	6595.4	-1.1	0.0	0.0	-6466.9	60.1
CE	-9.0	1567.4	-1154.7	0.0	79.0	-793.0	450.3
280	270.0	5413.2	0.3	5.8	0.0	-5477.3	211.5
DEI	-39.1	1065.0	-1654.7	-6.4	1158.7	-609.4	2263.4
281	0.0	270.6	0.0	0.0	0.0	-218.4	6.0
HE IN DE	0.0	91.3	0.0	0.0	56.2	-34.9	23.7
282	0.0	705.8	0.0	0.0	0.0	-681.7	2.6
DEI IND	0.0	198.1	-14.6	-0.3	14.0	-172.0	13.4
283	5223.1	360.0	0.0	0.0	0.0	4829.1	0.0
DEI GENS	1635.1	233.2	0.0	0.0	0.0	1346.2	39.7
284	0.0	3336.5	0.5	2.1	0.0	-3403.7	88.4
DEO	0.0	386.7	-629.3	-81.7	516.2	-167.2	1017.3
285	0.0	383.0	0.0	0.0	0.0	-403.7	0.9
DEO IND	0.0	71.0	0.0	0.0	0.9	-84.0	2.9
286	4118.4	0.0	0.0	0.2	0.0	4110.4	7.8
DEO GENS	455.3	0.0	0.0	1.1	0.0	132.8	321.5
287	0.0	310.4	0.1	0.0	0.0	-313.4	2.7
DEK	0.0	37.2	-141.4	0.0	3.1	90.0	16.6
288	0.0	11.8	0.0	0.0	0.0	-16.7	0.2
DEK IND	0.0	7.7	0.0	0.0	0.3	-10.8	1.0

290	88.3	105.0	0.0	0.0	0.0	48.3	0.0
	132.0	56.0	0.0	0.0	0.0	101.9	14.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	241.3	150.0	-21.2	0.0	0.0	63.4	49.1
301	0.0	0.0	0.0	0.0	0.0	-1.2	1.2
CIL345	0.0	0.0	0.0	0.0	48.2	6.7	41.6
302	0.0	242.8	0.0	0.0	0.0	-249.3	6.5
302	0.0	70.8	0.0	0.0	31.6	-103.6	64.4
303	690.0	65.0	0.0	0.0	0.0	624.8	0.2
CILGEN	291.9	40.3	0.0	0.0	0.0	245.6	5.9
304	0.0	342.1	0.0	0.0	0.0	-343.3	1.1
PEORIA	0.0	88.1	-31.2	0.0	0.3	-62.0	5.3
305	0.0	79.2	0.0	0.0	0.0	-79.7	0.4
PEKIN	0.0	20.6	0.0	0.0	0.0	-22.2	1.6
306	0.0	52.1	1.2	0.0	0.0	-53.3	0.1
EASTERN	0.0	9.4	0.0	0.0	0.0	-9.6	0.2
307	0.0	29.8	0.1	0.0	0.0	-30.0	0.0
WESTERN	0.0	6.6	0.0	0.0	0.0	-6.8	0.1
308	0.0	45.8	0.7	0.0	0.0	-46.5	0.0
LACON	0.0	11.1	-3.2	0.0	0.0	-8.1	0.2
309	0.0	25.3	0.0	0.0	0.0	-25.3	0.0
HOMER	0.0	7.4	0.0	0.0	0.0	-7.4	0.0
310	26.7	797.1	0.0	0.0	0.0	-819.5	20.6
REG E-IL	0.0	174.7	-61.2	0.0	112.8	-132.5	128.6
311	850.0	585.4	0.0	0.0	0.0	257.4	7.2
FRKNJEFF	382.6	134.2	0.0	0.0	173.3	300.4	121.4
312	712.0	554.1	0.0	0.0	0.0	132.5	25.4
ST FRAN	199.8	192.6	0.0	0.0	194.2	-10.5	212.0
313	618.0	852.8	0.0	0.0	0.0	-256.1	21.3
STCHMOED	155.8	138.1	0.0	0.0	247.8	32.7	232.9
314	1260.3	598.8	0.0	0.0	0.0	636.3	25.2
LKSDMP&L	530.0	75.5	58.5	0.0	509.3	575.3	329.9
315	0.0	81.3	0.0	0.0	0.0	-81.6	0.4
GREENHIL	0.0	5.7	0.0	0.0	0.0	-9.2	3.5
316	0.0	758.2	5.1	0.0	0.0	-773.9	10.6
SEMO	0.0	200.7	102.5	0.0	86.1	-315.0	97.8
317	7.0	1534.0	0.0	0.0	0.0	-1531.0	3.9
N METRO	0.0	142.1	0.0	0.0	60.2	-156.3	74.5

318	490.0	1820.8	0.0	0.0	0.0	-1338.3	7.5
S METRO	36.4	281.9	-248.3	0.0	43.3	-38.8	84.9
319	95.7	120.3	0.0	0.0	0.0	83.1	0.2
ILL-IOWA	20.1	22.8	0.0	0.0	0.0	13.3	4.3
320	643.0	2.3	0.0	0.0	0.0	642.6	0.4
MOGENINILL	27.5	0.4	0.0	0.0	0.0	6.4	21.1
321	0.0	443.5	0.0	0.0	0.0	-449.6	6.2
SOUTHERN	0.0	110.4	0.0	-0.3	94.2	-73.0	57.1
322	50.0	585.0	0.0	0.0	0.0	-574.5	9.6
357	0.0	125.1	0.0	0.0	104.2	-95.3	78.3
323	415.9	1297.1	0.0	0.0	0.0	-909.1	27.8
EASTERN	1.6	276.4	-37.8	0.0	338.7	-240.9	342.7
329	2362.9	207.4	0.0	0.0	0.0	2152.6	2.8
GEN&LOAD	271.5	91.7	0.0	0.0	0.0	36.7	143.1
331	0.0	0.0	0.0	0.0	0.0	-42.0	0.5
CHICAGO	0.0	0.0	0.0	0.0	2.3	-9.6	2.2
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-11.9	0.0	5.9	15.9	1.0
342	0.0	14.8	0.0	0.0	0.0	-15.6	0.9
C-N	0.0	3.6	0.0	0.0	3.8	-5.3	5.5
344	0.0	39.8	0.0	0.0	0.0	-40.5	0.7
NO-ESS	0.0	13.6	-14.9	0.0	8.8	7.5	2.6
345	0.0	109.0	0.0	0.0	0.0	-112.3	3.3
N-R	0.0	30.1	0.0	0.0	12.0	-38.8	20.7
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.5	0.2
RR-ESS	0.0	2.8	0.0	0.0	5.5	1.8	0.9
348	0.0	162.3	0.0	0.0	0.0	-165.7	3.4
R-S	0.0	55.9	-14.9	0.0	20.3	-38.6	17.8
349	489.5	24.3	0.0	0.0	0.0	456.9	8.4
SO-ESS	88.2	6.5	87.9	60.2	210.0	-11.5	155.1
351	0.0	51.6	0.0	0.0	0.0	-52.0	0.5
EEC	0.0	18.4	-16.3	-5.8	7.6	9.0	2.2
352	0.0	90.9	0.0	0.0	0.0	-93.8	2.9
SEIEC	0.0	44.8	-24.6	-8.2	22.6	-5.3	15.8

353	0.0	24.8	0.0	0.0	0.0	-24.8	0.0
SIEC	0.0	9.4	-16.4	-0.6	0.0	7.5	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	4357.9	3291.3	0.0	0.0	0.0	989.9	76.7
357	637.5	707.1	-558.6	0.0	606.2	60.1	1035.0
360	408.1	343.0	0.0	0.0	0.0	63.3	1.9
360	0.0	103.3	-118.6	0.0	8.4	0.3	23.4
361	3007.6	1750.1	0.0	2.0	0.0	1206.5	47.8
SIPC	692.5	414.8	-127.6	11.3	131.4	-108.9	626.8
362	1102.2	635.3	0.0	0.1	0.0	428.5	20.7
EEI	430.8	126.2	-27.1	0.7	160.5	198.2	289.3
363	551.0	703.5	0.0	0.6	0.0	-134.4	9.8
PJM500KV	45.1	115.3	-115.3	2.4	146.2	49.6	138.8
364	1388.7	575.7	0.0	0.8	0.0	780.2	31.1
SEAST	349.6	94.2	-88.6	6.7	206.3	157.6	381.6
365	1555.4	2285.6	0.0	1.8	0.0	-784.6	51.0
	164.6	404.8	-242.7	7.0	352.3	-236.7	575.0
366	1945.7	1937.9	0.0	0.3	0.0	-64.8	72.3
WPS	227.2	493.0	-801.8	0.9	494.5	177.6	852.2
367	61.1	586.1	0.0	0.9	0.0	-546.8	10.3
MGE	-1.4	182.4	-184.2	1.5	98.6	-46.5	141.0
368	7.0	98.6	0.0	0.0	0.0	-95.7	4.0
UPPC	-1.8	41.4	-46.1	0.0	33.4	21.8	14.5
371	2438.6	2513.0	0.0	0.4	0.0	-333.3	102.3
WPL	448.9	690.2	-929.5	0.4	453.0	129.1	950.3
372	0.0	258.7	0.0	0.0	0.0	-14.8	0.2
WPL-WPPI	0.0	94.0	-8.3	0.0	2.8	5.8	1.2
375	31.3	100.3	0.0	0.0	0.0	-70.9	1.8
ED SAULT	8.0	43.4	-10.2	0.0	55.0	19.9	9.8
376	5126.2	3890.5	0.0	1.5	0.0	1162.5	71.8
WE-MKR	1634.6	1260.8	-681.1	4.4	631.6	226.5	1455.6
377	0.0	679.1	0.0	0.0	0.0	-702.8	19.2
WE-FV	0.0	190.5	-100.4	0.0	184.0	-68.0	161.0
378	35.1	148.0	0.0	0.0	0.0	-115.4	2.5
WE-IR	12.9	54.4	-15.0	0.0	45.8	-0.8	20.0
379	553.6	338.4	0.0	0.0	0.0	203.0	12.2
WE-PI	16.7	51.3	-41.1	0.0	96.5	-14.9	117.9

380	55.8	704.6	0.0	0.0	0.0	-729.0	7.5
WE-WPPI	-14.2	138.5	-126.6	0.0	13.4	-114.5	77.1
381	0.0	16.2	0.0	0.0	0.0	-16.3	0.1
WRWL-WPS	0.0	6.5	0.0	0.0	0.1	-6.6	0.2
382	38.2	279.6	0.0	0.0	0.0	-245.0	3.7
CWP-WPS	23.4	127.3	0.0	0.0	0.0	-135.1	31.2
383	0.0	54.9	0.0	0.0	0.0	-55.1	0.3
MEWD-WPS	0.0	11.9	-26.0	0.0	2.3	15.0	1.4
384	22.1	84.2	0.0	0.0	0.0	-62.7	0.6
MPU-WPS	0.1	16.1	-10.0	0.0	0.4	-9.9	4.3
385	0.0	61.6	0.0	0.0	0.0	-61.7	0.1
WPPI-WPS	0.0	19.6	-34.7	0.0	0.9	15.7	0.2
386	17.1	23.4	0.0	0.0	0.0	-6.3	0.0
ESCANABA	0.1	2.1	0.0	0.0	0.3	-1.8	0.0
390	382.9	551.8	0.0	0.0	0.0	-223.2	22.1
	64.3	204.1	-262.8	0.0	133.5	92.5	145.3
391	1780.7	180.1	0.0	0.0	0.0	444.7	38.3
ALTW_391	558.0	67.4	-424.1	0.0	313.6	351.6	464.1
392	2.7	22.3	0.0	0.0	0.0	-935.4	15.7
ALTW_392	3.7	5.9	-40.8	0.0	50.9	-232.8	39.9
393	1247.4	74.8	0.0	0.0	0.0	1107.3	28.6
ALTW_393	-96.8	6.6	62.9	0.0	183.4	-295.9	294.8
394	617.6	2763.8	0.0	0.0	0.0	-287.6	27.3
ALTW_394	-217.0	864.8	-108.7	-58.6	60.2	-288.4	95.7
395	0.0	53.0	0.0	0.0	0.0	-21.3	0.4
	0.0	17.4	-16.4	0.0	0.5	16.0	2.3
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-319.2	36.7
	476.1	652.1	-286.3	0.0	125.1	-119.7	354.3
401	20561.6	23603.4	0.0	0.0	0.0	-3659.2	621.0
FPLSOUTH	4430.3	6865.8	-6919.9	0.0	4250.9	111.5	8623.9
402	9883.3	11593.8	0.0	0.0	0.0	-1993.6	283.1
FPC GENS	2928.6	4004.9	-3213.5	0.0	1149.4	44.8	3241.9
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.4	5.7
	123.3	102.5	-24.8	0.0	12.4	-15.8	73.9

405	272.2	512.4	0.0	0.0	0.0	-241.7	1.5
HST	101.6	152.0	0.0	0.0	14.3	-56.9	20.9
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1067.5	1247.3	-493.6	0.0	229.1	-209.7	752.8
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.3	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3672.5	90.0	0.0	0.0	0.0	3553.7	28.7
NSB	1053.9	8.9	0.0	0.0	302.3	694.3	653.1
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	301.2	311.4	-51.6	0.0	253.4	-172.9	467.7
412	2239.6	1110.2	0.0	0.0	0.0	1079.2	50.2
SECI	484.5	276.2	-50.5	0.0	180.6	-333.7	773.1
413	866.9	1311.7	0.0	0.0	0.0	-459.9	15.0
MP-GEN	140.9	231.7	-122.9	0.0	30.0	-105.9	168.0
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.0	0.0	32.5	-365.3	156.7
415	629.3	669.5	0.0	0.0	0.0	-88.7	16.1
	161.8	209.0	-130.9	0.0	48.1	-9.4	130.4
416	4916.2	4567.2	0.0	0.0	0.0	227.1	121.9
GENERATN	1576.0	397.3	-825.4	0.0	234.2	278.5	1959.8
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.5
	85.1	36.4	-10.6	0.0	1.7	31.7	29.3
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	126.7	67.0	0.0	0.0	16.1	51.1	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	236.0	0.0	0.0	0.0	0.0	195.4	40.6
428	100.1	0.0	0.0	0.0	0.0	100.0	0.1
PLANTCTY	17.7	0.0	0.0	0.0	0.0	13.0	4.7

429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-112.4	9.2
	18.0	58.2	-24.2	0.0	19.0	-45.5	55.4
442	309.5	102.7	0.0	0.0	0.0	201.7	5.1
	26.0	11.4	0.0	0.0	10.3	-11.2	36.2
443	0.0	93.7	0.0	0.0	0.0	-98.0	3.5
	0.0	15.7	-43.4	0.0	8.4	21.8	10.3
444	575.0	244.5	0.0	0.0	0.0	318.8	9.4
	102.6	59.4	-35.0	0.0	10.5	-20.5	112.9
445	190.0	144.7	0.0	0.0	0.0	44.0	5.9
	31.2	29.1	-18.1	0.0	14.2	-19.6	50.2
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.6	0.0	10.6	-13.9	13.5
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.4	7.4
449	16.0	138.5	0.0	0.0	0.0	-130.1	0.9
	2.8	16.0	0.0	0.0	7.8	-12.8	4.8
450	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	3.0	-3.8	6.7
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.9	1.1
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.2	1.1
460	769.0	822.9	0.0	0.0	0.0	-65.3	11.4
	374.9	204.4	-25.7	0.0	47.1	87.2	156.0
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0

512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.3	3.4
WERE	14.0	57.1	-3.5	0.0	2.2	-29.4	5.8
600	5135.9	384.5	0.0	0.0	0.0	4740.5	11.9
608	716.3	228.4	0.0	0.0	1.3	38.0	461.8
601	1871.0	5359.0	0.0	0.0	0.0	-3920.7	216.2
XEL_MN	143.5	731.2	-2104.6	591.5	2271.1	827.9	2310.4
602	1.5	273.7	0.0	0.0	0.0	-312.5	7.3
XEL_ND	-0.4	54.7	-42.0	0.2	28.0	-31.3	42.8
603	0.0	345.3	0.0	0.0	0.0	-385.4	11.2
XEL_SD	0.0	67.9	-113.2	0.0	22.4	-8.7	67.9
604	164.7	1052.9	0.0	0.0	0.0	-940.6	76.6
XEL_WI	33.6	212.0	-589.2	0.0	244.8	48.3	612.2
605	131.7	493.3	0.0	0.0	0.0	-284.7	4.1
NON-XEL	-39.6	98.7	-69.6	0.0	9.3	-57.0	10.9
608	812.7	336.6	0.0	0.2	0.0	312.1	66.5
MP_608	-40.1	114.3	-891.0	0.8	242.0	-19.1	966.7
609	-125.1	1010.8	0.0	0.0	0.0	-1055.1	3.4
MP-INDUS	95.7	367.3	-59.0	0.0	6.6	-234.2	55.4
610	1179.6	81.9	0.0	0.0	0.0	1093.3	1.9
MP-SSL	133.9	44.2	-5.2	0.0	0.3	3.2	90.0
611	0.0	6.7	0.0	0.0	0.0	-6.7	0.0
	0.0	3.1	0.0	0.0	0.0	-3.7	0.5
613	0.0	194.4	0.0	0.0	0.0	-1.1	1.1
SMPA_613	0.0	48.6	-24.8	0.0	1.1	18.1	7.8
614	6.6	35.8	0.0	0.1	0.0	-38.3	0.2
SMPA_614	7.0	8.9	0.0	0.4	0.6	-6.0	1.4
615	5.9	46.7	0.0	0.0	0.0	-336.8	5.7
SMPA_615	4.0	10.7	-31.1	0.0	31.4	-103.4	50.1
616	136.4	409.2	0.0	0.0	0.0	-6.4	16.5
SMPA_616	-17.7	138.5	-219.3	0.5	93.0	98.7	163.6
617	32.5	59.0	0.0	0.0	0.0	-31.1	0.3
SMPA_617	13.5	14.7	0.0	0.0	3.5	-3.5	3.6
618	0.0	97.9	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	2.4	0.0	0.0	0.0	0.0	0.0
619	95.4	1054.1	0.0	0.3	0.0	-995.1	26.5
GRE-GRE	-37.7	186.8	-653.7	0.7	143.5	430.5	137.7

Appendix E – Loss Analysis

620	56.0	172.0	0.0	0.2	0.0	-110.9	4.6
GRE-MP	-22.2	26.2	-31.5	0.5	61.0	22.7	21.8
621	61.0	131.9	0.0	0.1	0.0	-71.6	8.1
GRE-OTP	-16.9	22.8	-6.3	0.2	25.6	-39.9	32.9
622	230.8	781.5	0.0	0.2	0.0	-579.5	47.9
GRE-NSP	-96.6	101.2	-9.8	0.7	121.5	-272.9	208.9
623	248.3	97.1	0.0	0.0	0.0	150.3	6.9
GRE-ALT	-102.8	12.6	0.0	0.0	11.8	-115.0	12.5
624	1434.8	0.0	0.0	0.7	0.0	1289.4	55.0
GRE-ND	258.2	0.0	-564.3	4.2	58.3	-643.9	1518.2
625	790.0	4.1	0.0	0.5	0.0	786.0	3.2
GRE-S	-91.3	0.0	0.0	0.7	6.6	-157.5	71.9
626	186.5	163.5	0.0	0.1	0.0	-44.5	22.3
OTP_626	7.8	52.5	-86.4	0.0	110.4	30.3	110.5
627	18.9	162.3	0.0	0.1	0.0	-200.8	20.8
OTP_627	-1.0	36.0	44.0	28.4	323.1	16.4	188.3
628	515.0	43.2	0.0	0.0	0.0	458.7	12.9
OTP_628	31.0	16.6	0.0	0.0	27.5	-51.3	93.2
630	19.5	199.2	0.0	0.2	0.0	-221.2	2.6
	-6.5	37.1	-29.2	0.1	9.6	-25.4	9.3
631	10.0	294.0	0.0	0.0	0.0	-481.1	2.7
RPU_631	6.6	73.7	0.0	0.0	13.9	-118.5	16.6
633	164.3	200.5	0.0	0.0	0.0	-37.1	0.9
MPW_633	87.0	48.1	0.0	0.0	9.1	28.1	19.8
635	49.0	156.2	0.0	0.0	0.0	-319.3	5.8
MEC_635	27.5	17.5	-60.7	0.0	31.9	25.1	35.9
636	3319.2	1660.2	0.0	0.0	0.0	1871.1	45.8
MEC_636	874.6	466.5	-147.3	0.0	217.8	230.1	594.9
637	864.8	2122.7	0.0	0.0	0.0	-1279.2	57.3
MEC_637	75.7	318.1	-321.3	0.0	703.9	157.9	633.4
638	1023.1	1434.6	0.0	0.0	0.0	-502.3	23.5
MEC_638	278.2	369.4	-157.3	0.0	263.3	29.9	278.1
639	246.6	380.9	0.0	0.0	0.0	-143.2	0.9
MEC_639	50.3	55.7	0.0	0.0	6.7	-3.0	2.6
640	2616.2	2470.5	0.0	0.0	0.0	-145.3	112.4
NPPD_640	290.6	797.5	-653.4	26.0	1072.5	14.8	1134.3
641	132.0	218.1	0.0	0.0	0.0	13.6	0.9
HAST_641	38.4	72.0	0.0	0.0	3.3	-10.3	11.1

642	191.0	196.2	0.0	0.0	0.0	-7.1	1.8
GRIS_642	27.4	11.3	0.0	0.0	2.6	-4.3	23.0
645	2477.1	2370.6	0.0	0.0	0.0	32.5	31.1
OPPD_645	448.0	414.8	-137.5	14.9	380.0	-29.2	539.2
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.5
OPPD_FRE	41.6	35.1	0.0	0.0	1.0	-11.4	11.5
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	-81.5	600.0	0.0	0.0	0.0	-688.4	6.9
LES_650	17.0	103.8	-217.7	0.0	88.6	104.6	114.9
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	16.0	0.0	-118.8	0.0	1.5	41.2	95.0
652	203.7	148.5	0.0	0.0	0.0	-14.6	6.9
WAPA_652	0.8	31.9	-136.3	0.0	114.8	17.9	182.4
653	93.9	97.5	0.0	0.0	0.0	-193.8	19.8
WAPA_653	-61.4	22.8	-7.8	-0.4	169.0	-69.1	119.0
654	1387.8	370.2	0.0	0.0	0.0	249.4	133.3
WAPA_654	415.2	61.7	-281.6	152.9	1025.2	186.3	1206.2
655	554.1	30.5	0.0	0.0	0.0	419.1	32.0
WAPA_655	-44.0	5.6	11.5	0.0	287.1	-29.4	246.2
656	0.0	415.1	0.0	0.0	0.0	-54.7	3.9
WAPA_656	0.0	117.9	-30.5	0.0	85.2	42.3	51.1
657	772.0	109.4	0.0	0.1	0.0	627.3	31.7
MPC-657	178.1	34.0	-98.5	0.0	185.1	116.4	307.0
659	75.1	1293.6	0.0	0.0	0.0	-459.8	67.6
BEPC_659	-14.9	243.9	-3.4	550.0	1195.5	-347.3	848.2
660	2282.3	202.5	0.0	0.0	0.0	2075.8	4.0
ZONE_660	414.6	126.2	0.0	0.0	0.7	81.2	207.9
661	698.3	320.7	0.0	0.0	0.0	271.6	26.7
MDU_661	98.4	92.3	29.9	3.4	254.9	0.3	236.4
663	75.7	320.0	0.0	0.0	0.0	-232.0	11.6
NWPS_663	24.2	70.2	-20.6	0.0	23.2	-47.7	47.4

665	122.9	409.4	0.0	0.0	0.0	-101.9	1.1
MRES_665	-3.3	129.3	0.0	0.0	4.0	-58.5	15.9
666	0.0	15.8	0.0	0.0	0.0	0.0	0.0
	0.0	3.5	0.0	0.0	0.0	0.0	0.0
667	0.0	556.0	0.0	0.0	0.0	-572.8	7.8
MHSUBWPG	0.0	123.5	-139.1	0.0	153.0	78.2	91.0
668	958.0	779.2	0.0	0.0	0.0	10.3	173.3
MHRURALS	843.4	162.6	-1396.3	268.5	806.5	-1172.1	3781.4
669	126.6	321.3	0.0	0.0	0.0	-212.0	17.4
MHWPGHYD	11.5	126.5	-52.0	0.0	32.6	-120.2	89.8
670	3447.8	51.0	0.0	0.0	0.0	3366.9	29.9
MHRURALN	1115.0	9.6	-799.3	150.8	353.6	1629.1	478.4
671	0.0	683.9	0.0	0.0	0.0	-683.4	3.6
MH INDUS	0.0	124.3	0.0	0.0	11.0	-124.9	16.8
672	0.0	2182.1	0.0	0.0	0.0	-2391.7	88.4
SPC	95.8	523.4	-329.5	86.1	995.3	121.3	643.1
674	0.0	641.5	0.0	0.0	0.0	-533.2	12.9
SPC-IND	0.0	127.0	5.5	0.0	122.7	-30.4	67.4
675	2648.9	138.0	0.0	0.0	0.0	2510.9	0.0
SPC-SSL	67.4	33.7	-52.2	0.0	0.0	-146.1	232.0
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	84.2	20.3	0.0	0.0	0.0	26.5	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	86.7	543.2	0.0	0.0	0.0	-491.8	35.1
DPC_680	9.8	141.8	-67.7	-5.9	87.8	-64.8	94.6
681	661.0	29.3	0.0	0.0	0.0	614.4	23.2
DPC_681	-12.1	9.2	-56.3	0.3	103.8	-37.7	177.8
682	0.0	33.9	0.0	0.0	0.0	-34.7	0.1
DPC_682	0.0	13.6	0.0	0.0	0.2	-13.7	0.1
683	0.0	4.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.9	0.0	0.0	0.0	0.0	0.0
684	0.0	10.2	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
685	0.0	13.2	0.0	0.0	0.0	0.0	0.0
	0.0	4.1	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0

707	28157.1	29430.7	6.4	213.3	0.0	-2153.7	660.3
MEPCO	5844.7	5450.6	-6972.5	29.9	4708.1	849.4	11195.2
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-417.3	57.3
NMPC WES	526.0	747.5	-104.0	-46.2	347.0	-440.5	716.1
752	4633.2	1634.8	4.5	0.0	0.0	2921.2	72.6
NMPC CEN	1196.9	759.9	-192.3	-21.2	472.8	-168.1	1291.3
753	1214.0	599.0	0.5	0.0	0.0	462.3	152.2
NMPC MVN	187.5	222.6	-783.9	-4.1	1264.0	-78.8	2095.9
754	2286.2	1954.6	7.2	0.1	0.0	237.6	86.7
NMPC EAS	852.6	866.7	-1066.6	-17.7	283.6	414.1	939.7

Appendix E – Loss Analysis

755	684.8	463.2	-3.1	0.0	0.0	207.4	17.4
NYSEG WE	200.4	247.5	-148.8	-7.3	299.6	179.3	229.2
756	752.4	1284.1	3.4	2.1	0.0	-604.2	67.0
NYSEG CE	213.8	630.7	-452.8	-183.1	350.3	-188.4	757.7
757	0.0	264.1	1.2	0.5	0.0	-269.1	3.2
NYSEG EA	0.0	122.6	-71.0	-77.2	17.4	28.2	14.8
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.5
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.7	32.0
RG&E	71.3	534.8	-639.8	-87.2	264.7	136.9	391.4
760	1369.2	1213.9	0.0	0.2	0.0	73.2	82.0
CENT HUD	432.4	340.7	-421.9	-3.3	185.5	-319.1	1021.6
761	1879.0	1067.6	0.1	0.3	0.0	792.3	18.6
O&R	721.6	363.7	-2.7	-62.4	23.6	104.8	341.7
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	641.4	2017.7	-805.1	-0.8	1813.9	231.1	1012.3
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	503.0	245.3	-1.9	0.0	0.9	95.2	165.4
764	906.5	532.4	0.0	0.0	0.0	368.8	5.3
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.6
765	7959.5	11796.5	0.0	0.0	0.0	-3975.6	138.5
CON ED C	3398.4	5697.1	-2296.4	0.0	3995.8	-552.8	4546.4
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	10.4	16.7	0.0	0.0	0.0	-6.3	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.6	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.2
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.5	15.6
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.8	33.1
CON ED N	568.9	167.3	-355.4	0.0	333.8	290.8	800.0
775	0.0	1483.2	0.0	0.0	0.0	-1519.0	35.8
CON ED C	0.0	686.3	-196.0	0.0	1494.2	-109.5	1113.4
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.6	0.0	0.0	0.0	0.0	43.1	15.5

777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.8	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-344.5	31.6
NMPC GNS	18.2	113.0	-187.1	-5.2	24.9	11.3	111.1
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.5
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.8	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.5	14.5
CE UPNY	0.0	0.0	0.0	0.0	466.5	155.2	311.2
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.4	59.9
	29.2	882.6	-703.7	38.2	359.7	-393.1	564.9
787	0.0	2168.8	0.0	4.3	0.0	-2194.8	21.7
	0.0	1124.8	-756.9	21.4	267.3	-558.4	436.5
788	350.2	2183.2	0.0	8.2	0.0	-1872.7	31.6
	136.2	1086.4	-940.4	53.2	70.1	-454.9	461.9
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-175.2	7.7	10.3	-33.8	68.4
790	350.6	1327.4	0.0	5.8	0.0	-1014.5	31.9
	-11.7	631.9	-640.4	27.9	65.8	-290.9	325.5
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	5.6	251.6	-20.8	41.9	170.2	-227.8	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.2
	49.3	402.4	-28.8	29.1	192.0	-434.6	273.5
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	271.1	850.1	-183.5	68.5	507.6	-608.0	651.6
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.8
	22.9	363.0	-213.1	5.4	122.9	-109.1	99.7
795	28.1	3513.3	0.0	7.1	0.0	-3538.5	46.2
	0.0	1589.8	-1808.3	49.8	131.3	-828.7	1128.7
796	166.2	2162.1	0.0	4.2	0.0	-2018.6	18.5
N-RICHVW	-13.6	1026.6	-719.0	28.6	146.2	-941.3	737.9
797	0.0	3286.0	0.0	6.9	0.0	-3334.0	41.1
W-RICHVW	0.0	1613.3	-1707.3	31.1	256.1	-567.9	886.9

Appendix E – Loss Analysis

798	0.0	904.1	0.0	7.6	0.0	-946.6	34.9
	0.0	420.9	313.2	18.4	306.9	-900.4	454.9
799	1271.6	1490.6	0.0	6.5	0.0	-274.1	48.7
	435.6	727.4	-386.1	31.6	339.9	-496.9	899.6
800	441.0	1549.0	0.0	10.6	0.0	-1159.7	41.1
	69.6	742.7	-826.5	33.8	502.8	-80.5	702.7
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	173.7	32.5	0.0	7.8	47.3	18.8	161.9
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-45.4	208.4	-192.6	51.5	243.5	-225.7	356.6
803	0.0	0.0	0.0	0.0	0.0	-10.1	10.1
	0.0	0.0	0.0	0.0	349.6	285.3	64.3
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	559.6	30.4	0.0	3.6	0.0	286.7	238.8
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.0
	1242.8	124.0	0.0	23.7	6.4	638.8	462.7
806	3082.7	96.0	0.0	2.3	0.0	2977.3	7.1
	1146.7	56.0	0.0	15.9	2.9	683.5	394.2
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.9	0.0	0.0	95.9	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1423.3	200.0	0.0	10.1	0.0	657.4	555.8
811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1439.5	48.0	0.0	9.4	0.0	946.9	435.3
812	215.6	60.0	0.0	1.1	0.0	153.8	0.7
	231.3	30.4	0.0	4.6	0.0	170.5	25.8
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-38.7	6.0	0.0	2.1	0.0	-66.5	19.6
814	315.9	20.0	0.0	0.3	0.0	294.9	0.7
	213.1	10.0	0.0	2.7	0.0	160.2	40.2
815	0.0	0.0	0.0	0.5	0.0	-136.8	136.3
	0.0	0.0	0.0	250.5	5103.1	3254.7	1597.9
816	285.1	244.2	0.0	0.4	0.0	31.3	9.2
	102.3	112.4	0.0	4.5	67.5	-11.5	64.4
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0

818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.9	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9

RICHELIE	-41.4	586.5	-1117.7	0.0	186.5	-290.6	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5

864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2

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 887             68.4       0.0       0.0       0.0       0.0      62.7       0.1
NSWEST-G         28.9       0.0       0.0       0.0       0.2      23.0       3.4

 900              0.0       0.0       0.0       0.0       0.0      -0.2       0.2
                  0.0       0.0       0.0       0.0       0.0      -2.9       2.9

 901              0.0      32.5       0.0       0.0       0.0       0.0       0.0
                  0.0      10.7       0.0       0.0       0.0       0.0       0.0

 918              0.0     118.5       0.0       0.0       0.0    -119.2       0.7
                  0.0      11.4       0.0       0.0       1.5     -13.4       3.5

 950              0.0       0.0       0.0       0.0       0.0       0.0       0.0
                 16.0       0.0      -1.9       0.0       0.0      16.7       1.2

 970            156.5     667.7       0.0       0.0       0.0    -512.0       0.8
                 19.9      65.4       0.0      -1.6       5.7     -42.0       3.9

 998              0.1    -186.0       0.0       0.0       0.0     186.0       0.1
                  0.0     123.0       0.0       0.0       0.0    -124.2       1.2

 999            240.1     500.0       0.0       0.0       0.0    -260.2       0.3
                -32.5       0.0    -223.3       0.0     260.3       5.5     445.6

1600              0.0       0.0       0.0       0.0       0.0       0.0       0.0
                  0.0       0.0       0.0       0.0       0.0       0.0       0.0

1604              0.0       0.0       0.0       0.0       0.0       0.0       0.0
                  0.0       0.0      30.2       0.0       0.0     -30.2       0.0

1628              0.0      77.3       0.0       0.0       0.0       0.0       0.0
                  0.0      24.1       0.0       0.0       0.0       0.0       0.0

1629              0.0       0.0       0.0       0.0       0.0     -80.8       3.5
                  0.0       0.0       0.0       0.0      26.6     -38.0      40.4

1636             36.0       0.0       0.0       0.0       0.0      33.1       2.9
                -11.8       0.0       0.0       0.0      14.9     -18.1      21.2

1666              0.0       1.4       0.0       0.0       0.0      -2.4       1.0
                  0.0       0.4       0.0       0.0       3.6      -3.7       6.8

TOTALS       659375.6  642693.7     211.1     491.8       0.0       0.0   15966.4
             131335.0  191178.4-131842.3    4502.6  166233.8       0.0  233769.0
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DRG II – SUOP Post 2013 Case + 600 MW

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     PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E      WED, AUG 05 2009  10:33
MTEP06 - 2011 SUMMER PEAK PHASE 3 CONTRACTUAL DISPATCH CASE          ZONE TOTALS
MTEP-2013_SUOP_FINAL(V1)_TOPOLOGY-(052307)                            IN MW/MVAR

                FROM       TO    TO BUS  TO LINE     FROM       TO
X-- ZONE --X GENERATION   LOAD     SHUNT    SHUNT CHARGING  NET INT    LOSSES

   1         13592.1   3700.4       0.0      0.0       0.0   9707.1     156.6
PJM500KV      3604.2    996.9    -708.8      0.0    3903.2   1407.7    5802.3
```

2	0.0	6272.4	0.0	0.0	0.0	-6303.5	31.1
NORTHERN	0.0	1172.3	-123.0	0.0	74.4	-1133.8	158.9
3	0.0	1604.0	0.0	0.0	0.0	-1634.2	30.2
ROCK RIV	76.8	220.7	-56.9	0.0	74.6	-198.8	186.4
4	0.0	3087.7	0.0	0.0	0.0	-3114.2	26.6
SOUTHERN	0.0	996.2	-240.3	0.0	56.5	-815.1	115.7
5	265.0	136.6	0.0	0.0	0.0	-192.6	291.4
345KV	58.7	50.1	100.1	0.0	3087.9	-1405.9	4390.8
6	305.5	35.4	0.0	0.0	0.0	222.3	47.8
PEAKERS	-28.0	14.1	-279.1	0.0	264.6	-303.3	804.8
7	17335.2	487.1	0.0	6.0	0.0	16802.2	40.0
GEN BUS	4000.4	72.4	-31.0	41.2	0.0	2364.3	1553.5
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.1
TR MIDPT	0.0	723.1	-687.7	0.0	0.0	-1322.1	1279.3
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4447.0	0.0	0.0	4158.9	8.0
10	4053.5	108.9	0.1	0.0	0.0	3942.8	1.8
CHI-ESS	774.4	59.8	-11.9	0.0	7.9	592.0	142.4
11	9106.0	0.0	0.0	0.0	0.0	9075.9	30.0
IPP GEN	2440.6	0.0	0.0	0.0	224.1	1889.4	775.3
12	0.0	1745.4	0.0	0.0	0.0	-1751.8	6.4
C-N	0.0	493.2	0.0	0.0	480.6	-67.9	55.3
14	567.5	2092.1	0.0	0.1	0.0	-1550.1	22.4
C-S	78.1	575.0	-204.4	0.0	133.7	-416.3	257.2
15	64.0	1388.8	0.0	0.0	0.0	-1347.7	22.9
YORK 115	-15.6	186.5	-37.4	0.0	72.9	-193.2	101.5
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.2	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.3	38.5
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-87.0	76.1
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.9	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.5	38.9
NO-ESS	1139.7	421.9	-87.8	0.0	196.5	271.8	672.6
21	1073.7	645.0	0.0	0.0	0.0	411.9	16.7
	564.9	165.4	-98.7	0.0	43.3	386.3	155.2

22	0.0	611.9	0.0	0.0	0.0	-616.5	4.6
	0.0	305.6	0.0	0.0	20.7	-328.1	43.2
23	765.0	6607.3	0.0	0.0	0.0	-6000.5	114.9
N-R	200.8	2128.3	-1684.7	0.0	51.0	-1058.4	886.2
24	1157.0	2326.7	0.0	0.0	0.0	-1258.6	88.9
N-S	370.3	542.9	-339.9	0.0	147.8	-725.1	1040.2
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.8	0.0	0.0	-498.0	713.6
26	2254.5	393.2	0.0	0.0	0.0	1844.8	16.5
JCSO 230	681.1	101.8	-543.2	0.0	90.5	776.7	436.3
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.3	21.1
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.6	43.1
32	13.0	183.6	-1.5	0.0	0.0	-280.2	111.1
	0.0	51.1	-637.8	0.0	372.8	-1142.8	2102.4
33	8502.5	40.5	0.0	0.0	0.0	8455.0	7.0
	1566.2	6.0	0.0	0.0	0.0	1500.6	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.1	9.2
NORTHEAS	18.6	134.0	-144.8	0.0	29.5	14.0	44.9
35	0.0	1539.0	-22.7	0.0	0.0	-1523.4	7.1
	0.0	706.2	-744.4	0.0	3.3	-5.5	47.1
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.2	14.7
	0.0	407.8	-369.6	0.0	0.4	-115.9	78.1
38	0.0	1923.0	-7.1	0.0	0.0	-1933.8	17.8
	0.0	594.9	-392.5	0.0	12.6	-309.7	119.9
40	196.7	681.0	0.0	0.0	0.0	-485.9	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-263.4	11.9
41	0.0	1594.2	-0.4	0.0	0.0	-1699.4	105.6
PECO	0.0	605.4	-1682.8	0.0	459.3	-254.9	1791.6
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-109.0	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.7	0.0	0.0	-260.1	92.2
44	4107.4	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	257.4	78.6	-93.8	0.0	0.0	101.4	171.2

45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	508.8	0.0	0.0	0.0	0.0	261.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.8	0.0	0.2	-11.6	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.4	0.0	0.0	-541.8	236.1
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-112.0	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1060.6	65.2
PS NORTH	906.2	703.8	0.0	0.0	1670.3	91.6	1751.6
51	2113.7	2698.7	0.0	0.0	0.0	-545.5	33.6
PS CENTR	553.9	233.7	-887.5	0.0	115.8	537.5	842.3
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	629.6	64.4	-453.0	0.0	158.3	360.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.4	6599.6	0.0	0.0	0.0	-3139.2	116.3
BGE 115	934.7	3991.4	-4555.9	0.0	467.1	-96.8	2037.3
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-112.1	0.0	0.0	-17.4	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-284.4	0.0	0.0	-46.2	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.5	6963.1	0.0	0.0	0.0	-1282.0	110.5
PEPCO	1696.3	1558.7	-971.2	0.0	1192.2	-35.3	2336.3
77	1501.9	1575.1	0.0	0.0	0.0	-1543.9	91.6
RIVER	446.6	102.4	-410.4	0.0	112.0	-301.3	1072.2
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	92.4	118.5	-32.9	0.0	10.0	-173.9	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	2.0	7.1	-5.6	0.0	0.0	0.5	0.0

88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	7.3	32.4	-26.1	0.0	0.4	-4.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1387.7	88.0
DPL COMP	453.2	610.6	-1171.2	0.0	240.0	55.2	1198.6
90	521.2	85.3	148.0	0.0	0.0	320.2	19.5
	70.1	12.2	0.0	0.0	269.0	59.9	272.5
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.5	21.6
96	46.7	186.0	0.0	0.0	0.0	-142.9	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-55.8	48.6
101	11453.2	12787.3	0.1	0.3	0.0	-1552.8	218.3
CPL-E	2847.1	2805.5	-1774.4	-917.1	1402.9	670.8	3465.3
106	811.6	846.3	0.0	0.0	0.0	-43.8	9.2
CPL-W	117.4	174.1	-205.9	-16.0	62.1	83.5	143.8
110	21271.0	20975.5	11.6	3.4	0.0	-102.4	482.9
DUKE.DUK	5113.5	9083.6	-7729.1	-1202.3	1822.9	16.8	6853.4
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.2	157.3	-104.2	-15.9	38.7	2.2	24.5
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.1
113	5.7	4.0	0.0	0.0	0.0	0.2	1.5
YADKIN	-10.3	2.0	0.0	0.0	1.7	-12.9	2.3
114	427.5	0.0	0.0	0.0	0.0	426.0	1.6
HARTWELL	185.3	0.0	0.0	0.0	0.0	124.1	61.2
115	6114.3	5184.0	0.0	0.0	0.0	835.5	94.8
SCEG	1426.2	2219.9	-1403.4	0.0	419.7	-177.1	1206.5
120	0.0	1628.9	0.0	0.1	0.0	-1650.2	21.2
SC-SO	0.0	614.7	-392.7	-80.7	100.7	-165.3	122.2
121	3198.3	1321.2	0.1	0.0	0.0	1812.4	64.5
SC-NO	598.0	495.3	-444.7	-48.4	271.7	-128.7	996.2
122	1757.0	1818.4	0.0	-0.1	0.0	-102.3	41.0
SC-EA	468.6	515.0	-374.1	-26.8	135.1	-61.2	550.7
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.6	51.7
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0

128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3549.9	8.0	0.0	0.0	0.0	3507.3	34.6
AECI	776.7	2.6	-115.6	105.2	724.2	916.6	644.7
131	27.0	347.4	0.0	0.0	0.0	-353.4	15.2
AECI-NW	-1.5	87.1	-2.7	0.0	66.1	-73.7	49.5
132	24.0	241.7	0.0	0.0	0.0	-223.2	8.0
AECI-NE	0.0	59.8	-16.5	0.0	31.3	-29.4	18.1
133	0.0	862.4	0.1	0.0	0.0	-899.9	37.3
AECI-CNT	0.0	216.1	-25.8	0.0	92.3	-291.5	193.6
134	15.0	637.2	0.0	0.0	0.0	-693.4	33.5
AECI-KMO	-4.2	159.7	-84.0	0.0	65.7	-123.8	100.2
135	0.0	631.1	0.0	0.0	0.0	-643.7	12.6
AECI-KOK	0.0	158.2	-78.2	0.0	47.1	-95.3	62.4
136	0.0	924.8	0.1	0.0	0.0	-951.5	26.6
AECI-SMP	0.0	231.7	-81.5	52.6	101.3	-195.3	146.4
137	0.0	390.8	0.0	0.0	0.0	-410.6	19.8
AECI-M&A	0.0	98.0	-4.5	0.0	40.3	-124.4	71.2
138	2108.4	1021.0	0.0	0.0	0.0	1058.0	29.5
LAGN	321.7	328.6	0.0	0.0	143.8	-260.4	397.4
140	28541.9	30306.1	19.6	3.3	0.0	-2325.2	538.1
GA-ITS	6529.8	12635.5	-10409.1	-834.0	4550.0	-33.8	9721.3
141	16564.1	13418.4	8.2	0.3	0.0	2840.2	241.1
APC	3446.1	3598.5	-2162.3	-162.6	1525.2	-289.9	3982.3
142	2083.0	2655.8	2.2	0.0	0.0	-640.3	53.9
GULF	-182.8	796.7	-1532.6	-42.5	193.7	147.0	642.1
143	3073.0	2653.2	3.5	0.0	0.0	340.8	75.4
MPC	985.7	938.2	-658.6	-6.3	516.3	117.0	1111.7
144	2084.0	1111.6	2.6	0.0	0.0	939.6	30.2
SAV	563.5	427.0	-391.5	0.0	55.1	72.7	510.3
145	855.0	790.7	0.0	0.0	0.0	42.4	22.0
SMEPA	114.6	265.5	-185.9	0.0	116.9	37.9	114.1
147	0.7	0.0	0.0	0.0	0.0	0.7	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.5	2058.2	0.0	0.0	0.0	1547.8	75.8
AEC	605.9	325.8	-411.7	0.0	294.0	220.7	769.6

155	6224.7	5901.4	1.9	0.5	0.0	154.5	166.4
EES_WEST	1500.2	2235.9	-1492.1	58.4	1013.4	48.0	1663.4
156	8945.6	9770.0	0.1	2.1	0.0	-918.7	92.0
EES_SOU	2013.4	2719.3	-1208.4	-573.0	857.5	101.7	1831.3
157	5443.0	5006.3	0.0	1.0	0.0	383.6	78.7
EES-ASNO	1241.8	1873.2	-618.4	-361.7	797.9	-350.1	1507.5
158	909.8	1767.3	0.0	0.7	0.0	-903.6	45.4
EES_CNTR	192.4	477.0	-304.3	-70.8	456.6	-9.6	556.8
159	8721.2	7791.3	0.0	106.4	0.0	688.6	134.9
EES_NOR	1026.0	2331.1	-947.5	-153.7	2112.5	-241.3	2149.7
165	3026.5	5549.8	0.0	0.0	0.0	-2638.5	115.3
TVA_WEST	1136.4	1662.5	-1940.9	100.7	1169.7	1027.7	1456.0
166	17554.4	15266.6	0.1	0.0	0.0	1981.0	306.7
TVA_CENT	4017.1	5590.8	-3192.9	102.1	3312.7	-186.0	5015.6
167	11513.7	9894.8	0.0	0.0	0.0	1461.9	157.0
TVA_EAST	2750.0	3523.9	-1850.4	212.4	2174.0	773.7	2264.4
168	0.0	3539.8	0.0	0.0	0.0	-3556.9	17.1
TVA_MEMP	0.0	1035.2	-177.2	0.0	104.3	-914.2	160.4
169	108.5	0.0	0.0	0.0	0.0	108.2	0.3
TVA_IPP	37.6	0.0	0.0	0.0	80.3	105.8	12.1
181	99.5	1772.1	0.0	0.0	0.0	-1676.8	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.2	49.8
182	0.0	3191.7	0.0	0.0	0.0	-3219.3	27.6
FAIRFAX	0.0	712.2	-990.5	0.0	104.2	-194.6	577.1
183	2665.0	1076.7	0.1	0.0	0.0	1571.9	16.2
WOODBRDG	50.4	294.2	-264.2	0.0	46.1	-138.5	205.0
184	275.0	483.0	0.0	0.0	0.0	-212.4	4.5
NOR NECK	65.9	100.9	-52.5	0.0	30.1	10.6	37.0
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-0.7	568.9	-317.7	0.0	60.4	-397.9	206.4
186	1144.0	1510.4	0.0	0.0	0.0	-379.2	12.8
YORKTOWN	-27.6	378.2	-473.2	0.0	66.5	22.7	111.2
187	2514.2	1730.7	0.0	0.0	0.0	769.8	13.6
CHESTERF	179.8	500.7	-286.9	0.0	99.8	-62.2	128.1
188	1411.0	637.6	1.3	0.0	0.0	754.0	18.1
SOUTHSDE	-152.7	156.6	-235.2	0.0	47.7	-135.8	109.5
189	710.0	2837.7	0.0	0.0	0.0	-2151.8	24.1
VA BEACH	179.8	690.0	-566.0	0.0	122.4	-200.0	378.2

190	1414.0	1111.3	0.0	0.0	0.0	298.9	44.6
SUFFOLK	51.8	251.4	-485.6	0.0	201.0	130.5	363.3
191	0.0	640.2	0.3	0.0	0.0	-665.7	8.3
OUTBANKS	0.0	161.1	-247.2	0.0	64.2	88.5	61.7
192	994.0	1116.2	0.3	0.0	0.0	-153.9	31.4
CAROLINA	47.7	296.5	-336.5	0.0	133.4	-7.7	228.8
193	1020.0	1831.2	0.0	0.0	0.0	-843.1	32.0
GORDONSV	-54.8	375.5	-237.9	0.0	164.9	-343.5	316.1
194	0.0	1211.1	0.0	0.0	0.0	-1231.2	17.5
VALLEY	0.0	326.6	-353.8	0.0	85.4	-117.0	229.0
195	1704.0	708.9	0.0	0.0	0.0	941.3	39.0
LEXINGTN	236.7	198.1	-131.2	0.0	189.9	-81.2	438.2
196	9293.0	816.3	0.0	0.0	0.0	8344.4	132.3
500KV	349.2	150.6	-689.3	0.0	2660.7	883.4	2665.1
197	1055.3	171.7	0.0	0.0	0.0	861.3	22.3
	337.8	34.7	0.0	0.0	181.3	220.0	264.4
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.5	45.3
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.4
201	9051.5	11383.3	0.0	0.0	0.0	-2543.4	219.0
AP	1470.5	2884.8	-2362.9	0.0	2230.7	-636.8	3818.1
202	1857.0	362.0	0.0	0.0	0.0	1465.4	22.3
	317.1	66.1	-35.2	0.0	145.1	116.3	313.6
203	151.0	472.3	0.0	0.0	0.0	-338.5	17.3
	48.6	97.1	-142.8	0.0	236.8	235.6	95.5
204	748.0	748.9	0.0	0.0	0.0	-24.9	29.9
	109.9	149.4	-146.1	0.0	258.8	166.1	200.8
205	0.0	43.0	0.0	0.0	0.0	-64.8	15.8
	0.0	15.2	0.0	0.0	8.9	-39.3	30.8
206	2045.8	61.7	0.0	0.0	0.0	1974.9	9.2
OVEC	-267.7	6.2	0.0	0.0	559.9	185.8	100.2
207	1086.2	598.4	0.0	0.0	0.0	494.7	21.1
HE	13.0	184.9	-149.2	0.0	125.5	-56.1	168.2
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.5	1.7
209	3787.6	3668.4	0.0	0.0	0.0	-293.2	101.0
DPL	170.4	663.9	-1420.9	0.0	393.4	158.0	1117.6

210	530.0	1085.5	0.0	0.0	0.0	-627.0	27.2
SIGE	233.7	348.6	-279.3	-0.7	48.9	-103.6	300.1
211	7700.5	8208.8	0.0	0.0	0.0	-739.5	231.3
LGEE	2798.2	2800.2	-1118.1	74.3	950.4	-544.7	2536.9
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.7	39.2	-21.9	0.0	10.4	-65.4	53.5
213	171.0	77.1	0.0	0.0	0.0	109.9	0.8
	51.2	5.4	0.0	0.0	5.2	28.6	22.3
214	1453.9	1769.8	0.0	0.0	0.0	-324.5	8.5
BREC	346.9	725.6	-293.3	0.0	108.9	-37.1	60.7
215	3253.4	3139.2	0.0	0.0	0.0	90.7	22.1
DLCO	465.2	438.2	-123.9	0.0	676.3	233.2	593.8
216	3068.3	2585.5	0.0	3.6	0.0	430.0	53.0
IPL	122.6	513.3	-472.5	21.1	325.5	-493.1	878.9
217	2482.2	2844.3	0.0	0.0	0.0	-395.5	44.6
NIPS	443.9	927.1	-460.6	0.0	375.6	-170.1	525.1
218	8406.2	129.1	0.0	0.0	0.0	8140.6	136.6
METC	596.5	58.1	-248.0	0.0	1974.5	1022.6	1738.1
219	1096.0	3771.3	0.0	0.0	0.0	-2819.9	148.3
ITC	11.6	1431.5	-418.7	0.0	1987.5	-1459.0	2445.8
220	2876.7	2302.3	0.0	4.1	0.0	456.3	114.0
EKPC	719.8	879.9	-932.5	10.7	230.5	52.0	940.2
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	11731.6	748.4	0.0	0.0	0.0	10945.6	37.6
FE-GEN	1886.6	503.9	0.0	0.0	151.2	115.5	1418.3
231	0.0	350.9	0.0	0.0	0.0	-352.6	1.6
FE-AK-23	0.0	79.2	0.0	0.0	0.1	-103.9	24.8
232	0.0	1198.0	0.0	0.0	0.0	-1221.6	30.0
FE-AK	0.0	249.2	-371.0	0.0	301.7	64.3	360.5
233	0.0	552.8	0.0	0.0	0.0	-558.7	5.9
FE-LAKE	0.0	127.7	-146.9	0.0	46.0	-16.1	81.3
234	0.0	203.7	0.0	0.0	0.0	-210.9	7.2
FE-MASS	0.0	24.6	0.0	0.0	12.1	-43.1	30.5
235	173.5	837.2	0.0	0.0	0.0	-686.9	20.8
FE-PP	14.0	213.5	-210.3	0.0	121.0	-83.3	214.7
236	0.0	94.6	0.0	0.0	0.0	-95.8	1.3
FE-ALL	0.0	30.2	0.0	0.0	8.0	-30.7	8.6

237	0.0	401.9	0.0	0.0	0.0	-404.2	2.4
FE-WARR	0.0	128.9	-67.6	0.0	27.1	-67.9	33.7
238	3.5	1085.8	0.0	0.0	0.0	-1118.0	29.2
FE-YNG	-10.1	261.0	-60.2	0.0	245.2	-215.9	248.9
239	24.0	3287.0	-3.3	0.0	0.0	-3294.0	34.3
FE-CEI	7.0	1218.6	-1208.3	0.0	412.7	-84.1	493.5
240	0.0	241.1	0.0	0.0	0.0	-243.4	2.3
FE-CPP	0.0	49.3	-49.3	0.0	0.0	-9.2	9.3
241	1995.0	892.1	0.0	0.4	0.0	1096.5	33.3
FE-MN	175.2	161.3	-103.2	2.3	255.5	11.1	365.6
242	1091.0	758.0	0.0	0.4	0.0	303.8	28.1
FE-MR	231.2	184.3	-80.9	0.8	195.5	40.2	279.0
243	3.5	950.2	0.0	0.2	0.0	-972.8	25.5
FE-SP	-12.6	188.9	-130.4	1.2	70.3	-146.7	142.5
244	1197.2	664.8	0.0	0.1	0.0	506.6	21.4
FE-BAY	357.7	173.1	-128.5	0.8	224.3	308.6	224.2
245	2212.8	4566.6	0.0	3.6	0.0	-2444.0	89.8
FE-TE	755.0	1194.9	-457.7	7.5	605.0	-316.5	929.8
246	26.0	862.0	0.0	0.6	0.0	-874.4	9.0
	10.5	170.8	0.0	-16.6	87.5	-176.1	104.9
250	7545.5	6638.7	0.0	0.0	0.0	737.7	169.1
AEP-AP	-250.9	1829.0	-1748.1	1626.3	3665.5	-605.7	2313.2
251	10848.6	5388.7	0.0	0.0	0.0	5250.3	209.6
AEP-OP	-489.9	836.3	-1488.0	2786.8	5556.3	272.3	2659.0
252	6499.6	4801.8	0.0	0.0	0.0	1531.5	166.3
AEP-IM	-261.7	732.1	-760.3	1495.5	3486.7	-331.1	2088.8
253	2449.0	5404.9	0.0	0.0	0.0	-3094.7	101.6
AEP-CS	214.5	1277.3	-1529.8	0.0	708.4	181.0	976.4
254	265.6	1403.2	0.0	0.0	0.0	-1189.9	52.3
AEP-KP	189.9	366.0	-429.6	0.0	73.8	14.2	313.0
255	363.3	1628.6	0.0	0.0	0.0	-1278.4	13.2
AEP-OP-I	56.5	669.3	-59.4	0.0	33.0	-600.6	80.3
256	0.0	573.6	0.0	0.0	0.0	-578.6	5.0
AEP-IM-I	0.0	104.3	-35.4	0.0	40.8	-55.3	27.3
257	450.0	330.3	0.0	0.0	0.0	105.3	10.9
	76.2	92.0	-13.5	0.0	75.0	-57.3	129.9
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.0

259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.1	3.9
	119.0	84.6	-36.3	0.0	3.5	34.6	39.6
261	3001.6	105.2	0.0	0.0	0.0	2895.1	1.2
ITC-GN	18.5	15.0	0.0	0.0	34.8	15.5	22.8
262	6157.3	783.0	0.0	0.0	0.0	5335.7	38.7
ITC-GS	740.7	176.9	-193.4	0.0	138.5	674.7	221.2
263	1548.7	5711.7	0.0	0.1	0.0	-4217.3	54.2
ITC-DIS	397.6	2217.9	-3061.8	125.3	421.0	1117.2	420.1
264	8.0	615.0	0.0	0.0	0.0	-634.6	35.4
	7.8	185.6	-74.9	0.0	91.5	-233.8	224.5
265	2273.4	1221.8	0.0	0.0	0.0	990.4	60.5
	340.6	275.7	-187.5	1.4	481.7	159.6	572.0
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.8	93.3	-111.6	0.0	36.7	18.9	126.1
267	481.0	522.5	0.0	0.0	0.0	-62.8	21.3
	202.2	186.5	-148.6	0.3	125.0	89.6	199.3
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	55.0	219.7	0.0	0.0	0.0	-165.9	1.2
MUNI	7.6	49.3	0.0	0.0	1.9	-52.7	13.0
271	507.0	364.3	0.0	0.0	0.0	141.2	1.5
LANSING	-113.8	146.0	-87.1	0.0	5.3	-177.1	9.7
272	81.0	601.7	0.0	0.0	0.0	-539.0	18.3
WOLVERIN	15.3	137.2	-102.7	0.0	40.5	-45.0	66.4
273	187.5	6595.4	-1.1	0.0	0.0	-6466.9	60.1
CE	-9.0	1567.4	-1154.7	0.0	79.0	-793.0	450.3
280	270.0	5413.2	0.3	5.8	0.0	-5476.8	211.0
DEI	-41.3	1065.0	-1655.1	-6.4	1158.8	-607.4	2259.7
281	0.0	270.6	0.0	0.0	0.0	-218.5	6.0
HE IN DE	0.0	91.3	0.0	0.0	56.2	-35.3	24.0
282	0.0	705.8	0.0	0.0	0.0	-681.7	2.6
DEI IND	0.0	198.1	-14.6	-0.3	14.0	-172.0	13.3
283	5223.1	360.0	0.0	0.0	0.0	4829.1	0.0
DEI GENS	1632.0	233.2	0.0	0.0	0.0	1343.2	39.6

284	0.0	3336.5	0.5	2.1	0.0	-3403.5	88.2
DEO	0.0	386.7	-629.3	-81.7	516.2	-165.3	1015.5
285	0.0	383.0	0.0	0.0	0.0	-403.7	0.9
DEO IND	0.0	71.0	0.0	0.0	0.9	-84.0	2.9
286	4118.4	0.0	0.0	0.2	0.0	4110.4	7.8
DEO GENS	452.7	0.0	0.0	1.1	0.0	130.2	321.4
287	0.0	310.4	0.1	0.0	0.0	-313.4	2.7
DEK	0.0	37.2	-141.4	0.0	3.1	90.0	16.6
288	0.0	11.8	0.0	0.0	0.0	-16.7	0.2
DEK IND	0.0	7.7	0.0	0.0	0.3	-10.8	1.0
290	88.3	105.0	0.0	0.0	0.0	48.3	0.0
	132.0	56.0	0.0	0.0	0.0	101.9	14.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	241.8	150.0	-21.2	0.0	0.0	63.8	49.1
301	0.0	0.0	0.0	0.0	0.0	-1.2	1.2
CIL345	0.0	0.0	0.0	0.0	48.2	7.1	41.1
302	0.0	242.8	0.0	0.0	0.0	-249.2	6.4
302	0.0	70.8	0.0	0.0	31.6	-103.3	64.0
303	690.0	65.0	0.0	0.0	0.0	624.8	0.2
CILGEN	292.0	40.3	0.0	0.0	0.0	245.7	5.9
304	0.0	342.1	0.0	0.0	0.0	-343.3	1.1
PEORIA	0.0	88.1	-31.2	0.0	0.3	-62.0	5.3
305	0.0	79.2	0.0	0.0	0.0	-79.7	0.4
PEKIN	0.0	20.6	0.0	0.0	0.0	-22.2	1.6
306	0.0	52.1	1.2	0.0	0.0	-53.3	0.1
EASTERN	0.0	9.4	0.0	0.0	0.0	-9.6	0.2
307	0.0	29.8	0.1	0.0	0.0	-30.0	0.0
WESTERN	0.0	6.6	0.0	0.0	0.0	-6.8	0.1
308	0.0	45.8	0.7	0.0	0.0	-46.5	0.0
LACON	0.0	11.1	-3.2	0.0	0.0	-8.1	0.2
309	0.0	25.3	0.0	0.0	0.0	-25.3	0.0
HOMER	0.0	7.4	0.0	0.0	0.0	-7.4	0.0
310	26.7	797.1	0.0	0.0	0.0	-819.2	20.3
REG E-IL	0.0	174.7	-61.4	0.0	112.9	-132.0	128.4
311	850.0	585.4	0.0	0.0	0.0	257.3	7.3
FRKNJEFF	382.6	134.2	0.0	0.0	173.3	300.4	121.4
312	712.0	554.1	0.0	0.0	0.0	132.2	25.7
ST FRAN	201.6	192.6	0.0	0.0	194.2	-11.8	215.1

313	618.0	852.8	0.0	0.0	0.0	-256.6	21.8
STCHMOED	157.3	138.1	0.0	0.0	247.9	29.8	237.2
314	1260.3	598.8	0.0	0.0	0.0	636.5	25.1
LKSDMP&L	530.7	75.5	58.5	0.0	509.3	577.6	328.5
315	0.0	81.3	0.0	0.0	0.0	-81.6	0.4
GREENHIL	0.0	5.7	0.0	0.0	0.0	-9.2	3.5
316	0.0	758.2	5.1	0.0	0.0	-774.1	10.8
SEMO	0.0	200.7	102.4	0.0	86.0	-316.1	99.0
317	7.0	1534.0	0.0	0.0	0.0	-1530.9	3.9
N METRO	0.0	142.1	0.0	0.0	60.2	-156.0	74.1
318	490.0	1820.8	0.0	0.0	0.0	-1338.3	7.5
S METRO	36.7	281.9	-248.3	0.0	43.3	-38.5	84.9
319	95.7	120.3	0.0	0.0	0.0	83.1	0.2
ILL-IOWA	20.0	22.8	0.0	0.0	0.0	13.3	4.3
320	643.0	2.3	0.0	0.0	0.0	642.6	0.4
MOGENINILL	28.8	0.4	0.0	0.0	0.0	7.8	21.1
321	0.0	443.5	0.0	0.0	0.0	-449.6	6.2
SOUTHERN	0.0	110.4	0.0	-0.3	94.2	-73.1	57.2
322	50.0	585.0	0.0	0.0	0.0	-575.0	10.1
357	0.0	125.1	0.0	0.0	104.1	-98.5	81.5
323	415.9	1297.1	0.0	0.0	0.0	-909.3	28.1
EASTERN	1.2	276.4	-37.8	0.0	338.8	-245.5	346.8
329	2362.9	207.4	0.0	0.0	0.0	2152.6	2.8
GEN&LOAD	277.4	91.7	0.0	0.0	0.0	42.5	143.3
331	0.0	0.0	0.0	0.0	0.0	-42.0	0.5
CHICAGO	0.0	0.0	0.0	0.0	2.3	-9.5	2.2
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-11.9	0.0	5.9	16.0	1.0
342	0.0	14.8	0.0	0.0	0.0	-15.6	0.9
C-N	0.0	3.6	0.0	0.0	3.8	-5.2	5.3
344	0.0	39.8	0.0	0.0	0.0	-40.5	0.7
NO-ESS	0.0	13.6	-15.0	0.0	8.8	7.7	2.5
345	0.0	109.0	0.0	0.0	0.0	-112.3	3.3
N-R	0.0	30.1	0.0	0.0	12.0	-38.7	20.7
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.5	0.2
RR-ESS	0.0	2.8	0.0	0.0	5.5	1.9	0.8

348	0.0	162.3	0.0	0.0	0.0	-165.7	3.4
R-S	0.0	55.9	-14.9	0.0	20.4	-38.3	17.6
349	489.5	24.3	0.0	0.0	0.0	457.3	7.9
SO-ESS	84.5	6.5	88.2	60.4	210.7	-9.3	149.4
351	0.0	51.6	0.0	0.0	0.0	-52.0	0.5
EEC	0.0	18.4	-16.3	-5.8	7.6	9.0	2.2
352	0.0	90.9	0.0	0.0	0.0	-93.9	3.0
SEIEC	0.0	44.8	-24.6	-8.2	22.5	-5.4	16.0
353	0.0	24.8	0.0	0.0	0.0	-24.8	0.0
SIEC	0.0	9.4	-16.3	-0.6	0.0	7.5	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	4357.9	3291.3	0.0	0.0	0.0	989.1	77.4
357	640.1	707.1	-558.7	0.0	606.2	52.8	1045.0
360	408.1	343.0	0.0	0.0	0.0	63.2	1.9
360	0.0	103.3	-118.6	0.0	8.4	0.3	23.4
361	3007.6	1750.1	0.0	2.0	0.0	1206.7	47.5
SIPC	688.8	414.8	-127.7	11.4	131.4	-111.1	625.5
362	1102.2	635.3	0.0	0.1	0.0	428.6	20.6
EEI	432.3	126.2	-27.1	0.7	160.5	200.5	288.6
363	551.0	703.5	0.0	0.6	0.0	-134.4	9.8
PJM500KV	44.3	115.3	-115.4	2.4	146.2	48.4	139.2
364	1388.7	575.7	0.0	0.8	0.0	780.5	30.8
SEAST	348.3	94.2	-88.7	6.7	206.4	159.5	378.6
365	1555.4	2285.6	0.0	1.8	0.0	-784.3	50.8
	162.5	404.8	-242.8	7.0	352.4	-237.2	573.5
366	1945.7	1937.9	0.0	0.3	0.0	-57.5	65.0
WPS	113.0	493.0	-804.9	0.9	500.1	165.1	758.9
367	61.1	586.1	0.0	0.9	0.0	-547.8	11.4
MGE	-1.4	182.4	-184.5	1.5	98.7	-58.4	153.3
368	7.0	98.6	0.0	0.0	0.0	-95.7	4.0
UPPC	-1.9	41.4	-46.1	0.0	33.4	21.6	14.5
371	2438.6	2513.0	0.0	0.5	0.0	-327.0	95.8
WPL	436.0	690.2	-952.4	0.4	495.9	203.0	929.2
372	0.0	258.7	0.0	0.0	0.0	-14.9	0.2
WPL-WPPI	0.0	94.0	-8.5	0.0	2.8	5.5	1.7
375	31.3	100.3	0.0	0.0	0.0	-71.0	1.9
ED SAULT	7.9	43.4	-10.2	0.0	55.0	19.2	10.4

376	5126.2	3890.5	0.0	1.5	0.0	1162.5	71.8
WE-MKR	1616.2	1260.8	-681.1	4.4	631.6	206.2	1457.5
377	0.0	679.1	0.0	0.0	0.0	-701.6	18.0
WE-FV	0.0	190.5	-100.7	0.0	184.4	-56.4	150.1
378	35.1	148.0	0.0	0.0	0.0	-115.5	2.6
WE-IR	12.6	54.4	-15.0	0.0	45.8	-1.4	20.4
379	553.6	338.4	0.0	0.0	0.0	203.0	12.2
WE-PI	15.5	51.3	-41.1	0.0	96.6	-16.2	118.1
380	55.8	704.6	0.0	0.0	0.0	-729.3	7.7
WE-WPPI	-14.6	138.5	-126.8	0.0	13.5	-115.6	78.0
381	0.0	16.2	0.0	0.0	0.0	-16.3	0.1
WRWL-WPS	0.0	6.5	0.0	0.0	0.1	-6.6	0.1
382	38.2	279.6	0.0	0.0	0.0	-244.9	3.5
CWP-WPS	22.5	127.3	0.0	0.0	0.0	-135.2	30.4
383	0.0	54.9	0.0	0.0	0.0	-55.1	0.2
MEWD-WPS	0.0	11.9	-26.5	0.0	2.3	15.7	1.2
384	22.1	84.2	0.0	0.0	0.0	-62.7	0.6
MPU-WPS	0.0	16.1	-10.0	0.0	0.4	-10.0	4.3
385	0.0	61.6	0.0	0.0	0.0	-61.7	0.1
WPPI-WPS	0.0	19.6	-34.7	0.0	0.9	15.8	0.2
386	17.1	23.4	0.0	0.0	0.0	-6.3	0.0
ESCANABA	0.1	2.1	0.0	0.0	0.3	-1.8	0.0
390	382.9	551.8	0.0	0.0	0.0	-222.9	21.8
	62.6	204.1	-263.1	0.0	133.7	92.6	144.0
391	1780.7	180.1	0.0	0.0	0.0	446.4	36.6
ALTW_391	541.7	67.4	-424.6	0.0	314.3	347.2	453.6
392	2.7	22.3	0.0	0.0	0.0	-935.1	15.4
ALTW_392	3.6	5.9	-40.9	0.0	51.0	-231.9	39.0
393	1247.4	74.8	0.0	0.0	0.0	1108.6	27.3
ALTW_393	-120.9	6.6	63.5	0.0	184.1	-313.3	288.3
394	617.6	2763.8	0.0	0.0	0.0	-286.2	25.9
ALTW_394	-219.5	864.8	-109.1	-58.9	60.6	-285.8	91.5
395	0.0	53.0	0.0	0.0	0.0	-21.3	0.4
	0.0	17.4	-16.5	0.0	0.5	16.1	2.3
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-318.9	36.4
	472.9	652.1	-286.5	0.0	125.2	-120.7	352.5

401	20561.6	23603.4	0.0	0.0	0.0	-3659.3	621.0
FPLSOUTH	4430.4	6865.8	-6919.9	0.0	4250.9	111.4	8623.9
402	9883.3	11593.8	0.0	0.0	0.0	-1993.6	283.0
FPC GENS	2928.6	4004.9	-3213.5	0.0	1149.4	45.0	3241.7
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.4	5.7
	123.3	102.5	-24.8	0.0	12.4	-15.8	73.9
405	272.2	512.4	0.0	0.0	0.0	-241.6	1.4
HST	98.0	152.0	0.0	0.0	14.3	-60.2	20.5
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1067.8	1247.3	-493.6	0.0	229.1	-209.5	752.8
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.3	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3672.5	90.0	0.0	0.0	0.0	3554.3	28.1
NSB	1044.9	8.9	0.0	0.0	302.5	691.7	646.8
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	300.5	311.4	-51.6	0.0	253.4	-173.5	467.7
412	2239.6	1110.2	0.0	0.0	0.0	1079.3	50.2
SECI	484.6	276.2	-50.5	0.0	180.6	-333.1	772.6
413	866.9	1311.7	0.0	0.0	0.0	-459.6	14.8
MP-GEN	140.9	231.7	-123.0	0.0	30.0	-105.1	167.2
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.1	0.0	32.5	-364.8	156.3
415	629.3	669.5	0.0	0.0	0.0	-88.8	16.2
	161.7	209.0	-130.9	0.0	48.1	-9.9	130.9
416	4916.2	4567.2	0.0	0.0	0.0	227.1	121.8
GENERATN	1575.4	397.3	-825.4	0.0	234.2	278.3	1959.4
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.5
	84.9	36.4	-10.6	0.0	1.7	31.6	29.3
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3

420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	126.0	67.0	0.0	0.0	16.1	50.5	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	236.0	0.0	0.0	0.0	0.0	195.5	40.6
428	100.1	0.0	0.0	0.0	0.0	100.0	0.1
PLANTCTY	17.7	0.0	0.0	0.0	0.0	13.0	4.7
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-112.4	9.2
	17.9	58.2	-24.2	0.0	19.0	-45.3	55.2
442	309.5	102.7	0.0	0.0	0.0	201.7	5.1
	26.0	11.4	0.0	0.0	10.3	-11.1	36.1
443	0.0	93.7	0.0	0.0	0.0	-97.9	3.4
	0.0	15.7	-43.4	0.0	8.4	21.8	10.2
444	575.0	244.5	0.0	0.0	0.0	318.8	9.4
	102.1	59.4	-35.0	0.0	10.5	-20.8	112.8
445	190.0	144.7	0.0	0.0	0.0	44.0	5.9
	31.0	29.1	-18.1	0.0	14.2	-19.6	50.0
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.6	0.0	10.6	-13.9	13.5
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.5	7.4
449	16.0	138.5	0.0	0.0	0.0	-130.1	0.9
	2.8	16.0	0.0	0.0	7.8	-12.8	4.8
450	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	3.0	-3.8	6.7
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.9	1.1
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0

456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.2	1.1
460	769.0	822.9	0.0	0.0	0.0	-65.3	11.4
	374.5	204.4	-25.7	0.0	47.1	87.1	155.9
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.3	3.4
WERE	12.8	57.1	-3.5	0.0	2.2	-30.5	5.8
600	5135.9	384.5	0.0	0.0	0.0	4733.4	19.0
608	675.6	228.4	0.0	0.0	154.8	71.5	541.2
601	1871.0	5359.0	0.0	0.0	0.0	-3916.6	212.1
XEL_MN	71.0	731.2	-2114.1	592.3	2272.8	803.2	2273.0
602	1.5	273.7	0.0	0.0	0.0	-309.9	4.7
XEL_ND	-0.4	54.7	-43.0	0.2	28.4	-15.5	28.4
603	0.0	345.3	0.0	0.0	0.0	-385.1	10.9
XEL_SD	0.0	67.9	-113.9	0.0	22.5	-5.3	65.4
604	164.7	1052.9	0.0	0.0	0.0	-926.1	62.1
XEL_WI	15.5	212.0	-596.1	0.0	248.6	160.2	492.7
605	131.7	493.3	0.0	0.0	0.0	-284.5	3.9
NON-XEL	-39.6	98.7	-69.8	0.0	9.4	-56.4	10.5
608	812.7	336.6	0.0	0.2	0.0	315.6	62.9
MP_608	-52.9	114.3	-903.3	0.9	244.6	3.3	946.6
609	-125.1	1010.8	0.0	0.0	0.0	-1055.1	3.5
MP-INDUS	92.0	367.3	-59.7	0.0	6.6	-237.0	55.2
610	1179.6	81.9	0.0	0.0	0.0	1093.3	1.8
MP-SSL	109.9	44.2	-5.2	0.0	0.3	-20.4	89.7
611	0.0	6.7	0.0	0.0	0.0	-6.7	0.0
	0.0	3.1	0.0	0.0	0.0	-3.6	0.5
613	0.0	194.4	0.0	0.0	0.0	-0.4	0.4
SMPA_613	0.0	48.6	-25.6	0.0	1.2	23.7	3.0
614	6.6	35.8	0.0	0.1	0.0	-38.3	0.2
SMPA_614	7.0	8.9	0.0	0.4	0.6	-6.1	1.5
615	5.9	46.7	0.0	0.0	0.0	-336.4	5.2
SMPA_615	4.0	10.7	-31.4	0.0	31.6	-99.0	46.2

616	136.4	409.2	0.0	0.0	0.0	-4.8	14.8
SMPA_616	-19.7	138.5	-224.5	0.3	90.8	119.9	143.6
617	32.5	59.0	0.0	0.0	0.0	-31.0	0.2
SMPA_617	10.2	14.7	0.0	0.0	3.5	-6.4	3.3
618	0.0	97.9	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	2.4	0.0	0.0	0.0	0.0	0.0
619	95.4	1054.1	0.0	0.3	0.0	-995.8	27.2
GRE-GRE	-38.3	186.8	-652.2	0.7	143.9	422.8	143.7
620	56.0	172.0	0.0	0.2	0.0	-110.1	3.8
GRE-MP	-23.1	26.2	-32.2	0.5	62.0	27.6	17.7
621	61.0	131.9	0.0	0.1	0.0	-70.1	6.7
GRE-OTP	-21.9	22.8	-6.5	0.2	26.1	-37.8	26.3
622	230.8	781.5	0.0	0.2	0.0	-577.6	46.0
GRE-NSP	-96.7	101.2	-9.9	0.7	122.1	-257.7	194.4
623	248.3	97.1	0.0	0.0	0.0	150.4	6.8
GRE-ALT	-102.8	12.6	0.0	0.0	11.8	-114.7	12.3
624	1434.8	0.0	0.0	0.7	0.0	1289.3	55.2
GRE-ND	260.2	0.0	-564.3	4.2	58.3	-642.9	1519.2
625	790.0	4.1	0.0	0.5	0.0	787.0	2.2
GRE-S	-94.7	0.0	0.0	0.7	6.8	-155.5	66.6
626	186.5	163.5	0.0	0.1	0.0	-39.6	17.3
OTP_626	-8.7	52.5	-87.4	0.0	111.8	39.6	87.0
627	18.9	162.3	0.0	0.1	0.0	-204.2	24.1
OTP_627	-1.0	36.0	44.1	28.3	325.6	-27.8	235.1
628	515.0	43.2	0.0	0.0	0.0	459.2	12.4
OTP_628	15.4	16.6	0.0	0.0	27.6	-62.3	88.5
630	19.5	199.2	0.0	0.2	0.0	-221.1	2.5
	-6.5	37.1	-29.7	0.1	9.8	-24.7	9.2
631	10.0	294.0	0.0	0.0	0.0	-480.7	2.3
RPU_631	6.6	73.7	0.0	0.2	14.5	-124.5	23.1
633	164.3	200.5	0.0	0.0	0.0	-37.2	1.0
MPW_633	86.8	48.1	0.0	0.0	9.1	27.6	20.1
635	49.0	156.2	0.0	0.0	0.0	-318.9	5.3
MEC_635	27.5	17.5	-61.1	0.0	32.0	27.4	34.1
636	3319.2	1660.2	0.0	0.0	0.0	1873.9	43.0
MEC_636	799.3	466.5	-147.8	0.0	218.3	173.5	577.3
637	864.8	2122.7	0.0	0.0	0.0	-1274.9	53.1
MEC_637	58.9	318.1	-322.0	0.0	705.5	177.6	599.1

Appendix E – Loss Analysis

638	1023.1	1434.6	0.0	0.0	0.0	-502.9	24.1
MEC_638	276.7	369.4	-157.3	0.0	263.4	20.9	285.7
639	246.6	380.9	0.0	0.0	0.0	-143.2	0.9
MEC_639	49.5	55.7	0.0	0.0	6.7	-3.8	2.6
640	2616.2	2470.5	0.0	0.0	0.0	-142.0	109.1
NPPD_640	262.3	797.5	-657.1	26.0	1076.4	19.8	1108.5
641	132.0	218.1	0.0	0.0	0.0	13.6	0.9
HAST_641	37.0	72.0	0.0	0.0	3.3	-11.6	11.0
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.8
GRIS_642	23.0	11.3	0.0	0.0	2.6	-8.6	22.9
645	2477.1	2370.6	0.0	0.0	0.0	33.6	30.1
OPPD_645	436.3	414.8	-137.6	14.9	380.5	-29.7	528.5
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.5
OPPD_FRE	40.7	35.1	0.0	0.0	1.0	-12.2	11.5
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	-81.5	600.0	0.0	0.0	0.0	-688.4	6.9
LES_650	17.0	103.8	-218.4	0.0	88.9	105.2	115.2
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	11.2	0.0	-119.7	0.0	1.5	34.8	97.6
652	203.7	148.5	0.0	0.0	0.0	-14.3	6.7
WAPA_652	-0.1	31.9	-132.2	0.0	115.0	14.4	181.0
653	93.9	97.5	0.0	0.0	0.0	-192.8	18.8
WAPA_653	-62.1	22.8	-7.9	-0.4	169.4	-63.0	112.6
654	1387.8	370.2	0.0	0.0	0.0	262.1	120.7
WAPA_654	334.8	61.7	-281.1	154.0	1031.4	220.3	1096.5
655	554.1	30.5	0.0	0.0	0.0	419.3	31.7
WAPA_655	-56.2	5.6	11.2	0.0	288.9	-43.5	250.3
656	0.0	415.1	0.0	0.0	0.0	-54.5	3.8
WAPA_656	0.0	117.9	-30.6	0.0	85.8	44.8	49.2
657	772.0	109.4	0.0	0.1	0.0	627.1	31.9
MPC-657	181.2	34.0	-98.2	0.0	186.0	121.0	306.0
659	75.1	1293.6	0.0	0.0	0.0	-455.1	62.9
BEPC_659	-23.1	243.9	-3.5	552.8	1199.5	-285.8	779.8

660	2282.3	202.5	0.0	0.0	0.0	2075.7	4.0
ZONE_660	363.6	126.2	0.0	0.0	0.7	28.8	209.2
661	698.3	320.7	0.0	0.0	0.0	273.8	24.5
MDU_661	99.5	92.3	30.2	3.4	256.0	17.1	221.6
663	75.7	320.0	0.0	0.0	0.0	-230.8	10.4
NWPS_663	14.2	70.2	-20.7	0.0	23.4	-52.8	42.8
665	122.9	409.4	0.0	0.0	0.0	-101.7	0.9
MRES_665	-7.3	129.3	0.0	0.0	4.0	-61.9	15.3
666	0.0	15.8	0.0	0.0	0.0	0.0	0.0
	0.0	3.5	0.0	0.0	0.0	0.0	0.0
667	0.0	556.0	0.0	0.0	0.0	-572.8	7.8
MHSUBWPG	0.0	123.5	-139.1	0.0	153.0	77.8	91.4
668	958.0	779.2	0.0	0.0	0.0	9.5	174.1
MHRURALS	823.7	162.6	-1396.1	268.4	806.2	-1194.2	3783.4
669	126.6	321.3	0.0	0.0	0.0	-212.0	17.4
MHWPGHYD	11.6	126.5	-52.0	0.0	32.6	-120.1	89.8
670	3447.8	51.0	0.0	0.0	0.0	3366.9	29.9
MHRURALN	1116.0	9.6	-799.3	150.8	353.6	1630.1	478.4
671	0.0	683.9	0.0	0.0	0.0	-683.4	3.6
MH INDUS	0.0	124.3	0.0	0.0	11.0	-124.9	16.8
672	0.0	2182.1	0.0	0.0	0.0	-2391.8	88.5
SPC	95.8	523.4	-329.5	86.0	995.3	121.0	643.4
674	0.0	641.5	0.0	0.0	0.0	-533.2	12.9
SPC-IND	0.0	127.0	5.5	0.0	122.7	-30.4	67.4
675	2648.9	138.0	0.0	0.0	0.0	2510.9	0.0
SPC-SSL	68.0	33.7	-52.2	0.0	0.0	-145.5	232.0
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	84.2	20.3	0.0	0.0	0.0	26.5	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	86.7	543.2	0.0	0.0	0.0	-481.6	24.8
DPC_680	5.1	141.8	-62.4	-6.0	88.7	-46.9	67.8
681	661.0	29.3	0.0	0.0	0.0	600.6	37.0
DPC_681	-82.2	9.2	-58.1	0.3	235.6	-161.1	364.7
682	0.0	33.9	0.0	0.0	0.0	-34.7	0.1
DPC_682	0.0	13.6	0.0	0.0	0.2	-13.6	0.1
683	0.0	4.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.9	0.0	0.0	0.0	0.0	0.0

684	0.0	10.2	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
685	0.0	13.2	0.0	0.0	0.0	0.0	0.0
	0.0	4.1	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28157.1	29430.7	6.4	213.3	0.0	-2153.7	660.4
MEPCO	5844.8	5450.6	-6972.4	29.9	4708.1	849.4	11195.3
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-417.4	57.3
NMPC WES	526.0	747.5	-104.0	-46.2	347.0	-440.8	716.4

752	4633.2	1634.8	4.5	0.0	0.0	2921.2	72.7
NMPC CEN	1197.0	759.9	-192.3	-21.2	472.8	-168.2	1291.5
753	1214.0	599.0	0.5	0.0	0.0	462.3	152.2
NMPC MVN	187.9	222.6	-784.3	-4.1	1264.0	-78.7	2096.6
754	2286.2	1954.6	7.2	0.1	0.0	237.6	86.7
NMPC EAS	852.9	866.7	-1066.6	-17.7	283.6	414.3	939.9
755	684.8	463.2	-3.1	0.0	0.0	207.4	17.4
NYSEG WE	200.4	247.5	-148.8	-7.3	299.6	179.2	229.3
756	752.4	1284.1	3.4	2.1	0.0	-604.2	67.0
NYSEG CE	213.9	630.7	-452.8	-183.1	350.3	-188.7	758.1
757	0.0	264.1	1.2	0.5	0.0	-269.1	3.2
NYSEG EA	0.0	122.6	-71.0	-77.2	17.4	28.2	14.8
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.5
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.7	32.0
RG&E	71.4	534.8	-639.8	-87.2	264.7	136.8	391.5
760	1369.2	1213.9	0.0	0.2	0.0	73.2	82.0
CENT HUD	432.7	340.7	-421.9	-3.3	185.5	-319.0	1021.8
761	1879.0	1067.6	0.1	0.3	0.0	792.3	18.6
O&R	721.6	363.7	-2.7	-62.4	23.6	104.9	341.8
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	641.4	2017.7	-805.1	-0.8	1813.9	231.1	1012.3
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	501.9	245.3	-1.9	0.0	0.9	94.1	165.4
764	906.5	532.4	0.0	0.0	0.0	368.8	5.3
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.6
765	7959.5	11796.5	0.0	0.0	0.0	-3975.6	138.5
CON ED C	3398.5	5697.1	-2296.4	0.0	3995.8	-552.6	4546.3
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	10.4	16.7	0.0	0.0	0.0	-6.3	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.2
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.5	15.6
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0

773	946.5	367.6	0.0	0.1	0.0	545.8	33.1
CON ED N	568.9	167.3	-355.4	0.0	333.8	290.7	800.1
775	0.0	1483.2	0.0	0.0	0.0	-1519.0	35.8
CON ED C	0.0	686.3	-196.0	0.0	1494.2	-109.6	1113.5
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.6	0.0	0.0	0.0	0.0	43.1	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.8	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-344.6	31.6
NMPC GNS	18.2	113.0	-187.1	-5.2	24.9	11.2	111.1
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.5
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.8	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.5	14.5
CE UPNY	0.0	0.0	0.0	0.0	466.5	155.1	311.3
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.4	59.8
	28.9	882.6	-704.0	38.2	359.4	-393.4	564.8
787	0.0	2168.8	0.0	4.3	0.0	-2194.8	21.7
	0.0	1124.8	-757.9	21.4	267.7	-556.5	435.9
788	350.2	2183.2	0.0	8.2	0.0	-1872.7	31.6
	135.9	1086.4	-941.3	53.3	70.1	-453.8	461.4
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-175.6	7.7	10.3	-33.4	68.3
790	350.6	1327.4	0.0	5.8	0.0	-1014.5	31.8
	-11.9	631.9	-640.7	27.9	65.9	-290.4	325.2
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	5.8	251.6	-20.6	41.8	170.1	-227.1	130.0
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.1
	49.4	402.4	-28.7	29.1	192.0	-434.5	273.3
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	270.3	850.1	-183.7	68.5	507.8	-608.3	651.4
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.8
	22.8	363.0	-213.3	5.4	123.0	-108.9	99.6

795	28.1	3513.3	0.0	7.1	0.0	-3538.4	46.1
	0.0	1589.8	-1810.3	49.9	131.4	-825.5	1127.6
796	166.2	2162.1	0.0	4.2	0.0	-2018.6	18.5
N-RICHVW	-15.0	1026.6	-719.8	28.6	146.4	-941.2	737.2
797	0.0	3286.0	0.0	6.9	0.0	-3334.0	41.0
W-RICHVW	0.0	1613.3	-1709.4	31.1	256.4	-564.3	885.7
798	0.0	904.1	0.0	7.6	0.0	-946.6	34.9
	0.0	420.9	313.2	18.4	307.3	-899.6	454.4
799	1271.6	1490.6	0.0	6.5	0.0	-274.1	48.7
	434.5	727.4	-386.6	31.6	340.1	-497.0	899.2
800	441.0	1549.0	0.0	10.6	0.0	-1159.7	41.1
	69.1	742.7	-826.9	33.8	503.0	-79.8	702.3
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	169.8	32.5	0.0	7.9	47.4	15.2	161.6
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-33.9	208.4	-190.5	51.4	241.8	-218.2	356.9
803	0.0	0.0	0.0	0.0	0.0	-10.1	10.1
	0.0	0.0	0.0	0.0	349.4	285.3	64.0
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	556.9	30.4	0.0	3.6	0.0	284.2	238.7
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.0
	1235.0	124.0	0.0	23.7	6.4	631.6	462.1
806	3082.7	96.0	0.0	2.3	0.0	2977.3	7.1
	1139.2	56.0	0.0	15.9	2.9	676.6	393.5
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-96.0	0.0	0.0	96.0	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1417.3	200.0	0.0	10.1	0.0	651.7	555.5
811	3539.6	90.3	0.0	1.8	0.0	3438.2	9.3
	1435.2	48.0	0.0	9.4	0.0	943.0	434.9
812	215.6	60.0	0.0	1.1	0.0	153.8	0.7
	230.9	30.4	0.0	4.6	0.0	170.1	25.7
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-38.9	6.0	0.0	2.1	0.0	-66.7	19.7
814	315.9	20.0	0.0	0.3	0.0	294.9	0.8
	213.3	10.0	0.0	2.7	0.0	160.4	40.3

815	0.0	0.0	0.0	0.5	0.0	-136.5	136.0
	0.0	0.0	0.0	252.3	5111.0	3264.0	1594.7
816	285.1	244.2	0.0	0.4	0.0	31.3	9.3
	104.9	112.4	0.0	4.5	67.3	-9.3	64.6
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.6	-1.6	0.0	1.0	7.6	0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0

841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.5	586.5	-1117.7	0.0	186.5	-290.7	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8

861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2

885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	0.0	-6.3	6.3
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.5
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15.9	0.0	-1.9	0.0	0.0	16.6	1.2
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.9	65.4	0.0	-1.6	5.7	-42.1	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-223.3	0.0	260.3	3.6	447.5
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	30.3	0.0	0.0	-30.3	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-80.5	3.3
	0.0	0.0	0.0	0.0	26.8	-35.3	37.9
1636	36.0	0.0	0.0	0.0	0.0	33.2	2.8
	-11.8	0.0	0.0	0.0	15.1	-17.2	20.5
1666	0.0	1.4	0.0	0.0	0.0	-2.3	0.9
	0.0	0.4	0.0	0.0	3.6	-2.7	6.0
TOTALS	659288.2	642693.7	211.2	492.1	0.0	0.0	15878.8
	130319.7	191178.4	-131919.8	4509.7	166622.5	0.0	233213.0

DRG II – SUPK Base Case

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:36
MTEP07 2013 SUMPK APPAB CBLEND 0731.SAV FROM MTEP06-2011PH3 ZONE TOTALS

Appendix E – Loss Analysis

CONTRACTUAL BLENDED DISPATCH WITH REF FUT GENS, APPAB, 0803 IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13725.6	3700.4	0.0	0.0	0.0	9832.4	152.8
PJM500KV	3536.6	996.9	-710.4	0.0	3907.5	1438.4	5706.0
2	0.0	6272.4	0.0	0.0	0.0	-6304.1	31.7
NORTHERN	0.0	1172.3	-123.2	0.0	74.4	-1136.8	162.1
3	0.0	1604.0	0.0	0.0	0.0	-1634.3	30.3
ROCK RIV	76.6	220.7	-56.7	0.0	74.5	-196.8	184.0
4	0.0	3087.7	0.0	0.0	0.0	-3112.9	25.3
SOUTHERN	0.0	996.2	-240.2	0.0	56.3	-812.4	112.8
5	265.0	136.6	0.0	0.0	0.0	-200.6	299.4
345KV	51.4	50.1	99.0	0.0	3078.0	-1535.0	4503.8
6	305.5	35.4	0.0	0.0	0.0	222.9	47.3
PEAKERS	-25.7	14.1	-279.1	0.0	264.5	-301.4	805.3
7	17362.5	487.1	0.0	6.0	0.0	16829.4	40.1
GEN BUS	4527.5	72.4	-31.1	41.2	0.0	2881.3	1563.7
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.2
TR MIDPT	0.0	723.1	-684.6	0.0	0.0	-1318.4	1272.6
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4446.7	0.0	0.0	4158.7	8.0
10	4054.0	108.9	0.1	0.0	0.0	3943.5	1.6
CHI-ESS	769.1	59.8	-11.9	0.0	7.9	587.9	141.3
11	9106.0	0.0	0.0	0.0	0.0	9073.7	32.2
IPP GEN	2490.1	0.0	0.0	0.0	223.0	1900.0	813.0
12	0.0	1745.4	0.0	0.0	0.0	-1751.8	6.4
C-N	0.0	493.2	0.0	0.0	480.8	-67.5	55.1
14	567.5	2127.8	0.0	0.1	0.0	-1582.7	22.4
C-S	77.0	574.5	-204.1	0.0	133.6	-415.6	255.8
15	8.0	1489.9	0.0	0.0	0.0	-1526.3	24.1
YORK 115	2.0	191.3	-63.0	0.0	72.5	-155.3	99.9
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.3	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.2	38.3
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-86.7	75.9
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7

EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.8	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.2	39.2
NO-ESS	1130.3	421.9	-87.8	0.0	196.5	262.6	672.4
21	1074.0	645.0	0.0	0.0	0.0	412.3	16.7
	563.7	165.4	-98.7	0.0	43.3	385.1	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.6	4.7
	0.0	305.6	0.0	0.0	20.7	-329.0	44.1
23	765.0	6607.3	0.0	0.0	0.0	-6002.4	116.7
N-R	200.7	2128.3	-1684.3	0.0	50.9	-1068.8	896.1
24	1157.0	2326.7	0.0	0.0	0.0	-1256.9	87.2
N-S	371.4	542.9	-339.9	0.0	147.9	-713.5	1029.8
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.9	0.0	0.0	-497.8	713.5
26	2254.3	393.2	0.0	0.0	0.0	1844.6	16.4
JCSO 230	679.5	101.8	-543.3	0.0	90.5	775.9	435.6
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.1	21.0
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.7	43.1
32	13.0	183.6	-1.5	0.0	0.0	-279.0	110.0
	0.0	51.1	-638.9	0.0	373.0	-1130.7	2091.5
33	8502.2	40.5	0.0	0.0	0.0	8454.7	7.0
	1529.3	6.0	0.0	0.0	0.0	1463.6	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.7	9.8
NORTHEAS	18.5	134.0	-144.9	0.0	28.8	11.2	47.0
35	0.0	1539.0	-22.7	0.0	0.0	-1523.3	7.1
	0.0	706.2	-745.3	0.0	3.3	-4.4	46.8
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.1	14.7
	0.0	407.8	-370.6	0.0	0.4	-114.8	77.9
38	0.0	1923.0	-7.1	0.0	0.0	-1933.7	17.7
	0.0	594.9	-392.7	0.0	12.6	-308.9	119.3
40	196.7	681.0	0.0	0.0	0.0	-486.0	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-263.9	12.4
41	0.0	1594.2	-0.4	0.0	0.0	-1699.5	105.7
PECO	0.0	605.4	-1683.5	0.0	459.4	-254.7	1792.3
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0

ZONE42	0.0	158.8	-61.5	0.0	104.6	-108.9	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.9	0.0	0.0	-259.8	92.2
44	4107.3	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	248.4	78.6	-93.8	0.0	0.0	92.4	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	506.7	0.0	0.0	0.0	0.0	259.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.9	0.0	0.2	-11.5	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.7	0.0	0.0	-541.3	235.9
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-111.9	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1059.3	63.9
PS NORTH	904.0	703.8	0.0	0.0	1670.5	107.4	1733.9
51	2113.7	2698.7	0.0	0.0	0.0	-545.7	33.8
PS CENTR	554.7	233.7	-887.6	0.0	115.8	536.7	844.1
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	628.5	64.4	-453.0	0.0	158.3	359.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.2	6599.6	0.0	0.0	0.0	-3137.9	114.7
BGE 115	927.5	3991.4	-4547.9	0.0	467.3	-98.3	2023.8
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-111.8	0.0	0.0	-17.7	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-283.7	0.0	0.0	-46.8	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.7	6963.1	0.0	0.0	0.0	-1282.9	111.5
PEPCO	1696.4	1558.7	-972.0	0.0	1192.5	-44.9	2347.1
77	1501.9	1575.1	0.0	0.0	0.0	-1544.0	91.7
RIVER	446.4	102.4	-410.4	0.0	112.0	-302.1	1072.9
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0

	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	89.7	118.5	-32.9	0.0	10.0	-176.5	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	1.7	7.1	-5.6	0.0	0.0	0.2	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	6.2	32.4	-26.1	0.0	0.4	-5.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1378.3	86.3
DPL COMP	415.2	610.6	-1201.6	0.0	241.3	64.6	1184.5
90	111.5	85.3	0.0	0.0	0.0	71.6	6.3
	-54.2	12.2	0.0	0.0	268.3	129.7	77.8
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.6	21.7
96	46.7	186.0	0.0	0.0	0.0	-143.0	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-56.2	49.0
101	11457.2	12787.3	0.1	0.3	0.0	-1563.4	232.9
CPL-E	2997.7	2805.5	-1770.0	-914.8	1400.2	665.8	3611.5
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2
CPL-W	118.6	174.1	-206.0	-16.0	62.2	85.7	143.1
110	21277.7	20975.5	11.6	3.4	0.0	-110.2	497.4
DUKE.DUK	5279.9	9083.7	-7702.8	-1198.8	1820.1	45.8	6958.0
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.4	157.3	-103.9	-15.9	38.6	6.2	20.3
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.2
113	5.7	4.0	0.0	0.0	0.0	0.0	1.7
YADKIN	-5.4	2.0	0.0	0.0	1.7	-8.3	2.6
114	427.5	0.0	0.0	0.0	0.0	426.0	1.5
HARTWELL	173.5	0.0	0.0	0.0	0.0	113.2	60.3
115	6116.8	5184.0	0.0	0.0	0.0	828.6	104.2
SCEG	1493.9	2219.9	-1398.4	0.0	418.1	-201.4	1291.8
120	0.0	1628.9	0.0	0.1	0.0	-1651.8	22.8
SC-SO	0.0	614.7	-391.4	-80.1	100.4	-170.1	124.7
121	3200.3	1321.2	0.1	0.0	0.0	1810.3	68.7
SC-NO	622.1	495.3	-442.8	-48.2	271.0	-147.8	1036.7
122	1757.0	1818.4	0.0	-0.1	0.0	-102.6	41.3

SC-EA	483.9	515.0	-372.6	-26.7	134.7	-47.3	550.1
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.8	51.6
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3540.7	8.0	0.0	0.0	0.0	3503.4	29.2
AECI	778.2	2.6	-115.6	103.8	723.2	972.8	589.8
131	27.0	347.4	0.0	0.0	0.0	-351.5	13.3
AECI-NW	-1.1	87.1	-2.7	0.0	66.4	-63.7	40.1
132	24.0	243.7	0.0	0.0	0.0	-222.7	7.5
AECI-NE	0.0	60.3	-16.3	0.0	31.3	-28.4	17.1
133	0.0	862.4	0.1	0.0	0.0	-891.3	28.7
AECI-CNT	0.0	216.1	-26.0	0.0	92.6	-250.5	153.0
134	15.0	637.2	0.0	0.0	0.0	-687.3	27.4
AECI-KMO	-4.2	159.7	-83.8	0.0	65.9	-106.4	82.7
135	0.0	631.1	0.0	0.0	0.0	-644.3	13.1
AECI-KOK	0.0	158.2	-77.8	0.0	47.1	-98.5	65.3
136	0.0	924.8	0.1	0.0	0.0	-955.7	30.9
AECI-SMP	0.0	231.7	-81.5	51.9	100.5	-220.7	171.0
137	0.0	390.8	0.0	0.0	0.0	-412.4	21.6
AECI-M&A	0.0	98.0	-15.4	0.0	40.2	-120.0	77.5
138	2108.5	1021.0	0.0	0.0	0.0	1058.1	29.5
LAGN	314.6	328.6	0.0	0.0	143.8	-267.8	397.7
140	28545.8	30306.1	19.6	3.3	0.0	-2322.4	539.2
GA-ITS	6545.2	12635.5	-10413.0	-833.8	4550.7	-23.4	9730.6
141	16564.1	13418.4	8.2	0.3	0.0	2833.3	248.0
APC	3509.0	3598.5	-2161.2	-162.6	1524.5	-325.4	4079.0
142	2083.0	2655.8	2.2	0.0	0.0	-642.2	55.8
GULF	-165.8	796.7	-1531.8	-42.4	193.6	147.8	657.2
143	3073.0	2653.2	3.5	0.0	0.0	342.1	74.1
MPC	972.3	938.2	-658.4	-6.3	516.7	124.9	1090.6
144	2084.0	1111.6	2.6	0.0	0.0	940.8	28.9
SAV	556.7	427.0	-391.5	0.0	55.1	75.2	501.1
145	855.0	790.7	0.0	0.0	0.0	42.9	21.4

Appendix E – Loss Analysis

SMEPA	113.3	265.5	-186.0	0.0	116.9	40.2	110.6
147	0.7	0.0	0.0	0.0	0.0	0.6	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.7	2058.2	0.0	0.0	0.0	1546.5	77.3
AEC	625.7	325.8	-411.0	0.0	293.6	233.6	775.3
155	6224.7	5901.4	1.9	0.5	0.0	154.0	166.9
EES_WEST	1501.8	2235.9	-1491.9	58.4	1013.4	49.6	1663.2
156	8945.6	9770.0	0.1	2.1	0.0	-919.0	92.3
EES_SOU	2013.1	2719.3	-1208.4	-573.0	857.6	97.4	1835.4
157	5443.0	5006.3	0.0	1.0	0.0	384.7	77.7
EES-ASNO	1223.0	1873.2	-618.6	-361.9	798.3	-355.0	1494.5
158	909.8	1767.3	0.0	0.7	0.0	-902.6	44.4
EES_CNTR	190.4	477.0	-304.3	-70.9	456.6	-0.2	545.4
159	8724.2	7791.3	0.0	106.4	0.0	690.9	135.6
EES_NOR	954.7	2331.1	-947.4	-153.2	2112.9	-302.2	2139.4
165	4336.5	5549.8	0.0	0.0	0.0	-1326.9	113.6
TVA_WEST	1256.9	1662.5	-1858.6	102.0	1177.0	1023.3	1504.7
166	17107.5	15266.6	0.1	0.0	0.0	1534.5	306.3
TVA_CENT	3708.0	5590.8	-3547.0	103.5	3332.7	-61.7	4955.0
167	13165.7	9894.8	0.0	0.0	0.0	3082.3	188.6
TVA_EAST	3029.9	3523.9	-1848.3	210.8	2169.9	375.2	2938.2
168	0.0	3539.8	0.0	0.0	0.0	-3556.6	16.8
TVA_MEMP	0.0	1035.2	-176.6	0.0	103.9	-914.4	159.7
169	108.5	0.0	0.0	0.0	0.0	108.1	0.4
TVA_IPP	38.7	0.0	0.0	0.0	80.4	106.5	12.6
181	99.5	1772.1	0.0	0.0	0.0	-1676.9	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.0	50.1
182	0.0	3191.7	0.0	0.0	0.0	-3219.7	28.0
FAIRFAX	0.0	712.2	-991.1	0.0	104.2	-199.1	582.2
183	2665.0	1076.7	0.1	0.0	0.0	1571.6	16.6
WOODBRDG	51.7	294.2	-264.2	0.0	46.1	-139.3	207.1
184	275.0	483.0	0.0	0.0	0.0	-212.1	4.1
NOR NECK	64.7	100.9	-52.5	0.0	30.1	11.5	35.0
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-2.3	568.9	-317.9	0.0	60.4	-392.6	199.8
186	1144.0	1510.4	0.0	0.0	0.0	-378.7	12.3
YORKTOWN	-34.4	378.2	-473.4	0.0	66.6	19.9	107.5
187	2512.8	1730.7	0.0	0.0	0.0	768.8	13.3

CHESTERF	163.4	500.7	-287.3	0.0	99.9	-76.6	126.5
188	1411.0	637.6	1.3	0.0	0.0	755.4	16.8
SOUTHSDE	-155.9	156.6	-235.6	0.0	47.7	-138.9	109.7
189	710.0	2837.7	0.0	0.0	0.0	-2151.5	23.8
VA BEACH	173.6	690.0	-566.8	0.0	122.5	-200.9	373.9
190	1414.0	1111.3	0.0	0.0	0.0	301.4	42.1
SUFFOLK	32.7	251.4	-486.2	0.0	201.2	131.5	344.0
191	0.0	640.2	0.3	0.0	0.0	-665.6	8.1
OUTBANKS	0.0	161.1	-247.8	0.0	64.3	90.6	60.4
192	994.0	1116.2	0.3	0.0	0.0	-151.8	29.2
CAROLINA	34.7	296.5	-336.6	0.0	133.5	-4.4	212.6
193	1020.0	1831.2	0.0	0.0	0.0	-842.6	31.4
GORDONSV	-57.8	375.5	-237.9	0.0	164.9	-342.5	312.1
194	0.0	1211.1	0.0	0.0	0.0	-1231.4	17.6
VALLEY	0.0	326.6	-353.8	0.0	85.3	-115.4	227.4
195	1704.0	708.9	0.0	0.0	0.0	940.6	39.7
LEXINGTN	243.0	198.1	-130.9	0.0	189.8	-82.6	445.5
196	9293.0	816.3	0.0	0.0	0.0	8348.5	128.2
500KV	217.2	150.6	-689.4	0.0	2663.3	835.0	2584.3
197	1057.9	171.7	0.0	0.0	0.0	864.0	22.3
	336.7	34.7	0.0	0.0	181.3	219.0	264.3
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.8
	0.0	32.9	-51.5	0.0	14.2	-8.2	45.0
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.2	20.5
201	9052.7	11383.3	0.0	0.0	0.0	-2537.2	214.0
AP	1443.4	2884.8	-2368.9	0.0	2232.6	-572.4	3734.7
202	1857.0	362.0	0.0	0.0	0.0	1465.0	22.7
	300.9	66.1	-35.2	0.0	145.4	100.4	313.6
203	151.0	472.3	0.0	0.0	0.0	-339.7	18.4
	52.1	97.1	-142.4	0.0	236.3	227.7	106.1
204	748.0	748.9	0.0	0.0	0.0	-25.0	30.0
	109.5	149.4	-146.3	0.0	258.8	170.2	196.5
205	0.0	43.0	0.0	0.0	0.0	-66.1	17.1
	0.0	15.2	0.0	0.0	8.9	-41.0	32.5
206	2047.4	61.7	0.0	0.0	0.0	1970.9	14.7
OVEC	-84.3	6.2	0.0	0.0	557.1	307.2	159.4
207	1866.4	854.9	0.0	0.0	0.0	1008.0	43.5

HE	123.8	264.1	-145.9	0.0	123.8	-235.7	378.3
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.6	1.8
209	3797.9	3668.4	0.0	0.0	0.0	-298.0	116.0
DPL	369.7	663.9	-1408.2	0.0	388.3	176.2	1280.9
210	967.4	1456.0	0.0	0.0	0.0	-560.9	27.9
SIGE	360.7	481.1	-300.1	-0.7	49.3	-106.1	318.5
211	7708.2	8208.8	0.0	0.0	0.0	-714.3	213.8
LGEE	2793.3	2800.2	-1121.6	74.3	951.4	-400.6	2392.6
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.6	39.2	-21.9	0.0	10.4	-65.0	53.1
213	171.0	77.1	0.0	0.0	0.0	109.8	0.9
	51.3	5.4	0.0	0.0	5.2	28.4	22.6
214	1451.5	1769.8	0.0	0.0	0.0	-332.4	14.1
BREC	400.0	725.6	-293.2	0.0	108.7	-2.8	79.2
215	3252.9	3139.2	0.0	0.0	0.0	92.7	19.6
DLCO	521.2	438.2	-124.0	0.0	676.9	317.5	566.1
216	3137.6	3452.6	0.0	3.6	0.0	-392.1	77.3
IPL	846.2	690.2	-453.0	20.9	318.6	-254.4	1160.6
217	3019.5	3997.5	0.0	0.0	0.0	-1031.3	64.4
NIPS	953.2	1472.1	-476.8	0.0	369.2	-452.2	781.3
218	11699.5	182.5	0.0	0.0	0.0	11248.8	268.2
METC	2618.4	82.1	-477.3	0.0	1943.1	1374.0	3582.4
219	2244.0	5062.5	0.0	0.0	0.0	-3059.5	244.7
ITC	287.7	1857.5	-747.8	0.0	1883.8	-2787.0	3849.4
220	2877.8	2302.3	0.0	4.1	0.0	474.8	96.5
EKPC	643.8	879.9	-937.0	10.7	231.3	82.0	839.3
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	14274.4	748.4	0.0	0.0	0.0	13478.6	47.4
FE-GEN	4034.5	503.9	0.0	0.0	151.2	1905.8	1776.0
231	0.0	476.6	0.0	0.0	0.0	-479.6	3.1
FE-AK-23	0.0	108.6	-101.0	0.0	0.1	-51.8	44.3
232	0.0	1701.5	0.0	0.0	0.0	-1756.2	61.1
FE-AK	0.0	353.7	-410.6	0.0	294.4	-387.8	740.4
233	0.0	794.0	0.0	0.0	0.0	-807.4	13.4
FE-LAKE	0.0	183.5	-178.3	0.0	45.1	-127.7	167.6
234	0.0	292.6	0.0	0.0	0.0	-303.3	10.7

Appendix E – Loss Analysis

FE-MASS	0.0	35.3	0.0	0.0	11.8	-83.9	60.4
235	174.4	1127.9	0.0	0.0	0.0	-987.6	31.7
FE-PP	17.0	289.5	-202.9	0.0	119.3	-311.0	360.1
236	0.0	135.8	0.0	0.0	0.0	-138.2	2.4
FE-ALL	0.0	43.4	0.0	0.0	7.8	-53.6	18.0
237	0.0	577.2	0.0	0.0	0.0	-582.1	4.9
FE-WARR	0.0	185.1	-65.5	0.0	26.4	-162.7	69.4
238	4.5	1369.8	0.0	0.0	0.0	-1435.6	63.8
FE-YNG	24.9	333.8	-57.5	0.0	241.4	-545.8	534.5
239	103.0	4612.4	-3.2	0.0	0.0	-4564.6	58.4
FE-CEI	16.0	1718.9	-1831.7	0.0	409.4	-354.2	892.4
240	0.0	342.2	0.0	0.0	0.0	-346.7	4.5
FE-CPP	0.0	69.9	-148.1	0.0	0.0	59.9	18.3
241	1995.0	1025.6	0.0	0.4	0.0	957.9	38.4
FE-MN	179.6	180.3	-144.8	2.3	254.7	5.0	398.0
242	1091.0	875.2	0.0	0.4	0.0	180.6	34.1
FE-MR	219.3	209.6	-166.5	0.8	195.9	51.7	316.4
243	7.0	1069.2	0.0	0.2	0.0	-1093.3	30.5
FE-SP	-25.2	193.9	-142.8	1.2	69.7	-182.4	172.5
244	1196.5	789.7	0.0	0.1	0.0	376.0	26.5
FE-BAY	368.0	207.1	-123.5	0.8	223.9	256.0	247.6
245	2322.0	5266.0	0.0	3.6	0.0	-3040.2	95.7
FE-TE	834.6	1375.5	-376.4	7.5	601.4	-592.1	1019.3
246	26.0	862.0	0.0	0.6	0.0	-873.6	8.2
	10.5	170.8	0.0	-16.6	87.5	-170.0	98.9
250	6193.7	6638.7	0.0	0.0	0.0	-588.7	143.6
AEP-AP	-381.2	1829.0	-1760.2	1644.1	3698.8	-214.2	1818.9
251	11153.5	5388.7	0.0	0.0	0.0	5522.8	242.0
AEP-OP	-296.7	836.3	-1697.2	2773.1	5529.0	216.0	3104.0
252	6798.1	4801.8	0.0	0.0	0.0	1768.3	228.0
AEP-IM	448.0	732.1	-982.9	1482.6	3442.5	-158.6	2817.2
253	2440.0	5404.9	0.0	0.0	0.0	-3112.2	110.2
AEP-CS	296.7	1277.3	-1515.9	0.0	702.9	177.1	1043.1
254	260.0	1403.2	0.0	0.0	0.0	-1187.8	44.6
AEP-KP	152.6	366.0	-431.1	0.0	73.9	25.5	266.2
255	363.5	1628.6	0.0	0.0	0.0	-1277.7	12.7
AEP-OP-I	56.3	669.3	-59.4	0.0	33.0	-598.9	78.4
256	0.0	573.6	0.0	0.0	0.0	-578.3	4.7

Appendix E – Loss Analysis

AEP-IM-I	0.0	104.3	-35.3	0.0	40.4	-54.6	26.1
257	450.0	330.3	0.0	0.0	0.0	104.7	11.4
	79.5	92.0	-13.4	0.0	74.9	-59.5	135.3
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.1
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.0	3.9
	119.0	84.6	-36.3	0.0	3.6	34.6	39.6
261	3555.0	105.2	0.0	0.0	0.0	3448.3	1.4
ITC-GN	1187.8	15.0	0.0	0.0	34.8	1178.3	29.3
262	6644.0	783.0	0.0	0.0	0.0	5825.0	36.1
ITC-GS	1938.4	176.9	-193.1	0.0	138.9	1888.8	204.8
263	1671.9	8119.0	0.0	0.1	0.0	-6517.6	70.4
ITC-DIS	357.7	3206.0	-2947.7	127.6	425.2	-16.4	413.3
264	8.0	615.0	0.0	0.0	0.0	-634.2	35.0
	7.6	185.6	-75.0	0.0	91.6	-233.4	224.1
265	2271.7	1221.8	0.0	0.0	0.0	990.1	59.2
	327.2	275.7	-187.8	1.4	481.8	149.0	569.6
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.3	93.3	-111.6	0.0	36.7	18.7	126.0
267	481.0	522.5	0.0	0.0	0.0	-62.9	21.4
	201.6	186.5	-148.6	0.3	125.0	88.8	199.5
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	71.4	219.7	0.0	0.0	0.0	-149.6	1.3
MUNI	10.0	49.3	0.0	0.0	1.9	-49.0	11.6
271	419.2	507.9	0.0	0.0	0.0	-89.9	1.2
LANSING	82.1	202.9	-85.6	0.0	5.2	-37.8	7.9
272	306.2	857.4	0.0	0.0	0.0	-575.5	24.3
WOLVERIN	80.2	195.4	-123.2	0.0	41.4	-40.7	90.1
273	259.8	9323.0	-1.0	0.0	0.0	-9187.9	125.7
CE	25.3	2508.2	-2239.2	0.0	76.0	-1098.1	930.5
280	55.0	7311.4	0.3	5.6	0.0	-7762.2	379.2
DEI	60.8	1463.4	-2429.2	-6.5	1126.8	-1708.3	3807.6
281	0.0	365.1	0.0	0.0	0.0	-296.8	10.2

Appendix E – Loss Analysis

HE IN DE	0.0	123.2	-14.5	0.0	56.0	-55.6	35.0
282	0.0	705.8	0.0	0.0	0.0	-683.8	4.7
DEI IND	0.0	198.1	-14.3	-0.3	13.4	-197.2	37.7
283	7519.3	360.0	0.0	0.0	0.0	7109.2	0.0
DEI GENS	2484.8	233.2	0.0	0.0	0.0	2078.6	147.8
284	0.0	4955.5	0.5	2.0	0.0	-5046.6	127.3
DEO	0.0	738.6	-603.4	-77.5	507.5	-1034.9	1501.4
285	0.0	383.0	0.0	0.0	0.0	-418.9	1.1
DEO IND	0.0	71.0	0.0	0.0	0.9	-91.5	3.6
286	5546.5	0.0	0.0	0.2	0.0	5536.1	10.3
DEO GENS	1417.2	0.0	0.0	1.1	0.0	869.2	547.0
287	0.0	447.8	0.1	0.0	0.0	-453.7	5.6
DEK	0.0	64.4	-148.5	0.0	3.0	53.8	32.6
288	0.0	11.8	0.0	0.0	0.0	-16.8	0.4
DEK IND	0.0	7.7	0.0	0.0	0.3	-11.7	1.9
290	795.0	105.0	0.0	0.0	0.0	755.0	0.0
	400.0	56.0	0.0	0.0	0.0	249.9	134.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	259.9	150.0	-21.2	0.0	0.0	80.7	50.5
301	0.0	0.0	0.0	0.0	0.0	-4.2	4.2
CIL345	0.0	0.0	0.0	0.0	48.0	-37.9	85.9
302	44.0	357.8	0.0	0.0	0.0	-325.2	11.4
302	0.0	104.3	0.0	0.0	30.7	-179.5	105.8
303	1130.0	65.0	0.0	0.0	0.0	1063.8	1.2
CILGEN	431.0	40.3	0.0	0.0	0.0	352.1	38.6
304	0.0	504.2	0.0	0.0	0.0	-507.8	3.7
PEORIA	0.0	129.8	-30.4	0.0	0.3	-117.0	17.8
305	0.0	116.7	0.0	0.0	0.0	-117.4	0.7
PEKIN	0.0	30.4	0.0	0.0	0.0	-32.9	2.5
306	0.0	76.8	1.1	0.0	0.0	-78.1	0.2
EASTERN	0.0	13.8	0.0	0.0	0.0	-14.7	0.8
307	0.0	43.9	0.1	0.0	0.0	-44.2	0.2
WESTERN	0.0	9.8	0.0	0.0	0.0	-10.5	0.7
308	0.0	67.5	0.7	0.0	0.0	-68.2	0.1
LACON	0.0	16.3	-3.2	0.0	0.0	-13.5	0.4
309	0.0	37.2	0.0	0.0	0.0	-37.2	0.0
HOMER	0.0	10.9	0.0	0.0	0.0	-10.9	0.0
310	31.4	957.5	0.0	0.0	0.0	-973.9	19.4

REG E-IL	19.8	224.1	-62.2	0.0	113.4	-184.4	152.5
311	2529.0	821.3	0.0	0.0	0.0	1684.6	23.1
FRKNJEFF	775.5	170.2	0.0	0.0	172.4	269.6	508.1
312	1696.0	744.7	0.0	0.0	0.0	901.5	49.8
ST FRAN	415.4	252.8	0.0	0.0	192.2	-93.3	448.2
313	1238.0	1230.7	0.0	0.0	0.0	-22.0	29.4
STCHMOED	433.0	183.7	0.0	0.0	249.0	139.3	359.1
314	1701.6	865.5	0.0	0.0	0.0	795.4	40.6
LKSDMP&L	695.6	98.1	59.2	0.0	509.3	558.7	488.9
315	5.0	121.2	0.0	0.0	0.0	-116.7	0.5
GREENHIL	4.5	8.6	0.0	0.0	0.0	-9.0	4.9
316	5.0	890.0	5.0	0.0	0.0	-899.7	9.8
SEMO	6.6	223.6	100.4	0.0	85.3	-331.3	99.3
317	9.0	2288.0	0.0	0.0	0.0	-2290.3	11.3
N METRO	0.0	211.9	0.0	0.0	59.4	-337.3	184.8
318	955.0	2692.1	0.0	0.0	0.0	-1756.3	19.2
S METRO	297.3	408.1	-243.7	0.0	42.8	-70.5	246.1
319	135.0	159.8	0.0	0.0	0.0	116.0	0.4
ILL-IOWA	22.2	34.5	0.0	0.0	0.0	9.9	8.6
320	796.0	2.3	0.0	0.0	0.0	795.1	0.9
MOGENINI	145.6	0.4	0.0	0.0	0.0	104.3	41.4
321	0.0	653.5	0.0	0.0	0.0	-664.0	10.5
SOUTHERN	0.0	162.7	0.0	-0.3	93.2	-154.4	85.1
322	269.0	855.4	0.0	0.0	0.0	-632.5	16.1
357	16.1	180.9	0.0	0.0	105.5	-158.0	102.7
323	980.7	1887.9	0.0	0.0	0.0	-953.2	46.0
EASTERN	87.7	400.8	-36.7	0.0	334.6	-509.7	567.9
329	3494.0	235.1	0.0	0.0	0.0	3253.4	5.5
GEN&LOAD	711.7	95.4	0.0	0.0	0.0	345.2	271.1
331	0.0	0.0	0.0	0.0	0.0	-59.8	0.5
CHICAGO	0.0	0.0	0.0	0.0	2.3	-14.2	2.7
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.3	0.0	6.1	16.7	0.9
342	0.0	14.8	0.0	0.0	0.0	-15.4	0.6
C-N	0.0	3.6	0.0	0.0	3.9	-3.7	3.9
344	0.0	39.8	0.0	0.0	0.0	-40.1	0.3
NO-ESS	0.0	13.6	-15.0	0.0	9.0	9.1	1.3
345	0.0	109.0	0.0	0.0	0.0	-112.1	3.2

N-R	0.0	30.1	0.0	0.0	12.1	-37.6	19.6
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.4	0.1
RR-ESS	0.0	2.8	0.0	0.0	5.6	2.5	0.3
348	0.0	162.3	0.0	0.0	0.0	-165.5	3.2
R-S	0.0	55.9	-15.5	0.0	20.7	-35.9	16.1
349	489.1	24.3	0.0	0.0	0.0	461.1	3.8
SO-ESS	43.7	6.5	90.7	62.2	216.9	5.5	95.7
351	0.0	73.7	0.0	0.0	0.0	-74.5	0.8
EEC	0.0	26.3	-16.2	-5.8	7.6	-0.9	4.1
352	0.0	129.8	0.0	0.0	0.0	-139.5	9.7
SEIEC	0.0	64.0	-24.6	-8.2	21.9	-55.2	45.9
353	0.0	35.4	0.0	0.0	0.0	-35.5	0.1
SIEC	0.0	13.4	-15.7	-0.6	0.0	2.7	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	6497.4	4768.6	0.0	0.0	0.0	1607.9	120.8
357	1348.0	999.5	-553.2	0.0	595.6	-185.5	1682.8
360	619.9	489.0	0.0	0.0	0.0	128.0	3.0
360	58.2	147.2	-114.7	0.0	8.2	-0.1	34.0
361	3312.2	1762.1	0.0	2.0	0.0	1499.0	47.8
SIPC	695.7	419.4	-128.6	11.4	132.2	-132.6	650.9
362	1102.4	635.3	0.0	0.1	0.0	429.0	20.4
EEI	508.6	126.2	-27.2	0.7	161.4	288.2	278.3
363	551.0	703.5	0.0	0.6	0.0	-136.4	9.8
PJM500KV	37.4	115.3	-115.7	2.4	146.7	37.2	143.9
364	1353.7	575.7	0.0	0.8	0.0	751.2	25.1
SEAST	320.2	94.2	-88.5	6.7	207.2	196.5	314.1
365	1555.4	2285.6	0.0	1.8	0.0	-780.3	46.7
	143.5	404.8	-242.6	7.1	354.4	-228.0	547.1
366	2465.9	2587.2	0.0	0.3	0.0	-195.5	73.9
WPS	427.6	614.0	-719.0	0.9	506.4	272.7	765.4
367	566.7	834.2	0.0	0.9	0.0	-296.9	13.5
MGE	61.5	257.1	-218.9	1.5	99.5	-88.7	205.7
368	22.9	136.8	0.0	0.0	0.0	-118.9	5.0
UPPC	-3.0	56.9	-65.6	0.0	33.2	19.9	19.1
371	4691.7	3405.4	0.0	0.4	0.0	947.3	116.5

WPL	1052.4	916.4	-1039.8	0.4	456.5	386.2	1158.5
372	0.0	367.3	0.0	0.0	0.0	-21.3	0.3
WPL-WPPI	0.0	132.9	-8.2	0.0	2.8	2.6	2.7
375	44.6	143.3	0.0	0.0	0.0	-102.8	4.1
ED SAULT	8.1	62.1	-19.8	0.0	55.6	-0.4	21.9
376	7757.9	5493.3	0.0	1.5	0.0	2127.8	135.2
WE-MKR	2476.3	1776.7	-1097.3	4.3	615.6	-202.2	2610.4
377	300.0	955.9	0.0	0.0	0.0	-680.3	18.0
WE-FV	82.5	281.3	-104.4	0.0	182.7	-135.4	222.4
378	50.0	181.5	0.0	0.0	0.0	-138.1	6.6
WE-IR	9.0	63.3	-60.4	0.0	44.9	8.5	42.5
379	507.3	358.6	0.0	0.0	0.0	137.0	11.8
WE-PI	18.4	53.3	-40.8	0.0	95.7	3.8	97.8
380	228.9	844.1	0.0	0.0	0.0	-725.2	7.1
WE-WPPI	7.0	168.0	-136.3	0.0	13.7	-108.4	62.8
381	0.0	23.2	0.0	0.0	0.0	-23.3	0.1
WRWL-WPS	0.0	9.3	0.0	0.0	0.1	-9.5	0.3
382	106.5	279.6	0.0	0.0	0.0	-174.4	1.3
CWP-WPS	43.0	127.3	0.0	0.0	0.0	-97.4	13.1
383	0.0	78.4	0.0	0.0	0.0	-78.9	0.5
MEWD-WPS	0.0	17.0	-25.8	0.0	2.3	8.4	2.7
384	82.6	120.3	0.0	0.0	0.0	-38.2	0.5
MPU-WPS	11.3	23.1	-9.9	0.0	0.4	-14.1	12.6
385	0.0	88.0	0.0	0.0	0.0	-88.2	0.2
WPPI-WPS	0.0	28.0	-34.6	0.0	0.9	7.0	0.5
386	14.0	33.5	0.0	0.0	0.0	-19.6	0.1
ESCANABA	7.4	3.1	0.0	0.0	0.3	4.3	0.4
390	382.8	551.8	0.0	0.0	0.0	-221.0	19.9
	48.6	204.1	-264.8	0.0	134.8	91.4	134.2
391	2497.9	257.3	0.0	0.0	0.0	610.1	33.9
ALTW_391	811.0	96.3	-442.9	0.0	317.1	388.5	496.9
392	27.9	31.0	0.0	0.0	0.0	-1310.9	21.1
ALTW_392	12.9	8.2	-50.5	0.0	50.5	-357.8	59.6
393	1459.2	106.8	0.0	0.0	0.0	1276.3	23.6
ALTW_393	101.6	9.4	67.8	0.0	186.2	-202.7	387.3
394	302.7	3943.5	0.0	0.0	0.0	-966.2	17.5
ALTW_394	-56.0	1234.3	-101.5	-64.5	61.6	-192.7	74.7
395	0.0	32.1	0.0	0.0	0.0	0.0	0.0

	0.0	18.7	-16.5	0.0	0.2	15.3	1.4
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-315.8	33.4
	446.0	652.1	-289.0	0.0	126.1	-125.3	333.6
401	20561.6	23603.4	0.0	0.0	0.0	-3659.1	620.8
FPLSOUTH	4429.8	6865.8	-6919.9	0.0	4251.2	111.9	8623.3
402	9883.4	11593.8	0.0	0.0	0.0	-1994.0	283.6
FPC GENS	2930.2	4004.9	-3213.6	0.0	1149.4	42.0	3246.3
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.5	5.7
	122.7	102.5	-24.9	0.0	12.4	-16.2	73.7
405	272.2	512.4	0.0	0.0	0.0	-242.2	1.9
HST	66.7	152.0	0.0	0.0	14.4	-91.1	20.1
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1060.9	1247.3	-493.6	0.0	229.1	-215.8	752.2
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.2	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3673.1	90.0	0.0	0.0	0.0	3559.9	23.2
NSB	958.0	8.9	0.0	0.0	304.5	657.8	595.8
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	293.4	311.4	-51.9	0.0	253.6	-179.3	466.9
412	2239.6	1110.2	0.0	0.0	0.0	1079.5	49.9
SECI	482.4	276.2	-50.7	0.0	181.0	-326.1	764.1
413	866.9	1311.7	0.0	0.0	0.0	-456.0	11.2
MP-GEN	140.8	231.7	-123.8	0.0	30.1	-93.8	156.8
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.6	0.0	32.7	-360.2	152.4
415	629.3	669.5	0.0	0.0	0.0	-90.3	17.6
	163.7	209.0	-130.9	0.0	48.1	-17.1	140.1
416	4916.0	4567.2	0.0	0.0	0.0	227.9	120.8
GENERATN	1492.4	397.3	-825.5	0.0	234.3	208.6	1946.2
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3

Appendix E – Loss Analysis

VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.6
	83.6	36.4	-10.6	0.0	1.7	30.4	29.2
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	118.4	67.0	0.0	0.0	16.2	42.9	24.8
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	235.5	0.0	0.0	0.0	0.0	194.9	40.5
428	100.2	0.0	0.0	0.0	0.0	100.0	0.2
PLANTCTY	92.1	0.0	0.0	0.0	0.0	84.2	7.9
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-111.7	8.5
	16.8	58.2	-24.3	0.0	19.1	-42.9	51.9
442	309.2	102.7	0.0	0.0	0.0	201.8	4.8
	26.0	11.4	0.0	0.0	10.3	-9.4	34.4
443	0.0	93.7	0.0	0.0	0.0	-97.7	3.2
	0.0	15.7	-43.7	0.0	8.4	22.7	9.6
444	575.0	244.5	0.0	0.0	0.0	319.2	9.0
	98.4	59.4	-35.0	0.0	10.5	-21.9	110.2
445	190.0	144.7	0.0	0.0	0.0	44.5	5.4
	30.0	29.1	-18.0	0.0	14.2	-17.8	47.2
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.5	0.0	10.6	-14.1	13.6
447	0.0	108.0	0.0	0.0	0.0	-110.7	2.5
	0.0	37.1	0.0	0.0	3.6	-41.7	7.6
449	16.0	138.5	0.0	0.0	0.0	-130.0	0.8
	2.7	16.0	0.0	0.0	7.8	-12.8	4.6
450	0.0	0.0	0.0	0.0	0.0	-0.5	0.5
	0.0	0.0	0.0	0.0	3.0	-4.1	7.1
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.8	1.2
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2

	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.0	11.1
	371.9	204.4	-25.7	0.0	47.2	86.7	153.6
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.5	3.2
WERE	7.2	57.1	-3.5	0.0	2.2	-35.8	5.5
600	7573.5	384.5	0.0	0.0	0.0	7164.9	21.3
608	1019.3	228.4	0.0	0.0	1.3	-5.6	807.7
601	1764.0	7583.7	0.0	0.0	0.0	-6308.0	193.5
XEL_MN	131.9	1033.8	-2287.2	593.0	2293.5	776.8	2235.1
602	14.0	391.1	0.0	0.0	0.0	-430.1	6.1
XEL_ND	-2.8	78.2	-150.9	0.0	28.3	51.9	41.6
603	0.0	410.8	0.0	0.0	0.0	-459.5	7.4
XEL_SD	0.0	80.7	-30.9	0.0	22.9	-95.5	56.6
604	181.8	1469.7	0.0	0.0	0.0	-1294.9	41.6
XEL_WI	23.8	295.9	-667.9	0.0	248.1	344.4	306.5
605	149.6	674.2	0.0	0.0	0.0	-382.8	4.3
NON-XEL	-11.6	136.2	-74.1	0.0	8.9	-57.2	18.5
608	520.1	501.4	0.0	0.2	0.0	-114.6	61.7
MP_608	-68.3	165.5	-926.0	0.9	245.8	13.2	902.3
609	-62.3	1045.4	0.0	0.0	0.0	-1054.9	5.2
MP-INDUS	93.7	369.4	-63.2	0.0	6.7	-239.5	52.8
610	1269.7	84.6	0.0	0.0	0.0	1178.3	2.3
MP-SSL	83.7	44.2	-5.3	0.0	0.3	-59.6	102.7
611	0.0	9.6	0.0	0.0	0.0	-9.6	0.1
	0.0	3.1	0.0	0.0	0.0	-4.1	0.9
613	0.0	216.0	0.0	0.0	0.0	-0.6	0.6

Appendix E – Loss Analysis

SMPA_613	0.0	54.0	-25.7	0.0	1.2	22.7	4.2
614	11.5	55.0	0.0	0.1	0.0	-56.7	0.4
SMPA_614	13.6	13.6	0.0	0.4	0.6	-8.8	4.8
615	22.9	61.2	0.0	0.0	0.0	-331.5	2.6
SMPA_615	12.5	14.3	-33.6	0.0	32.1	-75.8	30.6
616	118.7	459.9	0.0	0.0	0.0	-62.9	1.5
SMPA_616	11.5	150.8	-225.1	0.5	95.4	255.8	30.7
617	62.0	84.3	0.0	0.0	0.0	-29.0	0.6
SMPA_617	28.7	21.0	0.0	0.0	3.6	2.1	6.3
618	0.0	139.8	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	3.4	0.0	0.0	0.0	0.0	0.0
619	97.6	1503.0	0.0	0.3	0.0	-1452.3	33.0
GRE-GRE	-0.8	262.9	-666.1	0.7	144.0	344.4	196.8
620	0.0	231.1	0.0	0.1	0.0	-231.8	6.8
GRE-MP	0.0	34.1	-34.2	0.1	62.0	34.9	27.1
621	50.0	161.7	0.0	0.1	0.0	-96.6	7.8
GRE-OTP	-13.1	30.4	-3.7	0.2	25.8	-45.7	34.5
622	48.5	1114.7	0.0	0.2	0.0	-1096.7	58.0
GRE-NSP	-14.5	143.4	-17.6	0.6	122.4	-272.6	258.9
623	70.7	138.7	0.0	0.0	0.0	-62.6	3.2
GRE-ALT	-22.8	18.0	0.0	0.0	11.9	-33.2	5.9
624	1461.7	0.0	0.0	0.7	0.0	1276.5	56.5
GRE-ND	426.5	0.0	-398.2	4.2	57.7	-658.8	1533.8
625	1239.8	5.9	0.0	0.6	0.0	1231.9	7.0
GRE-S	-177.2	0.0	0.0	0.7	6.9	-324.1	152.8
626	238.6	214.3	0.0	0.1	0.0	-39.9	21.8
OTP_626	-4.0	65.7	-90.2	0.0	111.3	15.4	106.8
627	2.2	221.8	0.0	0.1	0.0	-297.7	23.7
OTP_627	-0.2	50.9	19.6	26.5	323.4	-29.4	244.1
628	497.0	39.0	0.0	0.0	0.0	446.3	11.4
OTP_628	8.3	14.3	0.0	0.0	27.9	-58.0	79.7
630	12.2	210.5	0.0	0.2	0.0	-243.0	2.6
	-3.0	43.4	-27.8	0.1	9.8	-30.3	9.2
631	114.5	294.0	0.0	0.0	0.0	-397.3	1.8
RPU_631	117.5	73.7	0.0	0.0	14.4	-6.1	10.3
633	164.1	215.3	0.0	0.0	0.0	-51.9	0.7
MPW_633	80.7	48.1	0.0	0.0	9.1	23.6	18.0
635	49.0	156.2	0.0	0.0	0.0	-318.2	4.6

MEC_635	27.5	17.5	-91.8	0.0	32.2	60.0	32.6
636	3411.6	1702.2	0.0	0.0	0.0	1942.0	32.5
MEC_636	528.1	469.1	-126.2	0.0	222.5	-91.1	552.2
637	864.8	2138.8	0.0	0.0	0.0	-1282.0	44.0
MEC_637	36.1	321.7	-323.1	0.0	709.4	248.3	506.8
638	1023.1	1434.6	0.0	0.0	0.0	-502.2	23.3
MEC_638	265.3	369.4	-157.1	0.0	264.3	3.9	291.9
639	246.6	381.3	0.0	0.0	0.0	-143.5	1.2
MEC_639	51.1	55.8	0.0	0.0	6.7	-3.1	3.6
640	2617.8	2487.0	0.0	0.0	0.0	-146.8	97.0
NPPD_640	160.5	797.5	-669.8	25.8	1087.2	68.8	981.4
641	132.0	220.1	0.0	0.0	0.0	13.8	0.7
HAST_641	36.9	72.0	0.0	0.0	3.3	-11.2	10.6
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.9
GRIS_642	16.6	11.3	0.0	0.0	2.6	-15.1	23.0
645	2477.3	2370.6	0.0	0.0	0.0	37.0	26.9
OPPD_645	411.1	414.8	-137.8	15.0	381.1	-19.3	493.7
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.6
OPPD_FRE	41.2	35.1	0.0	0.0	1.0	-12.0	11.7
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	176.4	854.9	0.0	0.0	0.0	-689.0	10.5
LES_650	17.0	147.1	-211.7	0.0	88.2	-15.0	184.9
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	2.5	0.0	-121.3	0.0	1.5	25.4	99.9
652	212.5	152.3	0.0	0.0	0.0	-74.4	5.6
WAPA_652	26.6	33.0	-119.6	0.0	113.0	10.6	180.5
653	77.4	97.5	0.0	0.0	0.0	-203.4	12.9
WAPA_653	-66.4	22.8	-8.0	-0.3	170.6	-30.6	77.1
654	1374.8	370.2	0.0	0.0	0.0	297.9	70.8
WAPA_654	17.4	61.7	-250.2	158.6	1050.9	294.7	688.2
655	506.0	30.5	0.0	0.0	0.0	368.4	33.1
WAPA_655	-21.2	5.6	-3.8	0.0	288.9	-5.6	262.4
656	0.0	465.4	0.0	0.0	0.0	-54.3	3.5

WAPA_656	0.0	135.8	-30.3	0.0	88.1	49.1	46.9
657	751.0	144.4	0.0	0.1	0.0	578.5	31.1
MPC-657	160.3	34.0	-190.5	0.0	191.4	200.0	300.6
659	75.1	1366.5	0.0	0.0	0.0	-475.6	49.8
BEPC_659	-44.4	254.7	-3.9	561.5	1207.6	-114.3	569.9
660	2389.3	202.5	0.0	0.0	0.0	2182.4	4.4
ZONE_660	297.8	126.2	0.0	0.0	0.7	-57.2	229.5
661	742.9	499.9	0.0	0.0	0.0	187.6	17.8
MDU_661	92.4	148.3	29.1	3.4	255.0	15.0	175.3
663	79.3	320.0	0.0	0.0	0.0	-223.7	6.9
NWPS_663	-4.2	70.2	-21.2	0.0	23.7	-55.0	27.5
665	128.7	464.5	0.0	0.0	0.0	-136.0	1.2
MRES_665	-6.8	146.1	-29.9	0.0	4.0	-40.9	17.4
666	0.0	17.4	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
667	0.0	794.1	0.0	0.0	0.0	-821.6	14.8
MHSUBWPG	0.0	176.5	-139.5	0.0	149.7	-57.1	170.7
668	1087.0	1109.6	0.0	0.0	0.0	-257.2	254.0
MHRURALS	1521.4	231.6	-1385.9	257.5	782.7	-1583.4	4784.4
669	146.8	458.4	0.0	0.0	0.0	-328.0	16.4
MHWPGHYD	25.0	180.5	-52.2	0.0	39.1	-151.8	87.5
670	4039.5	71.0	0.0	0.0	0.0	3927.4	41.1
MHRURALN	1671.8	13.3	-783.3	149.0	350.7	1979.3	664.2
671	0.0	675.5	0.0	0.0	0.0	-686.3	4.2
MH INDUS	0.0	118.7	0.0	0.0	11.0	-128.9	20.2
672	0.0	2182.1	0.0	0.0	0.0	-2395.7	92.4
SPC	91.9	523.4	-329.4	81.8	991.7	89.5	671.6
674	0.0	641.5	0.0	0.0	0.0	-533.0	12.7
SPC-IND	0.0	127.0	5.5	0.0	122.7	-29.3	66.3
675	2652.0	138.0	0.0	0.0	0.0	2514.0	0.0
SPC-SSL	149.0	33.7	-52.2	0.0	0.0	-63.8	231.3
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	85.3	20.3	0.0	0.0	0.0	27.6	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	83.2	793.1	0.0	0.0	0.0	-740.5	30.4
DPC_680	8.0	205.9	-116.0	0.0	88.1	-72.9	79.7
681	923.9	41.8	0.0	0.0	0.0	860.5	29.9

DPC_681	28.5	13.2	-56.0	0.3	104.2	-83.6	261.0
682	0.0	48.4	0.0	0.0	0.0	-49.7	0.2
DPC_682	0.0	19.5	0.0	0.0	0.2	-19.7	0.2
683	0.0	6.4	0.0	0.0	0.0	0.0	0.0
	0.0	1.3	0.0	0.0	0.0	0.0	0.0
684	0.0	14.6	0.0	0.0	0.0	0.0	0.0
	0.0	5.5	0.0	0.0	0.0	0.0	0.0
685	0.0	18.9	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28178.9	29430.7	6.4	213.3	0.0	-2132.2	660.7
MEPCO	5848.6	5450.6	-6972.4	29.9	4708.2	845.8	11202.9
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0

EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-418.5	58.5
NMPC WES	540.6	747.5	-104.0	-46.1	347.0	-430.6	720.8
752	4633.2	1634.8	4.5	0.0	0.0	2922.2	71.6
NMPC CEN	1186.2	759.9	-192.5	-21.2	473.1	-166.5	1279.6
753	1214.0	599.0	0.5	0.0	0.0	464.8	149.6
NMPC MVN	166.3	222.6	-757.6	-4.1	1264.3	-90.1	2060.0
754	2286.2	1954.6	7.2	0.1	0.0	238.4	85.9
NMPC EAS	833.3	866.7	-1067.0	-17.7	283.7	403.0	931.9
755	684.8	463.2	-3.1	0.0	0.0	207.9	16.8
NYSEG WE	194.3	247.5	-148.8	-7.3	299.7	178.8	223.8
756	752.4	1284.1	3.4	2.1	0.0	-601.6	64.4
NYSEG CE	207.4	630.7	-454.1	-183.7	351.3	-163.4	729.1
757	0.0	264.1	1.2	0.5	0.0	-269.0	3.1
NYSEG EA	0.0	122.6	-71.1	-77.4	17.4	28.8	14.6
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.4
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.4	31.7
RG&E	67.3	534.8	-641.3	-87.4	265.2	138.7	387.7
760	1369.1	1213.9	0.0	0.2	0.0	74.0	81.1
CENT HUD	418.5	340.7	-422.2	-3.3	185.6	-322.0	1010.9
761	1879.0	1067.6	0.1	0.3	0.0	792.4	18.5
O&R	717.7	363.7	-2.6	-62.4	23.6	102.6	340.1
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	640.0	2017.7	-804.9	-0.8	1814.5	230.4	1012.1
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	497.5	245.3	-1.9	0.0	0.9	89.8	165.2
764	906.5	532.4	0.0	0.0	0.0	368.8	5.4
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.7
765	7959.5	11796.8	0.0	0.0	0.0	-3976.0	138.6
CON ED C	3396.1	5697.7	-2297.0	0.0	3996.2	-559.3	4550.7
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	9.8	16.7	0.0	0.0	0.0	-6.8	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0

NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.1
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.4	15.5
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.9	33.0
CON ED N	568.7	167.4	-355.6	0.0	333.9	294.8	796.1
775	0.0	1483.5	0.0	0.0	0.0	-1519.1	35.6
CON ED C	0.0	686.7	-196.2	0.0	1494.8	-103.1	1107.4
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.5	0.0	0.0	0.0	0.0	43.0	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.7	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-343.0	30.0
NMPC GNS	18.2	113.0	-187.6	-5.2	24.9	17.2	105.8
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.4
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.7	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.2	14.2
CE UPNY	0.0	0.0	0.0	0.0	466.7	159.6	307.2
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.5	59.9
	29.8	882.6	-703.2	38.2	359.4	-393.5	565.2
787	0.0	2168.8	0.0	4.3	0.0	-2194.9	21.8
	0.0	1124.8	-755.3	21.3	266.8	-561.5	437.5
788	350.2	2183.2	0.0	8.1	0.0	-1872.8	31.7
	137.0	1086.4	-937.7	53.1	69.9	-458.3	463.2
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-174.7	7.7	10.3	-34.5	68.6
790	350.6	1327.4	0.0	5.8	0.0	-1014.9	32.3
	-4.8	631.9	-636.4	27.6	65.2	-291.7	328.9
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	6.0	251.6	-20.8	41.9	170.1	-227.5	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.1

	48.1	402.4	-28.5	29.1	192.2	-435.7	273.2
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	273.6	850.1	-183.3	68.4	507.4	-606.1	651.9
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.8
	23.2	363.0	-212.8	5.4	122.8	-109.4	99.9
795	28.1	3513.3	0.0	7.1	0.0	-3538.6	46.3
	0.0	1589.8	-1804.9	49.8	131.1	-834.3	1130.7
796	166.2	2162.1	0.0	4.1	0.0	-2018.7	18.5
N-RICHVW	-10.5	1026.6	-717.9	28.5	146.0	-940.5	738.7
797	0.0	3286.0	0.0	6.9	0.0	-3334.1	41.2
W-RICHVW	0.0	1613.3	-1704.7	31.0	255.5	-572.3	888.2
798	0.0	904.1	0.0	7.5	0.0	-946.7	35.0
	0.0	420.9	311.7	18.4	306.3	-900.8	456.2
799	1271.6	1490.6	0.0	6.5	0.0	-274.3	48.8
	438.3	727.4	-385.5	31.5	338.9	-498.6	902.5
800	441.0	1549.0	0.0	10.5	0.0	-1160.3	41.8
	86.9	742.7	-820.2	33.5	498.1	-97.7	726.6
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	174.3	32.5	0.0	7.8	47.3	19.4	161.9
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-44.2	208.4	-192.4	51.4	243.4	-224.8	356.6
803	0.0	0.0	0.0	0.0	0.0	-10.0	10.0
	0.0	0.0	0.0	0.0	349.9	286.0	63.9
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	563.6	30.4	0.0	3.6	0.0	290.6	239.0
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.1
	1254.6	124.0	0.0	23.7	6.4	649.7	463.6
806	3084.9	96.0	0.0	2.3	0.0	2979.4	7.1
	1158.9	56.0	0.0	15.9	2.9	694.1	395.8
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.7	0.0	0.0	95.7	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1451.4	200.0	0.0	10.1	0.0	683.8	557.4
811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1455.8	48.0	0.0	9.3	0.0	961.8	436.7
812	215.6	60.0	0.0	1.1	0.0	153.7	0.8

	242.0	30.4	0.0	4.5	0.0	179.7	27.4
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-39.8	6.0	0.0	2.1	0.0	-67.6	19.7
814	315.9	20.0	0.0	0.3	0.0	294.9	0.7
	212.7	10.0	0.0	2.7	0.0	159.8	40.2
815	0.0	0.0	0.0	0.5	0.0	-137.0	136.5
	0.0	0.0	0.0	250.2	5095.4	3244.3	1600.9
816	285.1	244.2	0.0	0.4	0.0	31.3	9.2
	102.5	112.4	0.0	4.5	67.5	-11.4	64.4
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.9	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1

Appendix E – Loss Analysis

ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.4	586.5	-1117.7	0.0	186.5	-290.6	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9

SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0

Appendix E – Loss Analysis

NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.8	0.8
	0.0	0.0	0.0	0.0	0.0	-13.1	13.1
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.4
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.4	0.0	-1.9	0.0	0.0	9.5	0.8
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.4	65.4	0.0	-1.6	5.7	-42.6	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-222.4	0.0	260.3	-0.2	450.5
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-79.5	2.3
	0.0	0.0	0.0	0.0	26.6	-25.0	27.5
1636	36.0	0.0	0.0	0.0	0.0	33.5	2.5
	-11.8	0.0	0.0	0.0	15.1	-15.3	18.6
1666	0.0	1.4	0.0	0.0	0.0	-2.1	0.7
	0.0	0.4	0.0	0.0	3.7	-1.7	5.0
TOTALS	695827.9	678337.8	63.2	491.1	0.0	0.0	16923.0

149856.0 200475.5-136761.2 4505.5 166070.6 0.0 247744.1

DRG II – SUPK Post 2013 Case

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:38
MTEP07 2013 SUMPK APPAB CBLEND 0731.SAV FROM MTEP06-2011PH3 ZONE TOTALS
CONTRACTUAL BLENDED DISPATCH WITH REF FUT GENS, APPAB, 0803 IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13725.6	3700.4	0.0	0.0	0.0	9832.4	152.8
PJM500KV	3536.9	996.9	-710.4	0.0	3907.5	1438.2	5706.5
2	0.0	6272.4	0.0	0.0	0.0	-6304.1	31.7
NORTHERN	0.0	1172.3	-123.2	0.0	74.4	-1136.9	162.2
3	0.0	1604.0	0.0	0.0	0.0	-1634.3	30.3
ROCK RIV	76.6	220.7	-56.7	0.0	74.5	-197.1	184.2
4	0.0	3087.7	0.0	0.0	0.0	-3112.9	25.3
SOUTHERN	0.0	996.2	-240.2	0.0	56.3	-812.4	112.7
5	265.0	136.6	0.0	0.0	0.0	-200.2	299.0
345KV	51.4	50.1	99.0	0.0	3078.3	-1528.4	4497.4
6	305.5	35.4	0.0	0.0	0.0	222.9	47.3
PEAKERS	-25.5	14.1	-279.1	0.0	264.5	-301.2	805.3
7	17362.5	487.1	0.0	6.0	0.0	16829.4	40.1
GEN BUS	4520.1	72.4	-31.1	41.2	0.0	2874.1	1563.5
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.2
TR MIDPT	0.0	723.1	-684.6	0.0	0.0	-1318.5	1272.6
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4447.1	0.0	0.0	4159.1	8.0
10	4054.0	108.9	0.1	0.0	0.0	3943.5	1.6
CHI-ESS	769.1	59.8	-11.9	0.0	7.9	587.9	141.2
11	9106.0	0.0	0.0	0.0	0.0	9073.7	32.2
IPP GEN	2487.9	0.0	0.0	0.0	223.0	1898.0	812.8
12	0.0	1745.4	0.0	0.0	0.0	-1751.8	6.4
C-N	0.0	493.2	0.0	0.0	480.8	-67.5	55.1
14	567.5	2127.8	0.0	0.1	0.0	-1582.7	22.4
C-S	77.0	574.5	-203.7	0.0	133.6	-416.0	255.8
15	8.0	1489.9	0.0	0.0	0.0	-1526.0	23.8
YORK 115	2.0	191.3	-63.0	0.0	72.9	-153.3	98.3
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.3	0.0	0.5	21.2	5.3

17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.2	38.3
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-86.7	75.9
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.8	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.2	39.2
NO-ESS	1130.3	421.9	-87.8	0.0	196.5	262.6	672.4
21	1074.0	645.0	0.0	0.0	0.0	412.3	16.7
	563.7	165.4	-98.7	0.0	43.3	385.1	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.6	4.7
	0.0	305.6	0.0	0.0	20.7	-329.0	44.1
23	765.0	6607.3	0.0	0.0	0.0	-6002.4	116.7
N-R	200.7	2128.3	-1684.3	0.0	50.9	-1068.8	896.1
24	1157.0	2326.7	0.0	0.0	0.0	-1256.8	87.2
N-S	371.4	542.9	-339.9	0.0	147.9	-713.1	1029.4
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.9	0.0	0.0	-497.8	713.5
26	2254.3	393.2	0.0	0.0	0.0	1844.6	16.4
JCSO 230	679.5	101.8	-543.3	0.0	90.5	775.9	435.6
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.1	21.0
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.7	43.1
32	13.0	183.6	-1.5	0.0	0.0	-279.0	110.0
	0.0	51.1	-638.9	0.0	373.0	-1130.8	2091.6
33	8502.2	40.5	0.0	0.0	0.0	8454.7	7.0
	1529.5	6.0	0.0	0.0	0.0	1463.8	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.7	9.8
NORTHEAS	18.5	134.0	-144.9	0.0	28.8	11.2	47.0
35	0.0	1539.0	-22.7	0.0	0.0	-1523.3	7.1
	0.0	706.2	-745.3	0.0	3.3	-4.4	46.8
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.1	14.7
	0.0	407.8	-370.6	0.0	0.4	-114.8	77.9
38	0.0	1923.0	-7.1	0.0	0.0	-1933.7	17.8
	0.0	594.9	-392.7	0.0	12.6	-308.9	119.3

40	196.7	681.0	0.0	0.0	0.0	-486.0	1.6
SO-ESS	0.9	257.7	0.0	0.0	5.4	-264.0	12.5
41	0.0	1594.2	-0.4	0.0	0.0	-1699.5	105.7
PECO	0.0	605.4	-1683.5	0.0	459.4	-254.7	1792.3
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-109.0	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.9	0.0	0.0	-259.8	92.2
44	4107.3	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	248.5	78.6	-93.8	0.0	0.0	92.5	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	506.7	0.0	0.0	0.0	0.0	259.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.9	0.0	0.2	-11.5	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.7	0.0	0.0	-541.3	235.9
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-111.9	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1059.3	63.9
PS NORTH	904.0	703.8	0.0	0.0	1670.5	107.3	1733.9
51	2113.7	2698.7	0.0	0.0	0.0	-545.7	33.8
PS CENTR	554.7	233.7	-887.6	0.0	115.8	536.7	844.1
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	628.5	64.4	-453.0	0.0	158.3	359.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.2	6599.6	0.0	0.0	0.0	-3137.9	114.8
BGE 115	927.6	3991.4	-4547.9	0.0	467.3	-98.3	2023.9
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-111.8	0.0	0.0	-17.7	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-283.8	0.0	0.0	-46.8	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0

68	5791.7	6963.1	0.0	0.0	0.0	-1282.9	111.5
PEPCO	1696.4	1558.7	-972.0	0.0	1192.5	-44.8	2347.1
77	1501.9	1575.1	0.0	0.0	0.0	-1544.0	91.7
RIVER	446.4	102.4	-410.4	0.0	112.0	-302.1	1072.9
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	89.7	118.5	-32.9	0.0	10.0	-176.5	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	1.7	7.1	-5.6	0.0	0.0	0.2	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	6.2	32.4	-26.1	0.0	0.4	-5.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1378.3	86.3
DPL COMP	415.2	610.6	-1201.6	0.0	241.3	64.6	1184.5
90	111.5	85.3	0.0	0.0	0.0	71.7	6.2
	-54.8	12.2	0.0	0.0	270.3	133.3	75.6
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.6	21.7
96	46.7	186.0	0.0	0.0	0.0	-143.0	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-56.2	49.0
101	11457.2	12787.3	0.1	0.3	0.0	-1563.3	232.8
CPL-E	2996.3	2805.5	-1770.1	-914.8	1400.3	665.9	3610.1
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2
CPL-W	118.5	174.1	-206.0	-16.0	62.2	85.6	143.1
110	21277.7	20975.5	11.6	3.4	0.0	-110.0	497.2
DUKE.DUK	5278.2	9083.7	-7703.0	-1198.8	1820.2	45.9	6956.6
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.4	157.3	-103.9	-15.9	38.6	6.2	20.3
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.2
113	5.7	4.0	0.0	0.0	0.0	0.0	1.7
YADKIN	-5.4	2.0	0.0	0.0	1.7	-8.3	2.6
114	427.5	0.0	0.0	0.0	0.0	426.0	1.5
HARTWELL	173.6	0.0	0.0	0.0	0.0	113.2	60.3
115	6116.8	5184.0	0.0	0.0	0.0	828.7	104.2
SCEG	1493.2	2219.9	-1398.4	0.0	418.1	-201.1	1291.1

120	0.0	1628.9	0.0	0.1	0.0	-1651.8	22.8
SC-SO	0.0	614.7	-391.4	-80.1	100.4	-170.0	124.7
121	3200.3	1321.2	0.1	0.0	0.0	1810.3	68.6
SC-NO	621.8	495.3	-442.8	-48.2	271.0	-147.7	1036.3
122	1757.0	1818.4	0.0	-0.1	0.0	-102.6	41.3
SC-EA	483.7	515.0	-372.6	-26.7	134.7	-47.4	550.1
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.8	51.6
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3540.7	8.0	0.0	0.0	0.0	3503.4	29.3
AECI	779.3	2.6	-115.6	103.8	723.2	972.8	590.8
131	27.0	347.4	0.0	0.0	0.0	-351.5	13.3
AECI-NW	-1.1	87.1	-2.7	0.0	66.4	-63.7	40.2
132	24.0	243.7	0.0	0.0	0.0	-222.7	7.5
AECI-NE	0.0	60.3	-16.3	0.0	31.3	-28.4	17.1
133	0.0	862.4	0.1	0.0	0.0	-891.3	28.7
AECI-CNT	0.0	216.1	-26.0	0.0	92.6	-250.7	153.1
134	15.0	637.2	0.0	0.0	0.0	-687.3	27.5
AECI-KMO	-4.2	159.7	-83.8	0.0	65.9	-106.5	82.8
135	0.0	631.1	0.0	0.0	0.0	-644.3	13.1
AECI-KOK	0.0	158.2	-77.8	0.0	47.1	-98.5	65.3
136	0.0	924.8	0.1	0.0	0.0	-955.8	30.9
AECI-SMP	0.0	231.7	-81.4	51.9	100.5	-220.9	171.2
137	0.0	390.8	0.0	0.0	0.0	-412.4	21.6
AECI-M&A	0.0	98.0	-15.4	0.0	40.2	-120.0	77.6
138	2108.5	1021.0	0.0	0.0	0.0	1058.1	29.5
LAGN	314.6	328.6	0.0	0.0	143.8	-267.8	397.7
140	28545.8	30306.1	19.6	3.3	0.0	-2322.4	539.1
GA-ITS	6543.7	12635.5	-10413.1	-833.8	4550.7	-24.1	9729.9
141	16564.1	13418.4	8.2	0.3	0.0	2833.4	247.9
APC	3507.6	3598.5	-2161.3	-162.6	1524.5	-325.4	4077.6
142	2083.0	2655.8	2.2	0.0	0.0	-642.2	55.7
GULF	-165.9	796.7	-1531.8	-42.4	193.6	147.8	657.1

143	3073.0	2653.2	3.5	0.0	0.0	342.1	74.1
MPC	972.3	938.2	-658.4	-6.3	516.7	124.9	1090.6
144	2084.0	1111.6	2.6	0.0	0.0	940.8	29.0
SAV	556.7	427.0	-391.5	0.0	55.1	75.2	501.2
145	855.0	790.7	0.0	0.0	0.0	42.9	21.4
SMEPA	113.4	265.5	-186.0	0.0	116.9	40.2	110.6
147	0.7	0.0	0.0	0.0	0.0	0.6	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.7	2058.2	0.0	0.0	0.0	1546.5	77.3
AEC	625.7	325.8	-411.0	0.0	293.6	233.7	775.3
155	6224.7	5901.4	1.9	0.5	0.0	154.0	166.9
EES_WEST	1501.6	2235.9	-1491.9	58.4	1013.4	49.6	1663.0
156	8945.6	9770.0	0.1	2.1	0.0	-919.0	92.3
EES_SOU	2013.2	2719.3	-1208.4	-573.0	857.6	97.6	1835.3
157	5443.0	5006.3	0.0	1.0	0.0	384.6	77.7
EES-ASNO	1223.2	1873.2	-618.6	-361.9	798.3	-355.3	1495.0
158	909.8	1767.3	0.0	0.7	0.0	-902.5	44.4
EES_CNTR	190.3	477.0	-304.3	-70.9	456.6	0.0	545.2
159	8724.2	7791.3	0.0	106.4	0.0	690.9	135.5
EES_NOR	954.9	2331.1	-947.4	-153.2	2112.9	-301.7	2139.0
165	4336.5	5549.8	0.0	0.0	0.0	-1326.9	113.6
TVA_WEST	1257.1	1662.5	-1858.6	102.1	1177.1	1023.1	1505.2
166	17075.4	15266.6	0.1	0.0	0.0	1502.5	306.2
TVA_CENT	3707.6	5590.8	-3547.1	103.5	3332.8	-59.2	4952.4
167	13165.7	9894.8	0.0	0.0	0.0	3082.7	188.2
TVA_EAST	3026.6	3523.9	-1848.4	210.8	2170.1	377.2	2933.3
168	0.0	3539.8	0.0	0.0	0.0	-3556.6	16.9
TVA_MEMP	0.0	1035.2	-176.6	0.0	103.9	-914.5	159.8
169	108.5	0.0	0.0	0.0	0.0	108.1	0.4
TVA_IPP	38.6	0.0	0.0	0.0	80.4	106.4	12.6
181	99.5	1772.1	0.0	0.0	0.0	-1676.9	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	142.0	50.1
182	0.0	3191.7	0.0	0.0	0.0	-3219.7	28.0
FAIRFAX	0.0	712.2	-991.1	0.0	104.2	-199.1	582.2
183	2665.0	1076.7	0.1	0.0	0.0	1571.6	16.6
WOODBRDG	51.7	294.2	-264.2	0.0	46.1	-139.3	207.1

184	275.0	483.0	0.0	0.0	0.0	-212.1	4.1
NOR NECK	64.7	100.9	-52.5	0.0	30.1	11.5	35.0
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-2.3	568.9	-317.9	0.0	60.4	-392.6	199.8
186	1144.0	1510.4	0.0	0.0	0.0	-378.7	12.3
YORKTOWN	-34.3	378.2	-473.4	0.0	66.6	19.9	107.5
187	2512.8	1730.7	0.0	0.0	0.0	768.8	13.3
CHESTERF	163.5	500.7	-287.3	0.0	99.9	-76.5	126.5
188	1411.0	637.6	1.3	0.0	0.0	755.4	16.8
SOUTHSDE	-155.9	156.6	-235.6	0.0	47.7	-138.8	109.7
189	710.0	2837.7	0.0	0.0	0.0	-2151.5	23.8
VA BEACH	173.6	690.0	-566.8	0.0	122.5	-200.9	373.9
190	1414.0	1111.3	0.0	0.0	0.0	301.4	42.1
SUFFOLK	32.8	251.4	-486.2	0.0	201.2	131.4	344.1
191	0.0	640.2	0.3	0.0	0.0	-665.6	8.1
OUTBANKS	0.0	161.1	-247.8	0.0	64.3	90.6	60.4
192	994.0	1116.2	0.3	0.0	0.0	-151.8	29.3
CAROLINA	34.8	296.5	-336.6	0.0	133.5	-4.4	212.7
193	1020.0	1831.2	0.0	0.0	0.0	-842.6	31.4
GORDONSV	-57.8	375.5	-237.9	0.0	164.9	-342.4	312.1
194	0.0	1211.1	0.0	0.0	0.0	-1231.4	17.6
VALLEY	0.0	326.6	-353.8	0.0	85.3	-115.5	227.5
195	1704.0	708.9	0.0	0.0	0.0	940.6	39.7
LEXINGTN	242.9	198.1	-130.9	0.0	189.8	-82.6	445.4
196	9293.0	816.3	0.0	0.0	0.0	8348.4	128.3
500KV	218.3	150.6	-689.4	0.0	2663.3	835.4	2584.9
197	1057.9	171.7	0.0	0.0	0.0	864.0	22.3
	336.8	34.7	0.0	0.0	181.3	219.0	264.3
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.2	45.0
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.2	20.5
201	9052.7	11383.3	0.0	0.0	0.0	-2537.2	214.1
AP	1444.1	2884.8	-2368.9	0.0	2232.6	-572.8	3735.7
202	1857.0	362.0	0.0	0.0	0.0	1465.0	22.7
	301.0	66.1	-35.2	0.0	145.4	100.5	313.6
203	151.0	472.3	0.0	0.0	0.0	-339.7	18.4
	52.1	97.1	-142.4	0.0	236.3	227.8	106.0

Appendix E – Loss Analysis

204	748.0	748.9	0.0	0.0	0.0	-25.0	30.0
	109.5	149.4	-146.3	0.0	258.8	170.2	196.5
205	0.0	43.0	0.0	0.0	0.0	-66.1	17.0
	0.0	15.2	0.0	0.0	8.9	-41.0	32.5
206	2047.4	61.7	0.0	0.0	0.0	1970.9	14.7
OVEC	-85.0	6.2	0.0	0.0	557.1	306.5	159.4
207	1866.4	854.9	0.0	0.0	0.0	1008.0	43.5
HE	123.9	264.1	-145.9	0.0	123.8	-235.7	378.3
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.6	1.8
209	3797.9	3668.4	0.0	0.0	0.0	-297.9	116.0
DPL	369.1	663.9	-1408.3	0.0	388.3	176.4	1280.3
210	967.4	1456.0	0.0	0.0	0.0	-560.9	28.0
SIGE	360.8	481.1	-300.1	-0.7	49.3	-106.5	318.9
211	7708.2	8208.8	0.0	0.0	0.0	-714.5	213.9
LGEE	2794.7	2800.2	-1121.6	74.3	951.4	-400.7	2394.0
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.6	39.2	-21.9	0.0	10.4	-65.0	53.0
213	171.0	77.1	0.0	0.0	0.0	109.8	0.9
	51.3	5.4	0.0	0.0	5.2	28.4	22.6
214	1451.5	1769.8	0.0	0.0	0.0	-332.3	14.0
BREC	399.9	725.6	-293.2	0.0	108.7	-2.6	78.8
215	3252.9	3139.2	0.0	0.0	0.0	92.7	19.6
DLCO	521.1	438.2	-124.0	0.0	676.9	317.4	566.1
216	3137.6	3452.6	0.0	3.6	0.0	-392.0	77.3
IPL	845.4	690.2	-453.0	20.9	318.6	-254.9	1160.4
217	3019.5	3997.5	0.0	0.0	0.0	-1031.4	64.5
NIPS	952.6	1472.1	-476.8	0.0	369.3	-453.0	781.5
218	11699.5	182.5	0.0	0.0	0.0	11248.9	268.1
METC	2618.7	82.1	-477.3	0.0	1943.1	1374.1	3582.6
219	2244.0	5062.5	0.0	0.0	0.0	-3059.5	244.7
ITC	287.7	1857.5	-747.8	0.0	1883.8	-2786.6	3849.0
220	2877.8	2302.3	0.0	4.1	0.0	474.7	96.6
EKPC	644.2	879.9	-937.0	10.7	231.3	81.9	839.9
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	14274.4	748.4	0.0	0.0	0.0	13478.6	47.4
FE-GEN	4033.3	503.9	0.0	0.0	151.2	1904.6	1776.0

231	0.0	476.6	0.0	0.0	0.0	-479.6	3.1
FE-AK-23	0.0	108.6	-101.0	0.0	0.1	-51.8	44.3
232	0.0	1701.5	0.0	0.0	0.0	-1756.1	61.1
FE-AK	0.0	353.7	-410.6	0.0	294.4	-387.5	740.0
233	0.0	794.0	0.0	0.0	0.0	-807.4	13.4
FE-LAKE	0.0	183.5	-178.3	0.0	45.1	-127.6	167.6
234	0.0	292.6	0.0	0.0	0.0	-303.3	10.7
FE-MASS	0.0	35.3	0.0	0.0	11.8	-83.8	60.3
235	174.4	1127.9	0.0	0.0	0.0	-987.6	31.7
FE-PP	17.0	289.5	-202.9	0.0	119.3	-311.0	360.1
236	0.0	135.8	0.0	0.0	0.0	-138.2	2.4
FE-ALL	0.0	43.4	0.0	0.0	7.8	-53.6	18.0
237	0.0	577.2	0.0	0.0	0.0	-582.1	4.9
FE-WARR	0.0	185.1	-65.5	0.0	26.4	-162.7	69.4
238	4.5	1369.8	0.0	0.0	0.0	-1435.5	63.8
FE-YNG	24.9	333.8	-57.5	0.0	241.4	-545.5	534.2
239	103.0	4612.4	-3.2	0.0	0.0	-4564.6	58.4
FE-CEI	16.0	1718.9	-1831.7	0.0	409.4	-354.0	892.2
240	0.0	342.2	0.0	0.0	0.0	-346.7	4.5
FE-CPP	0.0	69.9	-148.1	0.0	0.0	59.9	18.3
241	1995.0	1025.6	0.0	0.4	0.0	957.9	38.4
FE-MN	179.5	180.3	-144.8	2.3	254.7	4.9	398.0
242	1091.0	875.2	0.0	0.4	0.0	180.6	34.1
FE-MR	219.4	209.6	-166.6	0.8	195.9	51.7	316.5
243	7.0	1069.2	0.0	0.2	0.0	-1093.3	30.5
FE-SP	-25.2	193.9	-142.8	1.2	69.7	-182.4	172.5
244	1196.5	789.7	0.0	0.1	0.0	376.0	26.5
FE-BAY	367.9	207.1	-123.5	0.8	223.9	255.9	247.6
245	2322.0	5266.0	0.0	3.6	0.0	-3040.2	95.7
FE-TE	834.5	1375.5	-376.4	7.5	601.4	-592.1	1019.2
246	26.0	862.0	0.0	0.6	0.0	-873.6	8.2
	10.5	170.8	0.0	-16.6	87.5	-170.1	98.9
250	6193.7	6638.7	0.0	0.0	0.0	-588.9	143.8
AEP-AP	-379.3	1829.0	-1760.2	1644.0	3698.5	-216.5	1822.9
251	11153.5	5388.7	0.0	0.0	0.0	5523.0	241.8
AEP-OP	-298.0	836.3	-1697.2	2773.2	5529.2	216.9	3101.9
252	6798.1	4801.8	0.0	0.0	0.0	1768.6	227.7
AEP-IM	445.3	732.1	-982.9	1482.7	3442.7	-156.3	2812.4

253	2440.0	5404.9	0.0	0.0	0.0	-3112.2	110.1
AEP-CS	296.3	1277.3	-1516.0	0.0	703.0	177.2	1042.8
254	260.0	1403.2	0.0	0.0	0.0	-1187.9	44.7
AEP-KP	152.8	366.0	-431.1	0.0	73.9	25.5	266.4
255	363.5	1628.6	0.0	0.0	0.0	-1277.7	12.7
AEP-OP-I	56.3	669.3	-59.4	0.0	33.0	-598.9	78.4
256	0.0	573.6	0.0	0.0	0.0	-578.3	4.7
AEP-IM-I	0.0	104.3	-35.3	0.0	40.4	-54.6	26.1
257	450.0	330.3	0.0	0.0	0.0	104.7	11.4
	79.5	92.0	-13.4	0.0	74.9	-59.5	135.2
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.1
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.0	3.9
	119.0	84.6	-36.3	0.0	3.6	34.6	39.6
261	3555.0	105.2	0.0	0.0	0.0	3448.3	1.4
ITC-GN	1187.5	15.0	0.0	0.0	34.8	1178.0	29.3
262	6644.0	783.0	0.0	0.0	0.0	5825.0	36.1
ITC-GS	1938.0	176.9	-193.1	0.0	138.9	1888.3	204.8
263	1671.9	8119.0	0.0	0.1	0.0	-6517.6	70.4
ITC-DIS	357.7	3206.0	-2947.7	127.6	425.2	-16.4	413.4
264	8.0	615.0	0.0	0.0	0.0	-634.2	35.0
	7.6	185.6	-75.0	0.0	91.6	-233.4	224.1
265	2271.7	1221.8	0.0	0.0	0.0	990.1	59.2
	327.2	275.7	-187.8	1.4	481.8	149.0	569.6
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.3	93.3	-111.6	0.0	36.7	18.7	126.0
267	481.0	522.5	0.0	0.0	0.0	-62.9	21.4
	201.6	186.5	-148.6	0.3	125.0	88.8	199.5
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	71.4	219.7	0.0	0.0	0.0	-149.6	1.3
MUNI	10.1	49.3	0.0	0.0	1.9	-49.0	11.6
271	419.2	507.9	0.0	0.0	0.0	-89.9	1.2
LANSING	82.2	202.9	-85.6	0.0	5.2	-37.7	7.9

272	306.2	857.4	0.0	0.0	0.0	-575.5	24.3
WOLVERIN	80.2	195.4	-123.2	0.0	41.4	-40.7	90.1
273	259.8	9323.0	-1.0	0.0	0.0	-9187.9	125.7
CE	25.3	2508.2	-2239.2	0.0	76.0	-1098.2	930.5
280	55.0	7311.4	0.3	5.6	0.0	-7762.1	379.1
DEI	60.7	1463.4	-2429.4	-6.5	1126.8	-1707.1	3806.5
281	0.0	365.1	0.0	0.0	0.0	-296.8	10.2
HE IN DE	0.0	123.2	-14.5	0.0	56.0	-55.6	35.1
282	0.0	705.8	0.0	0.0	0.0	-683.8	4.7
DEI IND	0.0	198.1	-14.3	-0.3	13.4	-197.2	37.7
283	7519.3	360.0	0.0	0.0	0.0	7109.2	0.0
DEI GENS	2483.3	233.2	0.0	0.0	0.0	2077.1	147.8
284	0.0	4955.5	0.5	2.0	0.0	-5046.5	127.3
DEO	0.0	738.6	-603.4	-77.5	507.5	-1034.5	1501.0
285	0.0	383.0	0.0	0.0	0.0	-418.9	1.1
DEO IND	0.0	71.0	0.0	0.0	0.9	-91.5	3.6
286	5546.5	0.0	0.0	0.2	0.0	5536.1	10.3
DEO GENS	1416.6	0.0	0.0	1.1	0.0	868.5	547.0
287	0.0	447.8	0.1	0.0	0.0	-453.7	5.6
DEK	0.0	64.4	-148.5	0.0	3.0	53.9	32.5
288	0.0	11.8	0.0	0.0	0.0	-16.8	0.4
DEK IND	0.0	7.7	0.0	0.0	0.3	-11.7	1.9
290	795.0	105.0	0.0	0.0	0.0	755.0	0.0
	400.0	56.0	0.0	0.0	0.0	249.9	134.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	260.0	150.0	-21.2	0.0	0.0	80.7	50.5
301	0.0	0.0	0.0	0.0	0.0	-4.2	4.2
CIL345	0.0	0.0	0.0	0.0	48.0	-37.7	85.7
302	44.0	357.8	0.0	0.0	0.0	-325.2	11.4
302	0.0	104.3	0.0	0.0	30.7	-179.4	105.7
303	1130.0	65.0	0.0	0.0	0.0	1063.8	1.2
CILGEN	430.8	40.3	0.0	0.0	0.0	351.9	38.6
304	0.0	504.2	0.0	0.0	0.0	-507.8	3.7
PEORIA	0.0	129.8	-30.4	0.0	0.3	-117.0	17.8
305	0.0	116.7	0.0	0.0	0.0	-117.4	0.7
PEKIN	0.0	30.4	0.0	0.0	0.0	-32.9	2.5
306	0.0	76.8	1.1	0.0	0.0	-78.1	0.2
EASTERN	0.0	13.8	0.0	0.0	0.0	-14.7	0.8

307	0.0	43.9	0.1	0.0	0.0	-44.2	0.2
WESTERN	0.0	9.8	0.0	0.0	0.0	-10.5	0.7
308	0.0	67.5	0.7	0.0	0.0	-68.2	0.1
LACON	0.0	16.3	-3.2	0.0	0.0	-13.5	0.4
309	0.0	37.2	0.0	0.0	0.0	-37.2	0.0
HOMER	0.0	10.9	0.0	0.0	0.0	-10.9	0.0
310	31.4	957.5	0.0	0.0	0.0	-973.9	19.4
REG E-IL	19.8	224.1	-62.2	0.0	113.4	-184.3	152.4
311	2529.0	821.3	0.0	0.0	0.0	1684.7	23.1
FRKNJEFF	775.4	170.2	0.0	0.0	172.4	269.7	507.8
312	1696.0	744.7	0.0	0.0	0.0	901.4	49.9
ST FRAN	415.8	252.8	0.0	0.0	192.2	-93.8	449.0
313	1238.0	1230.7	0.0	0.0	0.0	-22.0	29.3
STCHMOED	432.9	183.7	0.0	0.0	249.1	140.0	358.3
314	1701.6	865.5	0.0	0.0	0.0	795.4	40.6
LKSDMP&L	696.0	98.1	59.2	0.0	509.2	558.6	489.3
315	5.0	121.2	0.0	0.0	0.0	-116.7	0.5
GREENHIL	4.5	8.6	0.0	0.0	0.0	-9.0	4.9
316	5.0	890.0	5.0	0.0	0.0	-899.7	9.8
SEMO	6.6	223.6	100.4	0.0	85.3	-331.2	99.3
317	9.0	2288.0	0.0	0.0	0.0	-2290.3	11.3
N METRO	0.0	211.9	0.0	0.0	59.4	-337.2	184.7
318	955.0	2692.1	0.0	0.0	0.0	-1756.3	19.2
S METRO	297.1	408.1	-243.7	0.0	42.8	-70.5	246.0
319	135.0	159.8	0.0	0.0	0.0	116.0	0.4
ILL-IOWA	22.1	34.5	0.0	0.0	0.0	9.9	8.6
320	796.0	2.3	0.0	0.0	0.0	795.1	0.9
MOGENINI	145.5	0.4	0.0	0.0	0.0	104.2	41.4
321	0.0	653.5	0.0	0.0	0.0	-664.0	10.5
SOUTHERN	0.0	162.7	0.0	-0.3	93.2	-154.4	85.1
322	269.0	855.4	0.0	0.0	0.0	-632.4	16.1
357	16.1	180.9	0.0	0.0	105.5	-157.9	102.7
323	980.7	1887.9	0.0	0.0	0.0	-953.1	45.9
EASTERN	87.5	400.8	-36.7	0.0	334.7	-508.8	566.8
329	3494.0	235.1	0.0	0.0	0.0	3253.4	5.5
GEN&LOAD	710.6	95.4	0.0	0.0	0.0	344.1	271.1
331	0.0	0.0	0.0	0.0	0.0	-59.8	0.5
CHICAGO	0.0	0.0	0.0	0.0	2.3	-14.2	2.7

341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.3	0.0	6.1	16.7	0.9
342	0.0	14.8	0.0	0.0	0.0	-15.4	0.6
C-N	0.0	3.6	0.0	0.0	3.9	-3.7	3.9
344	0.0	39.8	0.0	0.0	0.0	-40.1	0.3
NO-ESS	0.0	13.6	-15.0	0.0	9.0	9.1	1.3
345	0.0	109.0	0.0	0.0	0.0	-112.1	3.2
N-R	0.0	30.1	0.0	0.0	12.1	-37.6	19.6
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.4	0.1
RR-ESS	0.0	2.8	0.0	0.0	5.6	2.5	0.3
348	0.0	162.3	0.0	0.0	0.0	-165.5	3.2
R-S	0.0	55.9	-15.5	0.0	20.7	-35.9	16.1
349	489.1	24.3	0.0	0.0	0.0	461.1	3.8
SO-ESS	43.6	6.5	90.7	62.2	216.9	5.5	95.6
351	0.0	73.7	0.0	0.0	0.0	-74.5	0.8
EEC	0.0	26.3	-16.2	-5.8	7.6	-0.9	4.1
352	0.0	129.8	0.0	0.0	0.0	-139.5	9.7
SEIEC	0.0	64.0	-24.6	-8.2	21.9	-55.4	46.0
353	0.0	35.4	0.0	0.0	0.0	-35.5	0.1
SIEC	0.0	13.4	-15.7	-0.6	0.0	2.7	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	6497.4	4768.6	0.0	0.0	0.0	1608.1	120.7
357	1347.6	999.5	-553.2	0.0	595.7	-185.2	1682.2
360	619.9	489.0	0.0	0.0	0.0	128.0	3.0
360	58.1	147.2	-114.7	0.0	8.2	-0.2	34.0
361	3312.2	1762.1	0.0	2.0	0.0	1499.0	47.8
SIPC	695.8	419.4	-128.6	11.4	132.3	-132.3	650.8
362	1102.4	635.3	0.0	0.1	0.0	429.0	20.4
EEI	509.0	126.2	-27.2	0.7	161.4	288.5	278.4
363	551.0	703.5	0.0	0.6	0.0	-136.4	9.8
PJM500KV	37.4	115.3	-115.7	2.4	146.7	37.2	144.0
364	1353.7	575.7	0.0	0.8	0.0	751.1	25.1
SEAST	320.4	94.2	-88.5	6.7	207.2	196.3	314.4

365	1555.4	2285.6	0.0	1.8	0.0	-780.3	46.7
	143.7	404.8	-242.6	7.1	354.4	-228.0	547.3
366	2465.9	2587.2	0.0	0.3	0.0	-194.8	73.2
WPS	406.3	614.0	-719.9	0.9	507.3	267.2	751.4
367	566.7	834.2	0.0	0.9	0.0	-296.7	13.3
MGE	59.1	257.1	-218.9	1.5	99.7	-88.6	203.3
368	22.9	136.8	0.0	0.0	0.0	-118.9	5.0
UPPC	-3.0	56.9	-65.6	0.0	33.2	19.9	19.0
371	4691.7	3405.4	0.0	0.5	0.0	951.2	112.5
WPL	991.5	916.4	-1034.8	0.4	499.6	388.2	1133.9
372	0.0	367.3	0.0	0.0	0.0	-21.3	0.3
WPL-WPPI	0.0	132.9	-8.4	0.0	2.8	2.8	2.6
375	44.6	143.3	0.0	0.0	0.0	-102.9	4.2
ED SAULT	8.2	62.1	-19.8	0.0	55.6	-1.0	22.5
376	7757.9	5493.3	0.0	1.5	0.0	2127.9	135.2
WE-MKR	2474.6	1776.7	-1097.4	4.3	615.7	-204.8	2611.4
377	300.0	955.9	0.0	0.0	0.0	-680.2	17.9
WE-FV	81.4	281.3	-104.5	0.0	182.8	-136.3	222.3
378	50.0	181.5	0.0	0.0	0.0	-138.1	6.6
WE-IR	8.9	63.3	-60.4	0.0	44.9	8.4	42.5
379	507.3	358.6	0.0	0.0	0.0	136.9	11.8
WE-PI	18.4	53.3	-40.8	0.0	95.7	3.6	98.1
380	228.9	844.1	0.0	0.0	0.0	-725.2	7.0
WE-WPPI	6.4	168.0	-136.5	0.0	13.7	-108.4	62.4
381	0.0	23.2	0.0	0.0	0.0	-23.3	0.1
WRWL-WPS	0.0	9.3	0.0	0.0	0.1	-9.5	0.3
382	106.5	279.6	0.0	0.0	0.0	-174.4	1.3
CWP-WPS	42.4	127.3	0.0	0.0	0.0	-97.9	13.0
383	0.0	78.4	0.0	0.0	0.0	-78.9	0.5
MEWD-WPS	0.0	17.0	-25.9	0.0	2.3	8.4	2.9
384	82.6	120.3	0.0	0.0	0.0	-38.2	0.5
MPU-WPS	11.2	23.1	-9.9	0.0	0.4	-14.2	12.6
385	0.0	88.0	0.0	0.0	0.0	-88.2	0.2
WPPI-WPS	0.0	28.0	-34.6	0.0	0.9	7.0	0.5
386	14.0	33.5	0.0	0.0	0.0	-19.6	0.1
ESCANABA	7.4	3.1	0.0	0.0	0.3	4.3	0.4
390	382.8	551.8	0.0	0.0	0.0	-221.0	19.9
	48.6	204.1	-264.8	0.0	134.8	91.4	134.1

Appendix E – Loss Analysis

391	2497.9	257.3	0.0	0.0	0.0	609.9	34.1
ALTW_391	810.5	96.3	-442.9	0.0	317.1	386.9	498.1
392	27.9	31.0	0.0	0.0	0.0	-1310.9	21.2
ALTW_392	12.9	8.2	-50.5	0.0	50.5	-357.7	59.6
393	1459.2	106.8	0.0	0.0	0.0	1276.3	23.6
ALTW_393	100.1	9.4	67.8	0.0	186.2	-200.6	383.7
394	302.7	3943.5	0.0	0.0	0.0	-966.2	17.4
ALTW_394	-55.7	1234.3	-101.5	-64.5	61.7	-192.3	74.6
395	0.0	32.1	0.0	0.0	0.0	0.0	0.0
	0.0	18.7	-16.5	0.0	0.2	15.3	1.4
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-315.8	33.4
	446.0	652.1	-289.0	0.0	126.1	-125.3	333.5
401	20561.6	23603.4	0.0	0.0	0.0	-3659.1	620.8
FPLSOUTH	4429.8	6865.8	-6919.9	0.0	4251.2	111.9	8623.3
402	9883.4	11593.8	0.0	0.0	0.0	-1994.0	283.6
FPC GENS	2930.2	4004.9	-3213.6	0.0	1149.4	42.0	3246.2
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.5	5.7
	122.8	102.5	-24.9	0.0	12.4	-16.2	73.7
405	272.2	512.4	0.0	0.0	0.0	-242.2	1.9
HST	66.6	152.0	0.0	0.0	14.4	-91.1	20.1
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1060.9	1247.3	-493.6	0.0	229.1	-215.7	752.2
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.2	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3673.1	90.0	0.0	0.0	0.0	3559.9	23.1
NSB	957.9	8.9	0.0	0.0	304.5	658.1	595.5
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	293.4	311.4	-51.9	0.0	253.6	-179.3	466.9
412	2239.6	1110.2	0.0	0.0	0.0	1079.5	49.9
SECI	482.4	276.2	-50.7	0.0	181.0	-326.1	764.1

Appendix E – Loss Analysis

413	866.9	1311.7	0.0	0.0	0.0	-456.0	11.2
MP-GEN	140.8	231.7	-123.8	0.0	30.1	-93.8	156.8
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.4
STARKE	0.0	337.1	-96.6	0.0	32.7	-360.2	152.4
415	629.3	669.5	0.0	0.0	0.0	-90.3	17.7
	163.7	209.0	-130.9	0.0	48.1	-17.2	140.2
416	4916.0	4567.2	0.0	0.0	0.0	227.9	120.8
GENERATN	1492.4	397.3	-825.5	0.0	234.3	208.6	1946.2
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.6
	83.6	36.4	-10.6	0.0	1.7	30.4	29.2
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	118.4	67.0	0.0	0.0	16.2	42.9	24.8
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	235.5	0.0	0.0	0.0	0.0	195.0	40.5
428	100.2	0.0	0.0	0.0	0.0	100.0	0.2
PLANTCTY	92.1	0.0	0.0	0.0	0.0	84.2	7.9
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-111.7	8.5
	16.8	58.2	-24.3	0.0	19.1	-42.9	51.9
442	309.2	102.7	0.0	0.0	0.0	201.8	4.8
	26.0	11.4	0.0	0.0	10.3	-9.5	34.4
443	0.0	93.7	0.0	0.0	0.0	-97.7	3.2
	0.0	15.7	-43.7	0.0	8.4	22.7	9.6
444	575.0	244.5	0.0	0.0	0.0	319.2	9.0
	98.4	59.4	-35.0	0.0	10.5	-21.9	110.2
445	190.0	144.7	0.0	0.0	0.0	44.5	5.4
	30.0	29.1	-18.0	0.0	14.2	-17.8	47.2
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.5	0.0	10.6	-14.1	13.6
447	0.0	108.0	0.0	0.0	0.0	-110.7	2.5
	0.0	37.1	0.0	0.0	3.6	-41.7	7.6

449	16.0	138.5	0.0	0.0	0.0	-130.0	0.8
	2.7	16.0	0.0	0.0	7.8	-12.8	4.6
450	0.0	0.0	0.0	0.0	0.0	-0.5	0.5
	0.0	0.0	0.0	0.0	3.0	-4.1	7.1
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.8	1.2
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.0	11.1
	372.0	204.4	-25.7	0.0	47.2	86.9	153.6
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.5	3.2
WERE	7.2	57.1	-3.5	0.0	2.2	-35.8	5.5
600	7573.5	384.5	0.0	0.0	0.0	7163.1	23.1
608	930.4	228.4	0.0	0.0	158.3	41.1	829.2
601	1764.0	7583.7	0.0	0.0	0.0	-6304.7	190.2
XEL_MN	107.7	1033.8	-2273.4	593.2	2295.2	767.1	2208.2
602	14.0	391.1	0.0	0.0	0.0	-429.2	5.1
XEL_ND	-2.8	78.2	-153.2	0.0	28.7	59.8	36.4
603	0.0	410.8	0.0	0.0	0.0	-459.5	7.4
XEL_SD	0.0	80.7	-31.0	0.0	22.9	-95.6	56.7
604	181.8	1469.7	0.0	0.0	0.0	-1292.8	39.5
XEL_WI	23.3	295.9	-617.8	0.0	248.4	313.2	287.4
605	149.6	674.2	0.0	0.0	0.0	-382.8	4.3
NON-XEL	-11.6	136.2	-74.2	0.0	9.0	-57.0	18.4

Appendix E – Loss Analysis

608	520.1	501.4	0.0	0.2	0.0	-112.1	59.2
MP_608	-71.1	165.5	-923.4	0.9	246.5	21.2	889.6
609	-62.3	1045.4	0.0	0.0	0.0	-1054.9	5.2
MP-INDUS	92.8	369.4	-58.0	0.0	6.7	-245.5	52.7
610	1269.7	84.6	0.0	0.0	0.0	1178.3	2.3
MP-SSL	72.8	44.2	-5.3	0.0	0.3	-70.4	102.6
611	0.0	9.6	0.0	0.0	0.0	-9.6	0.1
	0.0	3.1	0.0	0.0	0.0	-4.1	0.9
613	0.0	216.0	0.0	0.0	0.0	-0.2	0.2
SMPA_613	0.0	54.0	-26.0	0.0	1.2	25.3	1.8
614	11.5	55.0	0.0	0.1	0.0	-56.7	0.4
SMPA_614	13.6	13.6	0.0	0.4	0.6	-8.8	4.8
615	22.9	61.2	0.0	0.0	0.0	-331.5	2.6
SMPA_615	12.5	14.3	-33.7	0.0	32.1	-75.9	30.7
616	118.7	459.9	0.0	0.0	0.0	-63.4	1.9
SMPA_616	11.1	150.8	-226.4	0.3	93.6	256.7	29.1
617	62.0	84.3	0.0	0.0	0.0	-28.9	0.5
SMPA_617	28.5	21.0	0.0	0.0	3.6	2.2	5.9
618	0.0	139.8	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	3.4	0.0	0.0	0.0	0.0	0.0
619	97.6	1503.0	0.0	0.3	0.0	-1452.2	33.0
GRE-GRE	-0.9	262.9	-666.5	0.7	144.0	345.0	196.5
620	0.0	231.1	0.0	0.1	0.0	-231.4	6.4
GRE-MP	0.0	34.1	-32.9	0.1	62.3	34.6	26.3
621	50.0	161.7	0.0	0.1	0.0	-94.4	5.7
GRE-OTP	-16.9	30.4	0.0	0.2	26.2	-41.8	23.5
622	48.5	1114.7	0.0	0.2	0.0	-1095.3	56.6
GRE-NSP	-14.5	143.4	-10.0	0.6	122.6	-273.5	252.4
623	70.7	138.7	0.0	0.0	0.0	-62.6	3.2
GRE-ALT	-22.8	18.0	0.0	0.0	11.9	-33.2	5.9
624	1461.7	0.0	0.0	0.7	0.0	1276.5	56.5
GRE-ND	420.2	0.0	-398.2	4.2	57.8	-665.0	1533.8
625	1239.8	5.9	0.0	0.6	0.0	1233.2	5.7
GRE-S	-191.4	0.0	0.0	0.7	6.9	-334.3	148.9
626	238.6	214.3	0.0	0.1	0.0	-35.7	17.5
OTP_626	-16.9	65.7	-91.2	0.0	112.5	19.8	91.8
627	2.2	221.8	0.0	0.1	0.0	-298.3	24.2
OTP_627	-1.0	50.9	19.6	26.5	327.9	-39.1	257.5

628	497.0	39.0	0.0	0.0	0.0	446.2	11.5
OTP_628	-1.0	14.3	0.0	0.0	27.9	-67.5	80.0
630	12.2	210.5	0.0	0.2	0.0	-242.9	2.5
	-3.0	43.4	-28.7	0.1	9.9	-29.3	9.2
631	114.5	294.0	0.0	0.0	0.0	-396.5	1.0
RPU_631	117.5	73.7	0.0	0.2	14.7	-4.0	8.3
633	164.1	215.3	0.0	0.0	0.0	-52.0	0.7
MPW_633	80.7	48.1	0.0	0.0	9.1	23.6	18.0
635	49.0	156.2	0.0	0.0	0.0	-318.2	4.7
MEC_635	27.5	17.5	-91.8	0.0	32.2	59.9	32.7
636	3411.6	1702.2	0.0	0.0	0.0	1942.1	32.4
MEC_636	526.2	469.1	-126.2	0.0	222.5	-93.0	552.2
637	864.8	2138.8	0.0	0.0	0.0	-1281.8	43.8
MEC_637	35.9	321.7	-323.1	0.0	709.4	249.9	505.1
638	1023.1	1434.6	0.0	0.0	0.0	-502.2	23.4
MEC_638	265.3	369.4	-157.1	0.0	264.3	3.0	292.8
639	246.6	381.3	0.0	0.0	0.0	-143.5	1.2
MEC_639	51.1	55.8	0.0	0.0	6.7	-3.1	3.6
640	2617.8	2487.0	0.0	0.0	0.0	-146.8	97.0
NPPD_640	159.2	797.5	-670.1	25.8	1087.4	68.0	981.4
641	132.0	220.1	0.0	0.0	0.0	13.8	0.7
HAST_641	36.8	72.0	0.0	0.0	3.3	-11.3	10.6
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.9
GRIS_642	16.4	11.3	0.0	0.0	2.6	-15.3	23.0
645	2477.3	2370.6	0.0	0.0	0.0	37.0	26.9
OPPD_645	410.8	414.8	-137.8	15.0	381.1	-19.7	493.8
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.6
OPPD_FRE	41.2	35.1	0.0	0.0	1.0	-12.0	11.7
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	176.4	854.9	0.0	0.0	0.0	-689.0	10.5
LES_650	17.0	147.1	-211.8	0.0	88.2	-15.0	184.9
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	2.5	0.0	-121.3	0.0	1.5	25.4	99.9

652	212.5	152.3	0.0	0.0	0.0	-74.3	5.6
WAPA_652	26.4	33.0	-119.0	0.0	113.1	10.0	180.3
653	77.4	97.5	0.0	0.0	0.0	-203.4	12.9
WAPA_653	-66.4	22.8	-8.0	-0.3	170.6	-30.6	77.1
654	1374.8	370.2	0.0	0.0	0.0	299.3	69.4
WAPA_654	3.6	61.7	-249.9	158.7	1051.6	292.0	677.5
655	506.0	30.5	0.0	0.0	0.0	369.4	32.1
WAPA_655	-45.7	5.6	-3.6	0.0	290.7	-29.2	263.1
656	0.0	465.4	0.0	0.0	0.0	-54.3	3.5
WAPA_656	0.0	135.8	-30.3	0.0	88.2	49.3	46.7
657	751.0	144.4	0.0	0.1	0.0	578.3	31.3
MPC-657	154.1	34.0	-164.7	0.0	192.4	169.6	300.0
659	75.1	1366.5	0.0	0.0	0.0	-474.8	48.9
BEPC_659	-45.0	254.7	-3.9	562.1	1208.4	-101.7	556.9
660	2389.3	202.5	0.0	0.0	0.0	2182.4	4.4
ZONE_660	291.7	126.2	0.0	0.0	0.7	-63.2	229.4
661	742.9	499.9	0.0	0.0	0.0	187.9	17.5
MDU_661	89.1	148.3	29.3	3.4	255.5	13.7	173.5
663	79.3	320.0	0.0	0.0	0.0	-223.6	6.8
NWPS_663	-5.7	70.2	-21.2	0.0	23.7	-56.2	27.2
665	128.7	464.5	0.0	0.0	0.0	-135.8	1.0
MRES_665	-6.9	146.1	-30.9	0.0	4.1	-39.2	16.7
666	0.0	17.4	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
667	0.0	794.1	0.0	0.0	0.0	-821.6	14.8
MHSUBWPG	0.0	176.5	-139.5	0.0	149.7	-57.3	170.9
668	1087.0	1109.6	0.0	0.0	0.0	-257.7	254.5
MHRURALS	1516.1	231.6	-1385.9	257.5	782.6	-1591.8	4787.4
669	146.8	458.4	0.0	0.0	0.0	-328.0	16.4
MHWPGHYD	25.0	180.5	-52.2	0.0	39.1	-151.8	87.5
670	4039.5	71.0	0.0	0.0	0.0	3927.5	41.1
MHRURALN	1672.7	13.3	-783.2	148.9	350.7	1980.1	664.3
671	0.0	675.5	0.0	0.0	0.0	-686.3	4.2
MH INDUS	0.0	118.7	0.0	0.0	11.0	-128.9	20.2
672	0.0	2182.1	0.0	0.0	0.0	-2395.7	92.4
SPC	91.9	523.4	-329.4	81.8	991.7	89.3	671.8

674	0.0	641.5	0.0	0.0	0.0	-533.0	12.7
SPC-IND	0.0	127.0	5.5	0.0	122.7	-29.3	66.3
675	2652.0	138.0	0.0	0.0	0.0	2514.0	0.0
SPC-SSL	149.2	33.7	-52.2	0.0	0.0	-63.6	231.3
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	85.3	20.3	0.0	0.0	0.0	27.6	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	83.2	793.1	0.0	0.0	0.0	-734.8	24.7
DPC_680	6.3	205.9	-109.9	0.0	88.2	-65.6	64.6
681	923.9	41.8	0.0	0.0	0.0	859.5	30.9
DPC_681	-38.6	13.2	-57.5	0.3	242.2	-15.2	265.1
682	0.0	48.4	0.0	0.0	0.0	-49.7	0.2
DPC_682	0.0	19.5	0.0	0.0	0.2	-19.7	0.2
683	0.0	6.4	0.0	0.0	0.0	0.0	0.0
	0.0	1.3	0.0	0.0	0.0	0.0	0.0
684	0.0	14.6	0.0	0.0	0.0	0.0	0.0
	0.0	5.5	0.0	0.0	0.0	0.0	0.0
685	0.0	18.9	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28178.9	29430.7	6.4	213.3	0.0	-2132.2	660.7
MEPCO	5848.7	5450.6	-6972.4	29.9	4708.2	845.8	11202.9
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0

733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-418.5	58.5
NMPC WES	540.6	747.5	-104.0	-46.1	347.0	-430.6	720.8
752	4633.2	1634.8	4.5	0.0	0.0	2922.2	71.6
NMPC CEN	1186.2	759.9	-192.5	-21.2	473.1	-166.5	1279.6
753	1214.0	599.0	0.5	0.0	0.0	464.8	149.6
NMPC MVN	166.3	222.6	-757.7	-4.1	1264.3	-90.1	2060.0
754	2286.2	1954.6	7.2	0.1	0.0	238.4	85.9
NMPC EAS	833.3	866.7	-1067.0	-17.7	283.7	403.1	932.0
755	684.8	463.2	-3.1	0.0	0.0	207.9	16.8
NYSEG WE	194.3	247.5	-148.8	-7.3	299.7	178.8	223.8
756	752.4	1284.1	3.4	2.1	0.0	-601.6	64.4
NYSEG CE	207.5	630.7	-454.1	-183.7	351.3	-163.4	729.2
757	0.0	264.1	1.2	0.5	0.0	-269.0	3.1
NYSEG EA	0.0	122.6	-71.1	-77.4	17.4	28.8	14.6
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.4
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.4	31.7
RG&E	67.3	534.8	-641.3	-87.4	265.2	138.7	387.7
760	1369.1	1213.9	0.0	0.2	0.0	74.0	81.1
CENT HUD	418.6	340.7	-422.2	-3.3	185.6	-322.0	1010.9
761	1879.0	1067.6	0.1	0.3	0.0	792.4	18.5
O&R	717.7	363.7	-2.6	-62.4	23.6	102.6	340.1
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	640.0	2017.7	-804.9	-0.8	1814.5	230.4	1012.1

763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	497.5	245.3	-1.9	0.0	0.9	89.8	165.2
764	906.5	532.4	0.0	0.0	0.0	368.8	5.4
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.7
765	7959.5	11796.8	0.0	0.0	0.0	-3976.0	138.6
CON ED C	3396.1	5697.7	-2297.0	0.0	3996.2	-559.2	4550.7
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	9.8	16.7	0.0	0.0	0.0	-6.8	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.1
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.4	15.5
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.9	33.0
CON ED N	568.7	167.4	-355.6	0.0	333.9	294.8	796.1
775	0.0	1483.5	0.0	0.0	0.0	-1519.1	35.6
CON ED C	0.0	686.7	-196.2	0.0	1494.8	-103.1	1107.4
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.5	0.0	0.0	0.0	0.0	43.0	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.7	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-343.0	30.1
NMPC GNS	18.2	113.0	-187.6	-5.2	24.9	17.2	105.8
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.4
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.7	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.2	14.2
CE UPNY	0.0	0.0	0.0	0.0	466.7	159.6	307.2
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.5	59.9
	29.8	882.6	-703.2	38.2	359.4	-393.5	565.2

787	0.0	2168.8	0.0	4.3	0.0	-2194.9	21.8
	0.0	1124.8	-755.3	21.3	266.8	-561.5	437.5
788	350.2	2183.2	0.0	8.1	0.0	-1872.8	31.7
	137.0	1086.4	-937.7	53.1	69.9	-458.3	463.2
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-174.7	7.7	10.3	-34.5	68.6
790	350.6	1327.4	0.0	5.8	0.0	-1014.9	32.3
	-4.8	631.9	-636.4	27.6	65.2	-291.7	328.9
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	6.0	251.6	-20.8	41.9	170.1	-227.5	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.1
	48.0	402.4	-28.5	29.1	192.2	-435.8	273.1
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	273.6	850.1	-183.3	68.4	507.4	-606.1	651.9
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.9
	23.2	363.0	-212.8	5.4	122.8	-109.4	99.9
795	28.1	3513.3	0.0	7.1	0.0	-3538.6	46.3
	0.0	1589.8	-1804.9	49.8	131.1	-834.3	1130.7
796	166.2	2162.1	0.0	4.1	0.0	-2018.7	18.5
N-RICHVW	-10.5	1026.6	-717.9	28.5	146.0	-940.5	738.6
797	0.0	3286.0	0.0	6.9	0.0	-3334.1	41.2
W-RICHVW	0.0	1613.3	-1704.7	31.0	255.5	-572.3	888.2
798	0.0	904.1	0.0	7.5	0.0	-946.7	35.0
	0.0	420.9	311.7	18.4	306.3	-900.8	456.2
799	1271.6	1490.6	0.0	6.5	0.0	-274.3	48.8
	438.3	727.4	-385.5	31.5	338.9	-498.6	902.4
800	441.0	1549.0	0.0	10.5	0.0	-1160.3	41.8
	86.9	742.7	-820.2	33.5	498.2	-97.4	726.3
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	174.4	32.5	0.0	7.8	47.3	19.4	161.9
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-44.1	208.4	-192.4	51.4	243.4	-224.8	356.6
803	0.0	0.0	0.0	0.0	0.0	-10.0	10.0
	0.0	0.0	0.0	0.0	349.9	286.1	63.9
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	563.6	30.4	0.0	3.6	0.0	290.6	239.0
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.1
	1254.6	124.0	0.0	23.7	6.4	649.7	463.6

806	3084.9	96.0	0.0	2.3	0.0	2979.4	7.1
	1158.9	56.0	0.0	15.9	2.9	694.1	395.8
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.7	0.0	0.0	95.7	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1451.3	200.0	0.0	10.1	0.0	683.8	557.4
811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1455.8	48.0	0.0	9.3	0.0	961.8	436.7
812	215.6	60.0	0.0	1.1	0.0	153.7	0.8
	242.0	30.4	0.0	4.5	0.0	179.7	27.4
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-39.9	6.0	0.0	2.1	0.0	-67.7	19.7
814	315.9	20.0	0.0	0.3	0.0	294.9	0.7
	212.7	10.0	0.0	2.7	0.0	159.8	40.2
815	0.0	0.0	0.0	0.5	0.0	-137.0	136.5
	0.0	0.0	0.0	250.2	5095.4	3244.3	1600.8
816	285.1	244.2	0.0	0.4	0.0	31.3	9.2
	102.5	112.4	0.0	4.5	67.5	-11.4	64.5
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.9	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6

833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.4	586.5	-1117.7	0.0	186.5	-290.6	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4

CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1

Appendix E – Loss Analysis

876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.7	0.7
	0.0	0.0	0.0	0.0	0.0	-11.6	11.6
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.4
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.3	0.0	-1.9	0.0	0.0	9.4	0.8
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.4	65.4	0.0	-1.6	5.7	-42.6	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-222.4	0.0	260.3	-0.2	450.5

1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-79.5	2.2
	0.0	0.0	0.0	0.0	26.6	-24.6	27.1
1636	36.0	0.0	0.0	0.0	0.0	33.6	2.4
	-11.8	0.0	0.0	0.0	15.3	-14.3	17.8
1666	0.0	1.4	0.0	0.0	0.0	-2.1	0.7
	0.0	0.4	0.0	0.0	3.7	-1.4	4.7
TOTALS	695795.9	678337.8	63.2	491.3	0.0	0.0	16890.8
	149431.2	200475.5	-136650.2	4506.4	166427.8	0.0	247564.3

DRG II – SUPK Base Case + 600 MW

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:41
MTEP07 2013 SUMPK APPAB CBLEND 0731.SAV FROM MTEP06-2011PH3 ZONE TOTALS
CONTRACTUAL BLENDED DISPATCH WITH REF FUT GENS, APPAB, 0803 IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13720.0	3700.4	0.0	0.0	0.0	9826.9	152.6
PJM500KV	3532.4	996.9	-710.5	0.0	3907.7	1438.3	5702.1
2	0.0	6272.4	0.0	0.0	0.0	-6304.1	31.7
NORTHERN	0.0	1172.3	-123.2	0.0	74.3	-1137.1	162.3
3	0.0	1604.0	0.0	0.0	0.0	-1635.6	31.6
ROCK RIV	76.6	220.7	-56.6	0.0	74.4	-204.9	191.8
4	0.0	3087.7	0.0	0.0	0.0	-3112.8	25.2
SOUTHERN	0.0	996.2	-240.2	0.0	56.3	-812.4	112.7
5	265.0	136.6	0.0	0.0	0.0	-204.6	303.4
345KV	50.9	50.1	99.0	0.0	3077.5	-1597.1	4564.8
6	305.5	35.4	0.0	0.0	0.0	222.8	47.3
PEAKERS	-24.5	14.1	-279.1	0.0	264.5	-301.3	806.3
7	17362.5	487.1	0.0	6.0	0.0	16829.3	40.1
GEN BUS	4565.9	72.4	-31.1	41.2	0.0	2918.7	1564.7
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.2
TR MIDPT	0.0	723.1	-684.3	0.0	0.0	-1320.4	1274.2
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4445.9	0.0	0.0	4157.8	8.0

10	4054.0	108.9	0.1	0.0	0.0	3943.5	1.6
CHI-ESS	770.0	59.8	-11.9	0.0	7.9	588.9	141.1
11	9106.0	0.0	0.0	0.0	0.0	9073.4	32.5
IPP GEN	2534.6	0.0	0.0	0.0	222.9	1940.1	817.5
12	0.0	1745.4	0.0	0.0	0.0	-1751.9	6.4
C-N	0.0	493.2	0.0	0.0	480.7	-67.6	55.1
14	567.5	2127.8	0.0	0.1	0.0	-1582.6	22.4
C-S	77.0	574.5	-204.2	0.0	133.6	-415.2	255.6
15	64.0	1489.9	0.0	0.0	0.0	-1472.7	26.4
YORK 115	-11.5	191.3	-63.3	0.0	72.7	-170.7	102.4
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.3	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.2	38.3
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-86.7	75.9
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.8	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.3	39.1
NO-ESS	1129.0	421.9	-87.8	0.0	196.5	261.8	671.9
21	1074.0	645.0	0.0	0.0	0.0	412.3	16.7
	563.5	165.4	-98.7	0.0	43.3	385.0	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.6	4.7
	0.0	305.6	0.0	0.0	20.7	-329.3	44.4
23	765.0	6607.3	0.0	0.0	0.0	-6002.9	117.3
N-R	200.7	2128.3	-1683.8	0.0	50.9	-1072.6	899.5
24	1157.0	2326.7	0.0	0.0	0.0	-1256.8	87.1
N-S	371.3	542.9	-339.9	0.0	147.9	-712.9	1029.1
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.9	0.0	0.0	-497.8	713.5
26	2254.3	393.2	0.0	0.0	0.0	1844.6	16.4
JCSO 230	679.6	101.8	-543.3	0.0	90.5	776.0	435.5
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.2	21.0
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.7	43.1
32	13.0	183.6	-1.5	0.0	0.0	-279.0	109.9
	0.0	51.1	-638.9	0.0	373.0	-1130.2	2091.1

33	8502.2	40.5	0.0	0.0	0.0	8454.7	7.0
	1527.8	6.0	0.0	0.0	0.0	1462.1	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.8	9.9
NORTHEAS	18.5	134.0	-144.9	0.0	28.8	10.7	47.5
35	0.0	1539.0	-22.7	0.0	0.0	-1523.3	7.1
	0.0	706.2	-745.3	0.0	3.3	-4.4	46.8
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.1	14.7
	0.0	407.8	-370.6	0.0	0.4	-114.7	77.9
38	0.0	1923.0	-7.1	0.0	0.0	-1933.7	17.7
	0.0	594.9	-392.7	0.0	12.6	-308.8	119.3
40	196.7	681.0	0.0	0.0	0.0	-486.0	1.7
SO-ESS	0.8	257.7	0.0	0.0	5.4	-264.1	12.6
41	0.0	1594.2	-0.4	0.0	0.0	-1699.5	105.7
PECO	0.0	605.4	-1683.6	0.0	459.4	-254.8	1792.4
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-108.9	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.9	0.0	0.0	-259.8	92.2
44	4107.3	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	248.2	78.6	-93.8	0.0	0.0	92.2	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	506.7	0.0	0.0	0.0	0.0	259.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4
ZONE46	0.0	90.4	-100.9	0.0	0.2	-11.5	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.7	0.0	0.0	-541.3	235.9
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-111.9	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1059.8	64.3
PS NORTH	904.0	703.8	0.0	0.0	1670.5	101.8	1739.4
51	2113.7	2698.7	0.0	0.0	0.0	-545.7	33.8
PS CENTR	554.9	233.7	-887.6	0.0	115.8	536.7	844.3
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9

PS SOUTH	628.5	64.4	-453.0	0.0	158.3	359.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.2	6599.6	0.0	0.0	0.0	-3137.8	114.7
BGE 115	927.2	3991.4	-4547.5	0.0	467.3	-98.2	2023.1
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-111.8	0.0	0.0	-17.7	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-283.7	0.0	0.0	-46.8	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.7	6963.1	0.0	0.0	0.0	-1282.9	111.5
PEPCO	1696.7	1558.7	-972.0	0.0	1192.5	-45.3	2347.8
77	1501.9	1575.1	0.0	0.0	0.0	-1544.0	91.7
RIVER	446.4	102.4	-410.4	0.0	112.0	-302.2	1072.9
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	89.7	118.5	-32.9	0.0	10.0	-176.5	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	1.7	7.1	-5.6	0.0	0.0	0.2	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	6.2	32.4	-26.1	0.0	0.4	-5.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1378.3	86.3
DPL COMP	415.2	610.6	-1201.6	0.0	241.3	64.5	1184.5
90	111.5	85.3	0.0	0.0	0.0	71.8	6.1
	-55.3	12.2	0.0	0.0	269.6	132.6	75.2
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.6	21.7
96	46.7	186.0	0.0	0.0	0.0	-143.0	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-56.3	49.1
101	11457.2	12787.3	0.1	0.3	0.0	-1564.2	233.7
CPL-E	3006.5	2805.5	-1769.8	-914.7	1400.1	665.8	3619.8
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2

Appendix E – Loss Analysis

CPL-W	119.3	174.1	-206.0	-16.0	62.2	86.2	143.1
110	21277.7	20975.5	11.6	3.4	0.0	-111.0	498.2
DUKE.DUK	5290.2	9083.8	-7701.2	-1198.6	1819.8	45.4	6966.6
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.5	157.3	-103.8	-15.9	38.6	6.1	20.4
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.2
113	5.7	4.0	0.0	0.0	0.0	0.0	1.7
YADKIN	-5.1	2.0	0.0	0.0	1.7	-8.0	2.6
114	427.5	0.0	0.0	0.0	0.0	426.0	1.5
HARTWELL	173.4	0.0	0.0	0.0	0.0	113.1	60.3
115	6116.8	5184.0	0.0	0.0	0.0	828.2	104.7
SCEG	1497.0	2219.9	-1398.1	0.0	418.1	-202.4	1295.7
120	0.0	1628.9	0.0	0.1	0.0	-1651.9	22.9
SC-SO	0.0	614.7	-391.3	-80.0	100.4	-170.4	125.0
121	3200.3	1321.2	0.1	0.0	0.0	1810.1	68.9
SC-NO	623.3	495.3	-442.7	-48.2	271.0	-148.4	1038.3
122	1757.0	1818.4	0.0	-0.1	0.0	-102.6	41.3
SC-EA	484.6	515.0	-372.6	-26.7	134.7	-46.7	550.1
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.8	51.6
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0
	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3540.7	8.0	0.0	0.0	0.0	3503.3	29.4
AECI	784.6	2.6	-115.6	103.9	723.2	976.0	592.9
131	27.0	347.4	0.0	0.0	0.0	-351.1	12.9
AECI-NW	-1.3	87.1	-2.7	0.0	66.4	-62.6	38.8
132	24.0	243.7	0.0	0.0	0.0	-222.6	7.4
AECI-NE	0.0	60.3	-16.3	0.0	31.3	-28.1	16.7
133	0.0	862.4	0.1	0.0	0.0	-891.7	29.1
AECI-CNT	0.0	216.1	-25.9	0.0	92.6	-253.3	155.8
134	15.0	637.2	0.0	0.0	0.0	-687.9	28.0
AECI-KMO	-4.2	159.7	-83.7	0.0	65.9	-108.0	84.3
135	0.0	631.1	0.0	0.0	0.0	-644.2	13.1

Appendix E – Loss Analysis

AECI-KOK	0.0	158.2	-77.8	0.0	47.1	-98.2	64.9
136	0.0	924.8	0.1	0.0	0.0	-955.3	30.5
AECI-SMP	0.0	231.7	-81.5	51.9	100.6	-218.8	169.1
137	0.0	390.8	0.0	0.0	0.0	-412.1	21.3
AECI-M&A	0.0	98.0	-15.4	0.0	40.2	-119.1	76.7
138	2108.5	1021.0	0.0	0.0	0.0	1058.1	29.5
LAGN	313.4	328.6	0.0	0.0	143.8	-268.8	397.4
140	28545.8	30306.1	19.6	3.3	0.0	-2322.6	539.4
GA-ITS	6551.6	12635.5	-10412.6	-833.8	4550.6	-19.7	9732.8
141	16564.1	13418.4	8.2	0.3	0.0	2832.7	248.6
APC	3514.8	3598.5	-2161.1	-162.6	1524.5	-326.4	4085.6
142	2083.0	2655.8	2.2	0.0	0.0	-642.4	56.0
GULF	-163.9	796.7	-1531.7	-42.4	193.5	147.9	658.9
143	3073.0	2653.2	3.5	0.0	0.0	342.2	74.1
MPC	970.4	938.2	-658.3	-6.3	516.7	125.9	1087.7
144	2084.0	1111.6	2.6	0.0	0.0	940.9	28.9
SAV	556.7	427.0	-391.5	0.0	55.1	75.5	500.8
145	855.0	790.7	0.0	0.0	0.0	42.9	21.4
SMEPA	113.5	265.5	-186.0	0.0	116.9	40.7	110.1
147	0.7	0.0	0.0	0.0	0.0	0.6	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.7	2058.2	0.0	0.0	0.0	1546.4	77.4
AEC	628.1	325.8	-411.0	0.0	293.6	235.4	775.9
155	6224.7	5901.4	1.9	0.5	0.0	154.3	166.6
EES_WEST	1499.6	2235.9	-1492.0	58.4	1013.4	49.4	1661.3
156	8945.6	9770.0	0.1	2.1	0.0	-919.0	92.3
EES_SOU	2013.7	2719.3	-1208.4	-573.0	857.6	98.0	1835.4
157	5443.0	5006.3	0.0	1.0	0.0	384.5	77.9
EES-ASNO	1224.3	1873.2	-618.6	-361.9	798.2	-356.7	1497.4
158	909.8	1767.3	0.0	0.7	0.0	-902.5	44.3
EES_CNTR	189.7	477.0	-304.3	-70.9	456.6	0.7	543.9
159	8724.2	7791.3	0.0	106.4	0.0	691.5	134.9
EES_NOR	955.9	2331.1	-947.5	-153.3	2113.0	-298.7	2137.2
165	4336.5	5549.8	0.0	0.0	0.0	-1326.3	113.0
TVA_WEST	1253.3	1662.5	-1858.7	102.0	1177.1	1025.2	1499.3
166	17137.8	15266.6	0.1	0.0	0.0	1563.4	307.7
TVA_CENT	3724.3	5590.8	-3546.1	103.5	3332.0	-63.3	4971.3

167	13165.7	9894.8	0.0	0.0	0.0	3080.8	190.0
TVA_EAST	3043.8	3523.9	-1847.8	210.6	2168.7	367.9	2957.9
168	0.0	3539.8	0.0	0.0	0.0	-3556.7	16.9
TVA_MEMP	0.0	1035.2	-176.6	0.0	103.9	-914.6	159.9
169	108.5	0.0	0.0	0.0	0.0	108.1	0.4
TVA_IPP	38.8	0.0	0.0	0.0	80.4	106.5	12.6
181	99.5	1772.1	0.0	0.0	0.0	-1676.9	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	141.9	50.2
182	0.0	3191.7	0.0	0.0	0.0	-3219.8	28.1
FAIRFAX	0.0	712.2	-991.1	0.0	104.2	-199.5	582.6
183	2665.0	1076.7	0.1	0.0	0.0	1571.6	16.6
WOODBRDG	52.2	294.2	-264.2	0.0	46.1	-138.9	207.2
184	275.0	483.0	0.0	0.0	0.0	-212.0	4.1
NOR NECK	64.6	100.9	-52.5	0.0	30.1	11.5	34.9
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-2.2	568.9	-318.0	0.0	60.4	-392.3	199.6
186	1144.0	1510.4	0.0	0.0	0.0	-378.7	12.3
YORKTOWN	-34.6	378.2	-473.4	0.0	66.6	19.8	107.3
187	2512.8	1730.7	0.0	0.0	0.0	768.8	13.3
CHESTERF	163.0	500.7	-287.3	0.0	99.9	-77.0	126.5
188	1411.0	637.6	1.3	0.0	0.0	755.4	16.7
SOUTHSDE	-155.7	156.6	-235.6	0.0	47.7	-138.9	110.0
189	710.0	2837.7	0.0	0.0	0.0	-2151.5	23.8
VA BEACH	173.4	690.0	-566.8	0.0	122.5	-200.9	373.7
190	1414.0	1111.3	0.0	0.0	0.0	301.4	42.2
SUFFOLK	33.0	251.4	-486.2	0.0	201.2	131.7	344.0
191	0.0	640.2	0.3	0.0	0.0	-665.6	8.1
OUTBANKS	0.0	161.1	-247.8	0.0	64.3	90.7	60.3
192	994.0	1116.2	0.3	0.0	0.0	-151.7	29.1
CAROLINA	34.2	296.5	-336.6	0.0	133.5	-4.1	211.8
193	1020.0	1831.2	0.0	0.0	0.0	-842.5	31.3
GORDONSV	-57.7	375.5	-237.9	0.0	164.9	-341.8	311.5
194	0.0	1211.1	0.0	0.0	0.0	-1231.4	17.6
VALLEY	0.0	326.6	-353.8	0.0	85.3	-115.9	228.0
195	1704.0	708.9	0.0	0.0	0.0	940.8	39.4
LEXINGTN	241.5	198.1	-130.9	0.0	189.8	-81.9	443.4
196	9293.0	816.3	0.0	0.0	0.0	8348.5	128.2
500KV	214.5	150.6	-689.4	0.0	2663.3	832.7	2583.9

197	1057.9	171.7	0.0	0.0	0.0	863.9	22.3
	336.9	34.7	0.0	0.0	181.3	219.0	264.5
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.3	45.1
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.5
201	9052.7	11383.3	0.0	0.0	0.0	-2537.0	213.9
AP	1441.2	2884.8	-2369.2	0.0	2232.7	-571.7	3732.1
202	1857.0	362.0	0.0	0.0	0.0	1465.1	22.6
	302.2	66.1	-35.2	0.0	145.4	102.0	313.3
203	151.0	472.3	0.0	0.0	0.0	-339.4	18.2
	51.5	97.1	-142.5	0.0	236.4	229.4	104.0
204	748.0	748.9	0.0	0.0	0.0	-24.9	29.9
	109.2	149.4	-146.3	0.0	258.8	169.5	196.9
205	0.0	43.0	0.0	0.0	0.0	-65.9	16.9
	0.0	15.2	0.0	0.0	8.9	-40.8	32.2
206	2047.4	61.7	0.0	0.0	0.0	1970.8	14.9
OVEC	-81.0	6.2	0.0	0.0	557.1	308.0	161.9
207	1866.4	854.9	0.0	0.0	0.0	1007.4	44.1
HE	125.2	264.1	-145.8	0.0	123.7	-238.6	382.2
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.6	1.8
209	3797.9	3668.4	0.0	0.0	0.0	-298.6	116.6
DPL	371.1	663.9	-1408.6	0.0	388.3	172.4	1286.5
210	967.4	1456.0	0.0	0.0	0.0	-560.8	27.8
SIGE	360.6	481.1	-300.1	-0.7	49.3	-105.2	317.4
211	7708.2	8208.8	0.0	0.0	0.0	-714.3	213.8
LGEE	2798.7	2800.2	-1121.6	74.3	951.3	-393.4	2390.6
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.6	39.2	-21.9	0.0	10.4	-65.0	53.1
213	171.0	77.1	0.0	0.0	0.0	109.8	0.9
	51.1	5.4	0.0	0.0	5.2	28.3	22.6
214	1451.5	1769.8	0.0	0.0	0.0	-333.0	14.7
BREC	403.5	725.6	-293.2	0.0	108.7	-2.1	81.9
215	3252.9	3139.2	0.0	0.0	0.0	92.7	19.5
DLCO	524.7	438.2	-124.0	0.0	676.9	321.4	565.7
216	3117.6	3452.6	0.0	3.6	0.0	-412.7	77.9
IPL	865.4	690.2	-452.4	20.9	318.3	-245.0	1169.6

217	3019.5	3997.5	0.0	0.0	0.0	-1032.0	65.1
NIPS	956.9	1472.1	-476.3	0.0	369.1	-453.1	785.3
218	11697.0	182.5	0.0	0.0	0.0	11242.8	271.7
METC	2683.5	82.1	-476.0	0.0	1941.7	1396.0	3622.8
219	2225.0	5062.5	0.0	0.0	0.0	-3080.2	246.4
ITC	289.4	1857.5	-747.3	0.0	1882.7	-2815.4	3877.9
220	2877.8	2302.3	0.0	4.1	0.0	475.2	96.1
EKPC	642.1	879.9	-937.1	10.7	231.3	82.8	836.9
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	14270.4	748.4	0.0	0.0	0.0	13474.4	47.6
FE-GEN	4134.6	503.9	0.0	0.0	151.2	2001.2	1780.7
231	0.0	476.6	0.0	0.0	0.0	-479.6	3.1
FE-AK-23	0.0	108.6	-100.8	0.0	0.1	-52.1	44.4
232	0.0	1701.5	0.0	0.0	0.0	-1757.8	62.8
FE-AK	0.0	353.7	-409.8	0.0	294.0	-408.3	759.7
233	0.0	794.0	0.0	0.0	0.0	-807.6	13.6
FE-LAKE	0.0	183.5	-177.6	0.0	45.0	-131.1	170.2
234	0.0	292.6	0.0	0.0	0.0	-303.3	10.7
FE-MASS	0.0	35.3	0.0	0.0	11.8	-84.5	60.9
235	173.4	1127.9	0.0	0.0	0.0	-988.8	31.9
FE-PP	14.0	289.5	-202.7	0.0	119.2	-317.0	362.9
236	0.0	135.8	0.0	0.0	0.0	-138.3	2.5
FE-ALL	0.0	43.4	0.0	0.0	7.8	-53.9	18.3
237	0.0	577.2	0.0	0.0	0.0	-582.2	5.0
FE-WARR	0.0	185.1	-65.3	0.0	26.4	-163.5	70.0
238	0.0	1369.8	0.0	0.0	0.0	-1440.5	64.3
FE-YNG	0.0	333.8	-57.4	0.0	241.2	-576.7	540.2
239	24.0	4612.4	-3.2	0.0	0.0	-4643.1	58.0
FE-CEI	7.0	1718.9	-1829.0	0.0	409.2	-373.0	899.3
240	0.0	342.2	0.0	0.0	0.0	-346.7	4.5
FE-CPP	0.0	69.9	-148.0	0.0	0.0	59.8	18.3
241	1995.0	1025.6	0.0	0.4	0.0	958.1	38.2
FE-MN	178.4	180.3	-144.6	2.3	254.7	5.5	396.1
242	1091.0	875.2	0.0	0.4	0.0	180.3	34.5
FE-MR	220.6	209.6	-166.5	0.8	195.8	49.9	319.2
243	3.5	1069.2	0.0	0.2	0.0	-1097.0	30.7

FE-SP	-12.6	193.9	-144.0	1.2	69.8	-169.8	173.8
244	1196.5	789.7	0.0	0.1	0.0	375.9	26.6
FE-BAY	365.9	207.1	-123.1	0.8	223.9	253.5	247.6
245	2322.0	5266.0	0.0	3.6	0.0	-3040.8	96.3
FE-TE	835.8	1375.5	-376.3	7.5	601.2	-595.4	1023.5
246	26.0	862.0	0.0	0.6	0.0	-873.7	8.3
	10.5	170.8	0.0	-16.6	87.5	-170.5	99.4
250	6193.7	6638.7	0.0	0.0	0.0	-588.1	143.0
AEP-AP	-383.7	1829.0	-1760.4	1644.4	3699.2	-204.6	1807.2
251	11153.5	5388.7	0.0	0.0	0.0	5520.5	244.3
AEP-OP	-274.3	836.3	-1695.8	2772.7	5527.8	203.1	3137.2
252	6798.1	4801.8	0.0	0.0	0.0	1766.5	229.9
AEP-IM	472.5	732.1	-981.6	1482.3	3440.9	-156.6	2837.3
253	2440.0	5404.9	0.0	0.0	0.0	-3112.4	110.3
AEP-CS	297.5	1277.3	-1516.1	0.0	703.0	176.1	1045.2
254	260.0	1403.2	0.0	0.0	0.0	-1187.7	44.4
AEP-KP	151.9	366.0	-431.2	0.0	73.9	25.8	265.1
255	363.5	1628.6	0.0	0.0	0.0	-1277.8	12.7
AEP-OP-I	56.3	669.3	-59.4	0.0	33.0	-599.1	78.5
256	0.0	573.6	0.0	0.0	0.0	-578.3	4.7
AEP-IM-I	0.0	104.3	-35.3	0.0	40.4	-54.8	26.3
257	450.0	330.3	0.0	0.0	0.0	104.8	11.3
	78.8	92.0	-13.4	0.0	74.9	-59.2	134.3
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.1
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.0	3.9
	119.0	84.6	-36.3	0.0	3.6	34.6	39.6
261	3555.0	105.2	0.0	0.0	0.0	3448.3	1.4
ITC-GN	1201.4	15.0	0.0	0.0	34.8	1191.9	29.3
262	6644.0	783.0	0.0	0.0	0.0	5824.7	36.4
ITC-GS	1959.4	176.9	-193.1	0.0	138.9	1907.8	206.7
263	1631.9	8119.0	0.0	0.1	0.0	-6558.2	71.0
ITC-DIS	362.2	3206.0	-2945.8	127.4	424.6	-20.1	419.4
264	8.0	615.0	0.0	0.0	0.0	-634.3	35.0
	7.7	185.6	-75.0	0.0	91.5	-233.4	224.1
265	2271.7	1221.8	0.0	0.0	0.0	989.9	59.3

	328.7	275.7	-187.8	1.4	481.8	150.5	569.5
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.4	93.3	-111.6	0.0	36.7	18.7	126.0
267	481.0	522.5	0.0	0.0	0.0	-62.9	21.4
	201.7	186.5	-148.6	0.3	125.0	88.9	199.5
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	71.4	219.7	0.0	0.0	0.0	-149.6	1.3
MUNI	10.4	49.3	0.0	0.0	1.9	-48.7	11.7
271	419.2	507.9	0.0	0.0	0.0	-89.9	1.2
LANSING	85.5	202.9	-85.6	0.0	5.2	-34.5	8.0
272	283.2	857.4	0.0	0.0	0.0	-599.6	25.4
WOLVERIN	71.7	195.4	-122.9	0.0	41.4	-53.4	94.1
273	257.3	9323.0	-1.0	0.0	0.0	-9190.8	126.1
CE	26.8	2508.2	-2234.5	0.0	75.8	-1104.2	933.1
280	55.0	7311.4	0.2	5.6	0.0	-7765.2	382.2
DEI	61.5	1463.4	-2424.8	-6.5	1125.7	-1734.9	3829.5
281	0.0	365.1	0.0	0.0	0.0	-296.9	10.3
HE IN DE	0.0	123.2	-14.5	0.0	56.0	-56.1	35.5
282	0.0	705.8	0.0	0.0	0.0	-684.1	5.0
DEI IND	0.0	198.1	-14.1	-0.3	13.3	-198.3	38.5
283	7477.4	360.0	0.0	0.0	0.0	7067.3	0.0
DEI GENS	2497.4	233.2	0.0	0.0	0.0	2091.1	148.0
284	0.0	4955.5	0.5	2.0	0.0	-5047.1	127.8
DEO	0.0	738.6	-603.4	-77.5	507.5	-1040.7	1507.1
285	0.0	383.0	0.0	0.0	0.0	-418.9	1.1
DEO IND	0.0	71.0	0.0	0.0	0.9	-91.5	3.6
286	5544.5	0.0	0.0	0.2	0.0	5534.1	10.3
DEO GENS	1424.7	0.0	0.0	1.1	0.0	876.6	547.1
287	0.0	447.8	0.1	0.0	0.0	-453.7	5.6
DEK	0.0	64.4	-148.5	0.0	3.0	53.8	32.6
288	0.0	11.8	0.0	0.0	0.0	-16.8	0.4
DEK IND	0.0	7.7	0.0	0.0	0.3	-11.7	1.9
290	795.0	105.0	0.0	0.0	0.0	755.0	0.0
	400.0	56.0	0.0	0.0	0.0	249.9	134.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1

Appendix E – Loss Analysis

WAR	259.8	150.0	-21.2	0.0	0.0	80.5	50.4
301	0.0	0.0	0.0	0.0	0.0	-4.3	4.3
CIL345	0.0	0.0	0.0	0.0	48.0	-38.9	86.9
302	44.0	357.8	0.0	0.0	0.0	-325.2	11.4
302	0.0	104.3	0.0	0.0	30.7	-179.3	105.6
303	1130.0	65.0	0.0	0.0	0.0	1063.8	1.2
CILGEN	431.8	40.3	0.0	0.0	0.0	352.9	38.6
304	0.0	504.2	0.0	0.0	0.0	-507.8	3.7
PEORIA	0.0	129.8	-30.4	0.0	0.3	-117.0	17.8
305	0.0	116.7	0.0	0.0	0.0	-117.4	0.7
PEKIN	0.0	30.4	0.0	0.0	0.0	-32.9	2.5
306	0.0	76.8	1.1	0.0	0.0	-78.1	0.2
EASTERN	0.0	13.8	0.0	0.0	0.0	-14.7	0.9
307	0.0	43.9	0.1	0.0	0.0	-44.2	0.2
WESTERN	0.0	9.8	0.0	0.0	0.0	-10.5	0.7
308	0.0	67.5	0.7	0.0	0.0	-68.2	0.1
LACON	0.0	16.3	-3.2	0.0	0.0	-13.5	0.4
309	0.0	37.2	0.0	0.0	0.0	-37.2	0.0
HOMER	0.0	10.9	0.0	0.0	0.0	-10.9	0.0
310	26.4	957.5	0.0	0.0	0.0	-979.1	19.6
REG E-IL	0.0	224.1	-62.2	0.0	113.3	-203.5	151.7
311	2529.0	821.3	0.0	0.0	0.0	1685.1	22.6
FRKNJEFF	773.0	170.2	0.0	0.0	172.4	271.3	503.9
312	1696.0	744.7	0.0	0.0	0.0	902.1	49.3
ST FRAN	414.2	252.8	0.0	0.0	192.2	-91.2	444.8
313	1238.0	1230.7	0.0	0.0	0.0	-20.9	28.3
STCHMOED	440.1	183.7	0.0	0.0	249.1	156.0	349.6
314	1681.6	865.5	0.0	0.0	0.0	775.5	40.5
LKSDMP&L	686.3	98.1	59.2	0.0	509.1	550.5	487.5
315	0.0	121.2	0.0	0.0	0.0	-121.8	0.6
GREENHIL	0.0	8.6	0.0	0.0	0.0	-14.8	6.2
316	0.0	890.0	5.0	0.0	0.0	-904.6	9.6
SEMO	0.0	223.6	100.0	0.0	85.2	-337.0	98.6
317	9.0	2288.0	0.0	0.0	0.0	-2290.4	11.4
N METRO	0.0	211.9	0.0	0.0	59.4	-338.8	186.3
318	949.0	2692.1	0.0	0.0	0.0	-1762.3	19.2
S METRO	302.5	408.1	-243.7	0.0	42.8	-66.2	247.1
319	135.0	159.8	0.0	0.0	0.0	116.0	0.4

Appendix E – Loss Analysis

ILL-IOWA	21.9	34.5	0.0	0.0	0.0	9.6	8.6
320	796.0	2.3	0.0	0.0	0.0	795.1	0.9
MOGENINI	149.4	0.4	0.0	0.0	0.0	108.0	41.5
321	0.0	653.5	0.0	0.0	0.0	-664.2	10.7
SOUTHERN	0.0	162.7	0.0	-0.3	93.2	-155.3	86.0
322	267.0	855.4	0.0	0.0	0.0	-633.8	15.5
357	15.3	180.9	0.0	0.0	105.5	-154.7	98.7
323	980.7	1887.9	0.0	0.0	0.0	-954.2	47.0
EASTERN	88.8	400.8	-36.7	0.0	334.6	-517.2	576.5
329	3494.0	235.1	0.0	0.0	0.0	3253.4	5.5
GEN&LOAD	715.4	95.4	0.0	0.0	0.0	348.8	271.2
331	0.0	0.0	0.0	0.0	0.0	-59.8	0.6
CHICAGO	0.0	0.0	0.0	0.0	2.3	-14.4	2.9
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.3	0.0	6.1	16.6	0.9
342	0.0	14.8	0.0	0.0	0.0	-15.4	0.7
C-N	0.0	3.6	0.0	0.0	3.9	-3.9	4.1
344	0.0	39.8	0.0	0.0	0.0	-40.2	0.3
NO-ESS	0.0	13.6	-15.0	0.0	9.0	9.0	1.4
345	0.0	109.0	0.0	0.0	0.0	-112.1	3.2
N-R	0.0	30.1	0.0	0.0	12.1	-37.8	19.8
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.4	0.1
RR-ESS	0.0	2.8	0.0	0.0	5.6	2.4	0.4
348	0.0	162.3	0.0	0.0	0.0	-165.5	3.2
R-S	0.0	55.9	-15.4	0.0	20.7	-36.1	16.3
349	489.1	24.3	0.0	0.0	0.0	460.7	4.2
SO-ESS	47.7	6.5	90.5	62.0	216.3	4.2	100.8
351	0.0	73.7	0.0	0.0	0.0	-74.4	0.8
EEC	0.0	26.3	-16.2	-5.8	7.6	-0.8	4.0
352	0.0	129.8	0.0	0.0	0.0	-139.7	9.9
SEIEC	0.0	64.0	-24.6	-8.2	21.9	-56.0	46.7
353	0.0	35.4	0.0	0.0	0.0	-35.5	0.1
SIEC	0.0	13.4	-15.7	-0.6	0.0	2.7	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0

357	6497.4	4768.6	0.0	0.0	0.0	1609.0	119.7
357	1352.4	999.5	-552.9	0.0	595.5	-172.7	1673.9
360	619.9	489.0	0.0	0.0	0.0	128.0	3.0
360	58.9	147.2	-114.7	0.0	8.2	0.6	34.0
361	3312.2	1762.1	0.0	2.0	0.0	1498.9	47.8
SIPC	699.1	419.4	-128.5	11.4	132.2	-129.1	650.8
362	1102.4	635.3	0.0	0.1	0.0	429.0	20.4
EEI	510.9	126.2	-27.2	0.7	161.3	289.0	279.6
363	551.0	703.5	0.0	0.6	0.0	-136.4	9.8
PJM500KV	37.7	115.3	-115.7	2.4	146.6	38.3	143.0
364	1353.7	575.7	0.0	0.8	0.0	750.6	25.7
SEAST	322.2	94.2	-88.4	6.7	207.2	191.5	320.9
365	1555.4	2285.6	0.0	1.8	0.0	-780.8	47.2
	146.6	404.8	-242.5	7.1	354.2	-227.8	549.8
366	2465.9	2587.2	0.0	0.3	0.0	-196.5	74.9
WPS	458.6	614.0	-718.5	0.9	504.1	278.3	788.0
367	564.3	834.2	0.0	0.9	0.0	-299.3	13.5
MGE	64.7	257.1	-218.7	1.5	99.5	-86.9	206.8
368	11.9	136.8	0.0	0.0	0.0	-130.7	5.8
UPPC	-2.0	56.9	-64.2	0.0	32.7	16.7	21.4
371	4636.7	3405.4	0.0	0.4	0.0	893.5	115.3
WPL	1083.4	916.4	-1037.4	0.4	455.9	409.7	1163.2
372	0.0	367.3	0.0	0.0	0.0	-21.3	0.3
WPL-WPPI	0.0	132.9	-8.2	0.0	2.8	2.9	2.4
375	44.6	143.3	0.0	0.0	0.0	-103.2	4.5
ED SAULT	8.4	62.1	-19.7	0.0	55.5	-2.7	24.3
376	7637.9	5493.3	0.0	1.5	0.0	2006.8	136.3
WE-MKR	2491.5	1776.7	-1092.0	4.3	614.1	-206.1	2622.7
377	300.0	955.9	0.0	0.0	0.0	-680.6	18.3
WE-FV	81.9	281.3	-104.5	0.0	182.5	-142.7	229.0
378	50.0	181.5	0.0	0.0	0.0	-138.2	6.7
WE-IR	9.7	63.3	-60.3	0.0	44.7	8.1	43.2
379	504.2	358.6	0.0	0.0	0.0	133.6	12.1
WE-PI	24.5	53.3	-40.7	0.0	95.4	8.3	99.0
380	212.8	844.1	0.0	0.0	0.0	-741.2	6.9
WE-WPPI	7.9	168.0	-136.2	0.0	13.7	-109.7	64.9
381	0.0	23.2	0.0	0.0	0.0	-23.3	0.1
WRWL-WPS	0.0	9.3	0.0	0.0	0.1	-9.5	0.3

382	106.5	279.6	0.0	0.0	0.0	-174.4	1.3
CWP-WPS	43.2	127.3	0.0	0.0	0.0	-97.2	13.1
383	0.0	78.4	0.0	0.0	0.0	-78.8	0.5
MEWD-WPS	0.0	17.0	-25.7	0.0	2.3	8.5	2.6
384	82.6	120.3	0.0	0.0	0.0	-38.2	0.5
MPU-WPS	11.3	23.1	-9.9	0.0	0.4	-14.1	12.6
385	0.0	88.0	0.0	0.0	0.0	-88.2	0.2
WPPI-WPS	0.0	28.0	-34.5	0.0	0.9	6.9	0.5
386	14.0	33.5	0.0	0.0	0.0	-19.6	0.1
ESCANABA	7.4	3.1	0.0	0.0	0.3	4.3	0.4
390	382.8	551.8	0.0	0.0	0.0	-221.1	20.0
	49.9	204.1	-264.7	0.0	134.7	91.6	134.9
391	2454.9	257.3	0.0	0.0	0.0	568.1	32.8
ALTW_391	796.8	96.3	-451.3	0.0	316.8	387.2	492.0
392	27.9	31.0	0.0	0.0	0.0	-1311.2	21.4
ALTW_392	12.9	8.2	-50.5	0.0	50.5	-358.1	60.0
393	1441.2	106.8	0.0	0.0	0.0	1259.6	22.4
ALTW_393	111.0	9.4	67.7	0.0	186.2	-185.9	380.1
394	330.7	3943.5	0.0	0.0	0.0	-938.0	17.3
ALTW_394	-65.7	1234.3	-108.1	-64.7	61.7	-197.7	76.7
395	0.0	32.1	0.0	0.0	0.0	0.0	0.0
	0.0	18.7	-16.5	0.0	0.2	15.3	1.4
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-316.0	33.6
	447.3	652.1	-288.9	0.0	126.0	-125.6	335.0
401	20561.6	23603.4	0.0	0.0	0.0	-3659.0	620.8
FPLSOUTH	4429.8	6865.8	-6919.9	0.0	4251.2	112.0	8623.2
402	9883.4	11593.8	0.0	0.0	0.0	-1994.1	283.6
FPC GENS	2930.3	4004.9	-3213.6	0.0	1149.4	41.7	3246.6
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.5	5.7
	122.7	102.5	-24.9	0.0	12.4	-16.2	73.7
405	272.2	512.4	0.0	0.0	0.0	-242.0	1.8
HST	68.2	152.0	0.0	0.0	14.4	-89.3	19.8
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1060.5	1247.3	-493.6	0.0	229.1	-216.1	752.2

407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.2	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3673.1	90.0	0.0	0.0	0.0	3559.9	23.2
NSB	962.4	8.9	0.0	0.0	304.4	662.1	595.8
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	293.7	311.4	-51.9	0.0	253.6	-179.0	466.9
412	2239.6	1110.2	0.0	0.0	0.0	1079.6	49.9
SECI	482.3	276.2	-50.7	0.0	181.0	-326.6	764.5
413	866.9	1311.7	0.0	0.0	0.0	-456.3	11.5
MP-GEN	140.8	231.7	-123.7	0.0	30.1	-94.8	157.7
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.3
STARKE	0.0	337.1	-96.6	0.0	32.7	-360.5	152.6
415	629.3	669.5	0.0	0.0	0.0	-89.9	17.3
	163.9	209.0	-130.9	0.0	48.1	-15.2	138.3
416	4916.0	4567.2	0.0	0.0	0.0	227.9	120.9
GENERATN	1492.5	397.3	-825.5	0.0	234.3	208.3	1946.7
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.6
	83.7	36.4	-10.6	0.0	1.7	30.5	29.2
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	118.8	67.0	0.0	0.0	16.2	43.3	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	235.5	0.0	0.0	0.0	0.0	194.9	40.5
428	100.2	0.0	0.0	0.0	0.0	100.0	0.2
PLANTCTY	92.1	0.0	0.0	0.0	0.0	84.2	7.9
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-111.7	8.5

	16.9	58.2	-24.3	0.0	19.1	-43.2	52.2
442	309.2	102.7	0.0	0.0	0.0	201.7	4.8
	26.0	11.4	0.0	0.0	10.3	-9.6	34.6
443	0.0	93.7	0.0	0.0	0.0	-97.7	3.2
	0.0	15.7	-43.7	0.0	8.4	22.6	9.7
444	575.0	244.5	0.0	0.0	0.0	319.1	9.1
	99.0	59.4	-35.0	0.0	10.5	-21.7	110.6
445	190.0	144.7	0.0	0.0	0.0	44.4	5.5
	30.2	29.1	-18.0	0.0	14.2	-17.9	47.5
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.5	0.0	10.6	-14.0	13.6
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.6	7.5
449	16.0	138.5	0.0	0.0	0.0	-130.0	0.8
	2.7	16.0	0.0	0.0	7.8	-12.8	4.6
450	0.0	0.0	0.0	0.0	0.0	-0.5	0.5
	0.0	0.0	0.0	0.0	3.0	-4.1	7.1
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.8	1.2
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3
	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.0	11.2
	372.4	204.4	-25.7	0.0	47.2	87.0	153.9
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.5	3.2

WERE	7.0	57.1	-3.4	0.0	2.2	-36.1	5.5
600	7573.5	384.5	0.0	0.0	0.0	7164.7	21.4
608	1086.2	228.4	0.0	0.0	1.3	61.0	808.1
601	1871.0	7583.7	0.0	0.0	0.0	-6200.5	193.0
XEL_MN	145.7	1033.8	-2283.4	592.5	2292.2	759.5	2261.6
602	14.0	391.1	0.0	0.0	0.0	-429.6	5.5
XEL_ND	-2.8	78.2	-152.0	0.0	28.5	56.3	38.5
603	0.0	410.8	0.0	0.0	0.0	-459.6	7.6
XEL_SD	0.0	80.7	-30.9	0.0	22.8	-95.9	57.0
604	161.1	1469.7	0.0	0.0	0.0	-1322.5	48.5
XEL_WI	26.5	295.9	-662.9	0.0	246.3	287.6	359.1
605	162.6	674.2	0.0	0.0	0.0	-369.7	4.2
NON-XEL	-17.5	136.2	-73.8	0.0	8.9	-63.4	18.4
608	568.1	501.4	0.0	0.2	0.0	-64.6	59.7
MP_608	-69.5	165.5	-947.3	0.9	245.9	49.2	886.4
609	-58.4	1045.4	0.0	0.0	0.0	-1050.7	5.0
MP-INDUS	83.1	369.4	-63.3	0.0	6.7	-250.2	53.0
610	1269.7	84.6	0.0	0.0	0.0	1178.3	2.3
MP-SSL	87.9	44.2	-5.3	0.0	0.3	-55.4	102.7
611	0.0	9.6	0.0	0.0	0.0	-9.6	0.1
	0.0	3.1	0.0	0.0	0.0	-4.1	0.9
613	0.0	216.0	0.0	0.0	0.0	-0.6	0.6
SMPA_613	0.0	54.0	-25.7	0.0	1.2	22.7	4.1
614	11.5	55.0	0.0	0.1	0.0	-56.7	0.5
SMPA_614	13.6	13.6	0.0	0.4	0.6	-8.6	4.6
615	22.9	61.2	0.0	0.0	0.0	-331.5	2.6
SMPA_615	12.6	14.3	-33.7	0.0	32.0	-75.2	30.1
616	118.7	459.9	0.0	0.0	0.0	-63.4	2.0
SMPA_616	12.9	150.8	-225.0	0.5	95.3	252.1	35.5
617	62.0	84.3	0.0	0.0	0.0	-29.0	0.6
SMPA_617	28.6	21.0	0.0	0.0	3.6	1.4	6.8
618	0.0	139.8	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	3.4	0.0	0.0	0.0	0.0	0.0
619	148.6	1503.0	0.0	0.3	0.0	-1401.1	32.9
GRE-GRE	-20.3	262.9	-665.8	0.7	143.8	326.7	194.6
620	56.0	231.1	0.0	0.1	0.0	-173.8	4.8
GRE-MP	-24.8	34.1	-32.0	0.1	62.2	14.2	20.9
621	61.0	161.7	0.0	0.1	0.0	-84.3	6.6

Appendix E – Loss Analysis

GRE-OTP	-18.9	30.4	-3.7	0.2	26.0	-44.6	27.8
622	122.5	1114.7	0.0	0.2	0.0	-1018.7	54.0
GRE-NSP	-48.3	143.4	-10.0	0.6	122.3	-301.9	246.7
623	70.7	138.7	0.0	0.0	0.0	-62.5	3.1
GRE-ALT	-22.8	18.0	0.0	0.0	11.9	-33.0	5.7
624	1461.7	0.0	0.0	0.7	0.0	1276.8	56.2
GRE-ND	423.9	0.0	-398.2	4.2	57.9	-659.2	1531.8
625	1239.8	5.9	0.0	0.6	0.0	1232.4	6.5
GRE-S	-171.1	0.0	0.0	0.7	6.9	-315.0	149.8
626	238.6	214.3	0.0	0.1	0.0	-37.0	18.8
OTP_626	-15.2	65.7	-90.8	0.0	112.0	17.6	94.8
627	2.2	221.8	0.0	0.1	0.0	-295.8	21.7
OTP_627	-0.6	50.9	19.7	26.5	325.4	-10.4	226.6
628	497.0	39.0	0.0	0.0	0.0	446.2	11.6
OTP_628	5.2	14.3	0.0	0.0	27.9	-62.2	80.9
630	20.2	210.5	0.0	0.2	0.0	-235.3	2.8
	-6.5	43.4	-28.0	0.1	9.8	-33.2	8.8
631	114.5	294.0	0.0	0.0	0.0	-397.3	1.8
RPU_631	117.5	73.7	0.0	0.0	14.4	-6.3	10.5
633	164.1	215.3	0.0	0.0	0.0	-52.0	0.7
MPW_633	80.6	48.1	0.0	0.0	9.1	23.7	17.9
635	49.0	156.2	0.0	0.0	0.0	-318.8	5.2
MEC_635	27.5	17.5	-91.7	0.0	32.2	58.2	34.1
636	3411.6	1702.2	0.0	0.0	0.0	1941.9	32.6
MEC_636	543.6	469.1	-126.1	0.0	222.3	-71.5	547.7
637	864.8	2138.8	0.0	0.0	0.0	-1284.1	46.1
MEC_637	48.6	321.7	-322.6	0.0	708.7	242.7	523.9
638	1023.1	1434.6	0.0	0.0	0.0	-501.5	22.7
MEC_638	262.9	369.4	-157.1	0.0	264.4	11.3	282.4
639	246.6	381.3	0.0	0.0	0.0	-143.4	1.1
MEC_639	51.3	55.8	0.0	0.0	6.7	-2.7	3.4
640	2617.8	2487.0	0.0	0.0	0.0	-146.2	96.4
NPPD_640	170.8	797.5	-669.0	25.8	1086.1	75.1	983.5
641	132.0	220.1	0.0	0.0	0.0	13.8	0.7
HAST_641	37.2	72.0	0.0	0.0	3.3	-11.0	10.6
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.9
GRIS_642	17.8	11.3	0.0	0.0	2.6	-14.0	23.1

Appendix E – Loss Analysis

645	2477.3	2370.6	0.0	0.0	0.0	37.6	26.4
OPPD_645	412.9	414.8	-137.8	15.0	381.0	-13.4	489.5
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.6
OPPD_FRE	41.2	35.1	0.0	0.0	1.0	-12.0	11.6
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	176.4	854.9	0.0	0.0	0.0	-688.9	10.4
LES_650	17.0	147.1	-211.6	0.0	88.1	-14.0	183.7
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	2.3	0.0	-121.3	0.0	1.5	25.1	100.0
652	212.5	152.3	0.0	0.0	0.0	-74.5	5.7
WAPA_652	26.9	33.0	-121.1	0.0	112.9	11.5	181.3
653	77.4	97.5	0.0	0.0	0.0	-204.0	13.5
WAPA_653	-66.2	22.8	-8.0	-0.3	170.5	-33.8	80.5
654	1434.8	370.2	0.0	0.0	0.0	356.1	72.6
WAPA_654	13.5	61.7	-249.7	158.3	1049.6	270.6	707.0
655	506.0	30.5	0.0	0.0	0.0	370.5	31.1
WAPA_655	-40.0	5.6	-3.6	0.0	290.1	-11.5	250.5
656	0.0	465.4	0.0	0.0	0.0	-54.3	3.5
WAPA_656	0.0	135.8	-30.4	0.0	87.9	49.4	46.6
657	772.0	144.4	0.0	0.1	0.0	598.9	31.6
MPC-657	144.4	34.0	-191.4	0.0	191.3	180.8	304.7
659	75.1	1366.5	0.0	0.0	0.0	-477.0	51.1
BEPC_659	-42.7	254.7	-3.9	561.1	1207.0	-129.7	586.8
660	2389.3	202.5	0.0	0.0	0.0	2182.4	4.4
ZONE_660	301.8	126.2	0.0	0.0	0.7	-53.2	229.5
661	742.9	499.9	0.0	0.0	0.0	187.3	18.1
MDU_661	89.2	148.3	29.2	3.4	255.3	10.6	176.5
663	79.3	320.0	0.0	0.0	0.0	-224.0	7.2
NWPS_663	-3.8	70.2	-21.1	0.0	23.7	-56.3	29.1
665	128.7	464.5	0.0	0.0	0.0	-135.9	1.1
MRES_665	-5.8	146.1	-30.2	0.0	4.0	-39.0	16.9
666	0.0	17.4	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0

667	0.0	794.1	0.0	0.0	0.0	-821.2	14.4
MHSUBWPG	0.0	176.5	-139.6	0.0	149.8	-52.9	166.6
668	1087.0	1109.6	0.0	0.0	0.0	-256.3	253.1
MHRURALS	1525.1	231.6	-1386.2	257.5	782.8	-1575.8	4780.9
669	146.8	458.4	0.0	0.0	0.0	-328.0	16.4
MHWPGHYD	24.7	180.5	-52.3	0.0	39.1	-151.9	87.5
670	4039.5	71.0	0.0	0.0	0.0	3927.4	41.1
MHRURALN	1671.9	13.3	-783.3	149.0	350.7	1979.3	664.2
671	0.0	675.5	0.0	0.0	0.0	-686.3	4.2
MH INDUS	0.0	118.7	0.0	0.0	11.0	-128.8	20.1
672	0.0	2182.1	0.0	0.0	0.0	-2395.7	92.4
SPC	91.9	523.4	-329.4	81.8	991.7	89.3	671.8
674	0.0	641.5	0.0	0.0	0.0	-533.0	12.7
SPC-IND	0.0	127.0	5.5	0.0	122.7	-29.3	66.3
675	2652.0	138.0	0.0	0.0	0.0	2514.0	0.0
SPC-SSL	149.1	33.7	-52.2	0.0	0.0	-63.7	231.3
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	85.3	20.3	0.0	0.0	0.0	27.6	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	108.2	793.1	0.0	0.0	0.0	-717.9	32.8
DPC_680	4.8	205.9	-115.2	0.0	87.6	-84.6	86.8
681	942.9	41.8	0.0	0.0	0.0	879.5	29.9
DPC_681	34.6	13.2	-55.9	0.3	103.8	-75.6	258.6
682	0.0	48.4	0.0	0.0	0.0	-49.7	0.2
DPC_682	0.0	19.5	0.0	0.0	0.2	-19.7	0.2
683	0.0	6.4	0.0	0.0	0.0	0.0	0.0
	0.0	1.3	0.0	0.0	0.0	0.0	0.0
684	0.0	14.6	0.0	0.0	0.0	0.0	0.0
	0.0	5.5	0.0	0.0	0.0	0.0	0.0
685	0.0	18.9	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28178.9	29430.7	6.4	213.3	0.0	-2132.1	660.6
MEPCO	5848.2	5450.6	-6972.5	29.9	4708.2	845.6	11202.7
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8

727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-418.6	58.5
NMPC WES	541.9	747.5	-103.9	-46.1	347.0	-429.7	721.2
752	4633.2	1634.8	4.5	0.0	0.0	2922.3	71.6
NMPC CEN	1185.5	759.9	-192.5	-21.2	473.1	-166.4	1278.8
753	1214.0	599.0	0.5	0.0	0.0	465.0	149.5
NMPC MVN	164.9	222.6	-755.9	-4.1	1264.3	-90.7	2057.5
754	2286.2	1954.6	7.2	0.1	0.0	238.5	85.8
NMPC EAS	831.8	866.7	-1067.0	-17.7	283.7	402.2	931.3
755	684.8	463.2	-3.1	0.0	0.0	208.0	16.8
NYSEG WE	193.8	247.5	-148.8	-7.3	299.7	178.7	223.5
756	752.4	1284.1	3.4	2.1	0.0	-601.5	64.3
NYSEG CE	207.1	630.7	-454.1	-183.8	351.3	-161.9	727.5

757	0.0	264.1	1.2	0.5	0.0	-269.0	3.1
NYSEG EA	0.0	122.6	-71.1	-77.4	17.4	28.8	14.5
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.4
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.3	31.7
RG&E	67.0	534.8	-641.4	-87.4	265.3	138.9	387.5
760	1369.1	1213.9	0.0	0.2	0.0	74.1	81.0
CENT HUD	417.3	340.7	-422.2	-3.3	185.6	-322.2	1010.0
761	1879.0	1067.6	0.1	0.3	0.0	792.4	18.5
O&R	717.4	363.7	-2.6	-62.5	23.6	102.4	340.0
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	639.9	2017.7	-804.9	-0.8	1814.6	230.3	1012.1
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	496.9	245.3	-1.9	0.0	0.9	89.3	165.2
764	906.5	532.4	0.0	0.0	0.0	368.8	5.4
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.7
765	7959.5	11796.8	0.0	0.0	0.0	-3976.0	138.6
CON ED C	3395.9	5697.8	-2297.0	0.0	3996.2	-559.9	4551.2
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	9.8	16.7	0.0	0.0	0.0	-6.9	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.1
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.4	15.5
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.9	33.0
CON ED N	568.7	167.4	-355.6	0.0	333.9	295.2	795.7
775	0.0	1483.5	0.0	0.0	0.0	-1519.1	35.6
CON ED C	0.0	686.7	-196.2	0.0	1494.8	-102.5	1106.8
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.5	0.0	0.0	0.0	0.0	43.0	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.7	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0

NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-342.9	29.9
NMPC GNS	18.2	113.0	-187.6	-5.2	25.0	17.6	105.4
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.4
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.7	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.2	14.2
CE UPNY	0.0	0.0	0.0	0.0	466.8	160.0	306.8
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.6	60.1
	29.9	882.6	-703.2	38.1	359.1	-394.9	566.3
787	0.0	2168.8	0.0	4.3	0.0	-2194.9	21.8
	0.0	1124.8	-755.1	21.3	266.8	-561.8	437.6
788	350.2	2183.2	0.0	8.1	0.0	-1872.8	31.7
	137.0	1086.4	-937.6	53.1	69.9	-458.4	463.3
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-174.7	7.7	10.3	-34.5	68.5
790	350.6	1327.4	0.0	5.8	0.0	-1014.9	32.3
	-4.8	631.9	-636.4	27.6	65.2	-291.7	328.9
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	6.7	251.6	-20.7	41.8	170.0	-226.9	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.2
	50.7	402.4	-28.8	29.0	191.8	-433.5	273.6
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	39.0
	274.2	850.1	-183.3	68.4	507.4	-605.7	652.0
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.9
	23.2	363.0	-212.8	5.4	122.8	-109.5	99.9
795	28.1	3513.3	0.0	7.1	0.0	-3538.6	46.3
	0.0	1589.8	-1804.6	49.8	131.1	-834.8	1130.9
796	166.2	2162.1	0.0	4.1	0.0	-2018.7	18.5
N-RICHVW	-10.2	1026.6	-717.8	28.5	146.0	-940.4	738.8
797	0.0	3286.0	0.0	6.9	0.0	-3334.1	41.2
W-RICHVW	0.0	1613.3	-1704.5	31.0	255.5	-572.7	888.4
798	0.0	904.1	0.0	7.5	0.0	-946.7	35.1
	0.0	420.9	311.7	18.3	306.2	-901.2	456.5
799	1271.6	1490.6	0.0	6.5	0.0	-274.3	48.8

	438.4	727.4	-385.5	31.5	338.9	-498.6	902.5
800	441.0	1549.0	0.0	10.5	0.0	-1160.2	41.7
	87.0	742.7	-820.2	33.5	498.1	-96.8	725.8
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	174.9	32.5	0.0	7.8	47.3	19.9	162.0
802	949.0	426.0	0.0	6.1	0.0	489.1	27.9
	-41.7	208.4	-192.2	51.4	243.1	-225.5	359.2
803	0.0	0.0	0.0	0.0	0.0	-10.4	10.4
	0.0	0.0	0.0	0.0	348.9	282.4	66.5
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	564.0	30.4	0.0	3.6	0.0	290.9	239.0
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.1
	1255.6	124.0	0.0	23.7	6.4	650.7	463.6
806	3084.9	96.0	0.0	2.3	0.0	2979.4	7.1
	1160.0	56.0	0.0	15.9	2.9	695.1	395.9
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.7	0.0	0.0	95.7	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1452.0	200.0	0.0	10.1	0.0	684.4	557.5
811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1456.2	48.0	0.0	9.3	0.0	962.2	436.7
812	215.6	60.0	0.0	1.1	0.0	153.7	0.8
	242.0	30.4	0.0	4.6	0.0	179.7	27.4
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-38.2	6.0	0.0	2.1	0.0	-65.9	19.6
814	315.9	20.0	0.0	0.3	0.0	294.8	0.8
	214.1	10.0	0.0	2.7	0.0	161.1	40.3
815	0.0	0.0	0.0	0.5	0.0	-137.1	136.6
	0.0	0.0	0.0	250.0	5094.3	3242.5	1601.8
816	285.1	244.2	0.0	0.4	0.0	31.2	9.3
	104.2	112.4	0.0	4.5	67.3	-10.1	64.8
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.8	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5

Appendix E – Loss Analysis

PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1
INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.4	586.5	-1117.7	0.0	186.5	-290.6	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6

846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5
HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0

870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8
NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.6	0.6
	0.0	0.0	0.0	0.0	0.0	-10.5	10.5

901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.5
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.1	0.0	-1.9	0.0	0.0	10.2	0.8
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.4	65.4	0.0	-1.6	5.7	-42.6	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-222.5	0.0	260.3	0.1	450.2
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-79.6	2.4
	0.0	0.0	0.0	0.0	26.6	-26.5	28.9
1636	36.0	0.0	0.0	0.0	0.0	33.6	2.4
	-11.8	0.0	0.0	0.0	15.2	-14.5	18.0
1666	0.0	1.4	0.0	0.0	0.0	-2.1	0.7
	0.0	0.4	0.0	0.0	3.6	-1.7	4.9
TOTALS	695858.2	678337.9	63.2	491.1	0.0	0.0	16953.4
	150343.1	200475.6	-136740.1	4503.1	166046.3	0.0	248188.1

DRG II – SUPK Post 2013 Case + 600 MW

PTI INTERACTIVE POWER SYSTEM SIMULATOR--PSS/E WED, AUG 05 2009 10:43
MTEP07 2013 SUMPK APPAB CBLEND 0731.SAV FROM MTEP06-2011PH3 ZONE TOTALS
CONTRACTUAL BLENDED DISPATCH WITH REF FUT GENS, APPAB, 0803 IN MW/MVAR

X-- ZONE --X	FROM GENERATION	TO LOAD	TO BUS SHUNT	TO LINE SHUNT	FROM CHARGING	TO NET INT	LOSSES
1	13720.0	3700.4	0.0	0.0	0.0	9826.9	152.6
PJM500KV	3532.6	996.9	-710.4	0.0	3907.7	1438.0	5702.8
2	0.0	6272.4	0.0	0.0	0.0	-6304.2	31.7
NORTHERN	0.0	1172.3	-123.2	0.0	74.3	-1137.1	162.3
3	0.0	1604.0	0.0	0.0	0.0	-1635.7	31.7

ROCK RIV	76.6	220.7	-56.6	0.0	74.5	-204.9	191.8
4	0.0	3087.7	0.0	0.0	0.0	-3112.8	25.1
SOUTHERN	0.0	996.2	-240.2	0.0	56.3	-812.3	112.6
5	265.0	136.6	0.0	0.0	0.0	-203.7	302.5
345KV	50.9	50.1	99.0	0.0	3077.9	-1581.5	4549.7
6	305.5	35.4	0.0	0.0	0.0	222.8	47.3
PEAKERS	-24.0	14.1	-279.1	0.0	264.5	-300.9	806.3
7	17362.5	487.1	0.0	6.0	0.0	16829.3	40.1
GEN BUS	4552.3	72.4	-31.1	41.2	0.0	2905.5	1564.3
8	0.0	1509.7	7.0	0.0	0.0	-1544.5	13.2
TR MIDPT	0.0	723.1	-684.3	0.0	0.0	-1320.7	1274.6
9	0.0	665.0	2.6	0.0	0.0	-650.4	0.4
TR TERT	0.0	288.0	-4446.5	0.0	0.0	4158.4	8.0
10	4054.0	108.9	0.1	0.0	0.0	3943.5	1.6
CHI-ESS	770.0	59.8	-11.9	0.0	7.9	589.0	141.1
11	9106.0	0.0	0.0	0.0	0.0	9073.5	32.5
IPP GEN	2528.7	0.0	0.0	0.0	223.0	1935.0	816.7
12	0.0	1745.4	0.0	0.0	0.0	-1751.9	6.4
C-N	0.0	493.2	0.0	0.0	480.8	-67.5	55.1
14	567.5	2127.8	0.0	0.1	0.0	-1582.6	22.4
C-S	77.0	574.5	-203.8	0.0	133.6	-415.6	255.6
15	64.0	1489.9	0.0	0.0	0.0	-1472.5	26.3
YORK 115	-11.5	191.3	-63.3	0.0	72.9	-169.4	101.2
16	0.0	68.8	0.0	0.0	0.0	-69.7	1.0
MEYORK69	0.0	-7.8	-18.3	0.0	0.5	21.2	5.3
17	0.0	337.9	0.0	0.0	0.0	-341.7	3.7
ME LEB69	0.0	23.7	0.0	0.0	4.9	-57.2	38.3
18	0.0	883.0	0.0	0.0	0.0	-891.4	8.4
ME RDG69	0.0	78.1	-60.1	0.0	7.1	-86.7	75.9
19	10.0	401.9	0.6	0.0	0.0	-395.2	2.7
EASTN115	-1.0	149.4	-129.1	0.0	4.3	-54.8	38.0
20	4564.7	1233.7	0.0	0.0	0.0	3173.3	39.1
NO-ESS	1129.1	421.9	-87.8	0.0	196.5	261.8	671.9
21	1074.0	645.0	0.0	0.0	0.0	412.3	16.7
	563.5	165.4	-98.7	0.0	43.3	385.0	155.2
22	0.0	611.9	0.0	0.0	0.0	-616.6	4.7
	0.0	305.6	0.0	0.0	20.7	-329.3	44.4
23	765.0	6607.3	0.0	0.0	0.0	-6003.0	117.4

N-R	200.7	2128.3	-1683.9	0.0	50.9	-1073.2	900.0
24	1157.0	2326.7	0.0	0.0	0.0	-1256.7	87.0
N-S	371.3	542.9	-339.9	0.0	147.9	-712.2	1028.4
25	12.0	3209.1	0.0	0.0	0.0	-3136.7	101.5
JCSO34.5	1.0	704.3	-880.9	0.0	0.0	-497.8	713.5
26	2254.3	393.2	0.0	0.0	0.0	1844.6	16.4
JCSO 230	679.6	101.8	-543.3	0.0	90.5	776.0	435.5
29	0.0	0.0	0.0	0.0	0.0	-2.2	2.2
	0.0	0.0	0.0	0.0	7.8	-13.2	21.0
30	215.8	568.4	0.0	0.0	0.0	-356.6	4.0
RR-ESS	1.8	70.4	0.0	0.0	10.0	-101.7	43.1
32	13.0	183.6	-1.5	0.0	0.0	-279.0	109.9
	0.0	51.1	-638.9	0.0	373.0	-1130.3	2091.1
33	8502.2	40.5	0.0	0.0	0.0	8454.7	7.0
	1527.9	6.0	0.0	0.0	0.0	1462.3	59.7
34	44.0	1089.7	3.2	0.0	0.0	-1058.8	9.9
NORTHEAS	18.5	134.0	-144.9	0.0	28.8	10.7	47.5
35	0.0	1539.0	-22.7	0.0	0.0	-1523.3	7.1
	0.0	706.2	-745.3	0.0	3.3	-4.4	46.8
36	0.0	1318.2	-5.2	0.0	0.0	-1327.2	14.1
	0.0	297.3	-228.4	0.0	0.0	-168.2	99.2
37	0.0	1432.5	-10.1	0.0	0.0	-1437.1	14.7
	0.0	407.8	-370.6	0.0	0.4	-114.7	77.9
38	0.0	1923.0	-7.1	0.0	0.0	-1933.7	17.7
	0.0	594.9	-392.7	0.0	12.6	-308.8	119.3
40	196.7	681.0	0.0	0.0	0.0	-486.0	1.7
SO-ESS	0.8	257.7	0.0	0.0	5.4	-264.1	12.6
41	0.0	1594.2	-0.4	0.0	0.0	-1699.5	105.7
PECO	0.0	605.4	-1683.6	0.0	459.4	-254.8	1792.4
42	0.0	480.4	0.0	0.0	0.0	-490.4	10.0
ZONE42	0.0	158.8	-61.5	0.0	104.6	-108.9	116.3
43	0.0	2274.3	0.0	0.0	0.0	-2278.1	3.7
ZONE43	0.0	737.5	-569.9	0.0	0.0	-259.8	92.2
44	4107.3	182.3	0.0	0.0	0.0	3921.4	3.7
ZONE44	248.3	78.6	-93.8	0.0	0.0	92.2	171.2
45	2662.2	0.0	0.0	0.0	0.0	2661.7	0.5
ZONE45	506.7	0.0	0.0	0.0	0.0	259.2	247.5
46	0.0	127.9	0.0	0.0	0.0	-129.2	1.4

ZONE46	0.0	90.4	-100.9	0.0	0.2	-11.5	22.2
47	0.0	3262.7	-0.7	0.0	0.0	-3274.5	12.4
ZONE47	0.0	1083.1	-777.7	0.0	0.0	-541.3	235.9
48	0.0	49.0	0.0	0.0	0.0	-50.2	1.2
ZONE48	0.0	16.0	0.0	0.0	0.0	-19.0	3.0
49	0.0	699.0	0.0	0.0	0.0	-700.4	1.4
ZONE49	0.0	181.9	-104.8	0.0	0.0	-111.9	34.8
50	4298.2	5268.8	0.0	0.0	0.0	-1059.7	64.3
PS NORTH	904.0	703.8	0.0	0.0	1670.5	102.7	1738.5
51	2113.7	2698.7	0.0	0.0	0.0	-545.7	33.8
PS CENTR	554.9	233.7	-887.6	0.0	115.8	536.7	844.3
52	1779.0	2802.9	0.0	0.0	0.0	-1105.1	32.9
PS SOUTH	628.5	64.4	-453.0	0.0	158.3	359.0	789.4
53	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
59	3624.2	6599.6	0.0	0.0	0.0	-3137.8	114.7
BGE 115	927.3	3991.4	-4547.6	0.0	467.3	-98.2	2023.1
61	0.0	0.0	0.0	0.0	0.0	-0.4	0.4
	0.0	0.0	0.0	0.0	52.6	49.7	2.9
62	0.0	193.0	0.0	0.0	0.0	-193.3	0.3
	0.0	117.6	-111.8	0.0	0.0	-17.7	11.8
63	0.0	521.3	0.0	0.0	0.0	-474.6	1.0
	0.0	313.1	-283.7	0.0	0.0	-46.8	43.3
66	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68	5791.7	6963.1	0.0	0.0	0.0	-1282.9	111.5
PEPCO	1696.7	1558.7	-972.0	0.0	1192.5	-45.3	2347.8
77	1501.9	1575.1	0.0	0.0	0.0	-1544.0	91.7
RIVER	446.4	102.4	-410.4	0.0	112.0	-302.2	1072.9
78	0.0	1392.9	0.0	0.0	0.0	-13.8	0.0
	0.0	95.7	0.0	0.0	0.0	-0.3	0.3
86	686.6	300.4	0.0	0.0	0.0	379.0	7.3
DPL INLD	89.7	118.5	-32.9	0.0	10.0	-176.5	190.7
87	31.6	55.2	0.0	0.0	0.0	-23.6	0.0
DPL ESMU	1.7	7.1	-5.6	0.0	0.0	0.2	0.0
88	138.0	159.7	0.0	0.0	0.0	-22.0	0.3
DPL DOVR	6.2	32.4	-26.1	0.0	0.4	-5.8	6.1
89	2574.9	3874.6	0.0	0.0	0.0	-1378.3	86.3

Appendix E – Loss Analysis

DPL COMP	415.2	610.6	-1201.6	0.0	241.3	64.5	1184.5
90	111.5	85.3	0.0	0.0	0.0	71.9	6.0
	-55.5	12.2	0.0	0.0	271.2	135.9	73.2
93	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
95	0.0	452.1	0.0	0.0	0.0	-454.8	2.7
RECO	0.0	145.9	0.0	0.0	3.0	-164.6	21.7
96	46.7	186.0	0.0	0.0	0.0	-143.0	3.7
UGI	5.0	21.6	0.0	0.0	9.5	-56.2	49.1
101	11457.2	12787.3	0.1	0.3	0.0	-1564.1	233.5
CPL-E	3004.9	2805.5	-1769.9	-914.7	1400.1	665.8	3618.3
106	811.6	846.3	0.0	0.0	0.0	-43.9	9.2
CPL-W	119.2	174.1	-206.0	-16.0	62.2	86.1	143.1
110	21277.7	20975.5	11.6	3.4	0.0	-110.8	498.1
DUKE.DUK	5288.2	9083.7	-7701.5	-1198.6	1819.9	45.5	6965.0
111	103.2	284.3	0.0	0.0	0.0	-183.0	1.9
DUKE.NAN	25.5	157.3	-103.8	-15.9	38.6	6.1	20.3
112	0.0	4.2	0.0	0.0	0.0	-104.5	0.2
DUKE.DEL	0.0	2.7	0.0	0.0	0.3	-89.5	1.2
113	5.7	4.0	0.0	0.0	0.0	0.0	1.7
YADKIN	-5.2	2.0	0.0	0.0	1.7	-8.1	2.6
114	427.5	0.0	0.0	0.0	0.0	426.0	1.5
HARTWELL	173.5	0.0	0.0	0.0	0.0	113.2	60.3
115	6116.8	5184.0	0.0	0.0	0.0	828.3	104.6
SCEG	1496.3	2219.9	-1398.2	0.0	418.1	-202.1	1294.9
120	0.0	1628.9	0.0	0.1	0.0	-1651.9	22.9
SC-SO	0.0	614.7	-391.4	-80.0	100.4	-170.4	124.9
121	3200.3	1321.2	0.1	0.0	0.0	1810.1	68.8
SC-NO	623.0	495.3	-442.8	-48.2	271.0	-148.3	1038.0
122	1757.0	1818.4	0.0	-0.1	0.0	-102.6	41.3
SC-EA	484.4	515.0	-372.6	-26.7	134.7	-46.8	550.1
124	695.8	0.0	0.0	0.0	0.0	695.0	0.8
SEPA	102.3	0.0	0.0	0.0	0.0	50.8	51.6
125	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128	0.0	279.8	0.0	0.0	0.0	0.0	0.0
	0.0	41.1	0.0	0.0	0.0	0.0	0.0
129	0.0	44.3	0.0	0.0	0.0	0.0	0.0

Appendix E – Loss Analysis

	0.0	17.4	0.0	0.0	0.0	0.0	0.0
130	3540.7	8.0	0.0	0.0	0.0	3503.3	29.4
AECI	785.8	2.6	-115.6	103.9	723.1	976.6	593.4
131	27.0	347.4	0.0	0.0	0.0	-351.1	12.9
AECI-NW	-1.3	87.1	-2.7	0.0	66.4	-62.7	38.9
132	24.0	243.7	0.0	0.0	0.0	-222.5	7.3
AECI-NE	0.0	60.3	-16.3	0.0	31.3	-28.1	16.7
133	0.0	862.4	0.1	0.0	0.0	-891.7	29.2
AECI-CNT	0.0	216.1	-25.9	0.0	92.6	-253.4	155.8
134	15.0	637.2	0.0	0.0	0.0	-687.8	28.0
AECI-KMO	-4.2	159.7	-83.7	0.0	65.9	-107.9	84.2
135	0.0	631.1	0.0	0.0	0.0	-644.2	13.1
AECI-KOK	0.0	158.2	-77.8	0.0	47.1	-98.2	65.0
136	0.0	924.8	0.1	0.0	0.0	-955.4	30.6
AECI-SMP	0.0	231.7	-81.5	51.9	100.5	-219.2	169.5
137	0.0	390.8	0.0	0.0	0.0	-412.2	21.4
AECI-M&A	0.0	98.0	-15.4	0.0	40.2	-119.2	76.8
138	2108.5	1021.0	0.0	0.0	0.0	1058.1	29.5
LAGN	313.5	328.6	0.0	0.0	143.8	-268.7	397.4
140	28545.8	30306.1	19.6	3.3	0.0	-2322.6	539.3
GA-ITS	6549.9	12635.5	-10412.7	-833.8	4550.6	-20.5	9732.2
141	16564.1	13418.4	8.2	0.3	0.0	2832.8	248.5
APC	3513.3	3598.5	-2161.2	-162.6	1524.5	-326.4	4084.1
142	2083.0	2655.8	2.2	0.0	0.0	-642.4	55.9
GULF	-164.1	796.7	-1531.7	-42.4	193.5	147.9	658.7
143	3073.0	2653.2	3.5	0.0	0.0	342.2	74.1
MPC	970.6	938.2	-658.3	-6.3	516.7	125.8	1088.0
144	2084.0	1111.6	2.6	0.0	0.0	940.9	28.9
SAV	556.7	427.0	-391.5	0.0	55.1	75.4	500.9
145	855.0	790.7	0.0	0.0	0.0	42.9	21.4
SMEPA	113.5	265.5	-186.0	0.0	116.9	40.7	110.2
147	0.7	0.0	0.0	0.0	0.0	0.6	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
150	3614.7	2058.2	0.0	0.0	0.0	1546.4	77.4
AEC	628.2	325.8	-411.0	0.0	293.6	235.6	775.9
155	6224.7	5901.4	1.9	0.5	0.0	154.3	166.6
EES_WEST	1499.6	2235.9	-1492.0	58.4	1013.4	49.4	1661.3
156	8945.6	9770.0	0.1	2.1	0.0	-919.0	92.3

Appendix E – Loss Analysis

EES_SOU	2013.7	2719.3	-1208.4	-573.0	857.6	98.1	1835.3
157	5443.0	5006.3	0.0	1.0	0.0	384.5	77.9
EES-ASNO	1224.4	1873.2	-618.6	-361.9	798.2	-356.8	1497.5
158	909.8	1767.3	0.0	0.7	0.0	-902.5	44.3
EES_CNTR	189.7	477.0	-304.3	-70.9	456.6	0.7	543.9
159	8724.2	7791.3	0.0	106.4	0.0	691.5	135.0
EES_NOR	955.9	2331.1	-947.5	-153.3	2113.0	-298.6	2137.1
165	4336.5	5549.8	0.0	0.0	0.0	-1326.3	113.1
TVA_WEST	1253.8	1662.5	-1858.7	102.1	1177.1	1024.9	1500.2
166	17111.7	15266.6	0.1	0.0	0.0	1537.4	307.6
TVA_CENT	3722.8	5590.8	-3546.3	103.5	3332.1	-61.1	4968.0
167	13165.7	9894.8	0.0	0.0	0.0	3081.2	189.6
TVA_EAST	3040.2	3523.9	-1847.9	210.6	2169.0	370.0	2952.6
168	0.0	3539.8	0.0	0.0	0.0	-3556.7	16.9
TVA_MEMP	0.0	1035.2	-176.6	0.0	103.9	-914.7	159.9
169	108.5	0.0	0.0	0.0	0.0	108.1	0.4
TVA_IPP	38.7	0.0	0.0	0.0	80.4	106.5	12.6
181	99.5	1772.1	0.0	0.0	0.0	-1676.9	4.3
ALEXARL	-52.0	337.7	-351.0	0.0	230.8	141.9	50.2
182	0.0	3191.7	0.0	0.0	0.0	-3219.8	28.1
FAIRFAX	0.0	712.2	-991.0	0.0	104.2	-199.5	582.5
183	2665.0	1076.7	0.1	0.0	0.0	1571.6	16.6
WOODBRDG	52.2	294.2	-264.2	0.0	46.1	-138.9	207.2
184	275.0	483.0	0.0	0.0	0.0	-212.0	4.1
NOR NECK	64.6	100.9	-52.5	0.0	30.1	11.5	34.9
185	1086.7	2139.2	0.0	0.0	0.0	-1067.0	14.5
RICHMOND	-2.2	568.9	-317.9	0.0	60.4	-392.4	199.6
186	1144.0	1510.4	0.0	0.0	0.0	-378.7	12.3
YORKTOWN	-34.6	378.2	-473.4	0.0	66.6	19.8	107.4
187	2512.8	1730.7	0.0	0.0	0.0	768.8	13.3
CHESTERF	163.1	500.7	-287.3	0.0	99.9	-76.9	126.5
188	1411.0	637.6	1.3	0.0	0.0	755.4	16.8
SOUTHSDE	-155.7	156.6	-235.6	0.0	47.7	-138.9	109.9
189	710.0	2837.7	0.0	0.0	0.0	-2151.5	23.8
VA BEACH	173.4	690.0	-566.8	0.0	122.5	-200.9	373.7
190	1414.0	1111.3	0.0	0.0	0.0	301.4	42.2
SUFFOLK	33.0	251.4	-486.2	0.0	201.2	131.7	344.1
191	0.0	640.2	0.3	0.0	0.0	-665.6	8.1

OUTBANKS	0.0	161.1	-247.8	0.0	64.3	90.7	60.3
192	994.0	1116.2	0.3	0.0	0.0	-151.7	29.1
CAROLINA	34.2	296.5	-336.6	0.0	133.5	-4.1	211.9
193	1020.0	1831.2	0.0	0.0	0.0	-842.5	31.3
GORDONSV	-57.7	375.5	-237.9	0.0	164.9	-341.8	311.6
194	0.0	1211.1	0.0	0.0	0.0	-1231.4	17.6
VALLEY	0.0	326.6	-353.8	0.0	85.3	-115.9	227.9
195	1704.0	708.9	0.0	0.0	0.0	940.8	39.5
LEXINGTN	241.6	198.1	-130.9	0.0	189.8	-82.0	443.5
196	9293.0	816.3	0.0	0.0	0.0	8348.4	128.3
500KV	215.6	150.6	-689.4	0.0	2663.3	833.2	2584.4
197	1057.9	171.7	0.0	0.0	0.0	863.9	22.3
	336.9	34.7	0.0	0.0	181.3	219.0	264.5
198	0.0	203.0	0.0	0.0	0.0	-179.1	7.9
	0.0	32.9	-51.5	0.0	14.2	-8.3	45.1
199	0.0	182.9	0.0	0.0	0.0	-185.8	2.9
	16.0	60.0	-44.3	0.0	12.0	-8.1	20.5
201	9052.7	11383.3	0.0	0.0	0.0	-2537.1	213.9
AP	1442.0	2884.8	-2369.1	0.0	2232.7	-572.2	3733.3
202	1857.0	362.0	0.0	0.0	0.0	1465.1	22.6
	302.1	66.1	-35.2	0.0	145.4	101.9	313.3
203	151.0	472.3	0.0	0.0	0.0	-339.5	18.2
	51.6	97.1	-142.5	0.0	236.4	229.2	104.1
204	748.0	748.9	0.0	0.0	0.0	-24.9	29.9
	109.2	149.4	-146.3	0.0	258.8	169.6	196.9
205	0.0	43.0	0.0	0.0	0.0	-65.9	16.9
	0.0	15.2	0.0	0.0	8.9	-40.8	32.3
206	2047.4	61.7	0.0	0.0	0.0	1970.8	14.9
OVEC	-81.9	6.2	0.0	0.0	557.1	307.0	162.0
207	1866.4	854.9	0.0	0.0	0.0	1007.4	44.1
HE	125.2	264.1	-145.8	0.0	123.7	-238.5	382.3
208	0.0	12.5	0.0	0.0	0.0	-13.1	0.6
	0.0	1.7	0.0	0.0	2.9	-0.6	1.8
209	3797.9	3668.4	0.0	0.0	0.0	-298.5	116.5
DPL	370.5	663.9	-1408.7	0.0	388.3	172.6	1285.9
210	967.4	1456.0	0.0	0.0	0.0	-560.8	27.9
SIGE	360.6	481.1	-300.1	-0.7	49.3	-105.6	317.9
211	7708.2	8208.8	0.0	0.0	0.0	-714.4	213.9

Appendix E – Loss Analysis

LGEE	2800.0	2800.2	-1121.6	74.3	951.3	-393.4	2391.8
212	17.0	532.0	0.0	0.0	0.0	-579.1	10.8
	1.6	39.2	-21.9	0.0	10.4	-65.0	53.1
213	171.0	77.1	0.0	0.0	0.0	109.8	0.9
	51.1	5.4	0.0	0.0	5.2	28.3	22.6
214	1451.5	1769.8	0.0	0.0	0.0	-332.9	14.6
BREC	403.1	725.6	-293.2	0.0	108.7	-2.0	81.4
215	3252.9	3139.2	0.0	0.0	0.0	92.7	19.6
DLCO	524.6	438.2	-124.0	0.0	676.9	321.3	565.8
216	3117.6	3452.6	0.0	3.6	0.0	-412.6	77.8
IPL	864.1	690.2	-452.5	20.9	318.3	-245.7	1169.1
217	3019.5	3997.5	0.0	0.0	0.0	-1032.1	65.2
NIPS	956.2	1472.1	-476.3	0.0	369.1	-454.3	785.8
218	11697.0	182.5	0.0	0.0	0.0	11242.7	271.7
METC	2685.6	82.1	-476.0	0.0	1941.7	1396.2	3624.7
219	2225.0	5062.5	0.0	0.0	0.0	-3080.2	246.4
ITC	289.7	1857.5	-747.3	0.0	1882.7	-2815.9	3878.7
220	2877.8	2302.3	0.0	4.1	0.0	475.1	96.2
EKPC	642.6	879.9	-937.0	10.7	231.3	82.7	837.5
226	0.0	0.0	0.0	0.0	0.0	0.0	0.0
IPRV	-0.5	0.0	0.0	0.0	2.2	1.6	0.0
230	14270.4	748.4	0.0	0.0	0.0	13474.4	47.6
FE-GEN	4133.9	503.9	0.0	0.0	151.2	2000.6	1780.6
231	0.0	476.6	0.0	0.0	0.0	-479.6	3.1
FE-AK-23	0.0	108.6	-100.8	0.0	0.1	-52.1	44.4
232	0.0	1701.5	0.0	0.0	0.0	-1757.8	62.8
FE-AK	0.0	353.7	-409.8	0.0	294.0	-408.1	759.5
233	0.0	794.0	0.0	0.0	0.0	-807.6	13.6
FE-LAKE	0.0	183.5	-177.6	0.0	45.0	-131.0	170.1
234	0.0	292.6	0.0	0.0	0.0	-303.3	10.7
FE-MASS	0.0	35.3	0.0	0.0	11.8	-84.4	60.9
235	173.4	1127.9	0.0	0.0	0.0	-988.8	31.9
FE-PP	14.0	289.5	-202.7	0.0	119.2	-316.9	362.9
236	0.0	135.8	0.0	0.0	0.0	-138.3	2.5
FE-ALL	0.0	43.4	0.0	0.0	7.8	-53.9	18.3
237	0.0	577.2	0.0	0.0	0.0	-582.2	5.0
FE-WARR	0.0	185.1	-65.3	0.0	26.4	-163.5	70.0
238	0.0	1369.8	0.0	0.0	0.0	-1440.5	64.2

FE-YNG	0.0	333.8	-57.4	0.0	241.2	-576.5	540.0
239	24.0	4612.4	-3.2	0.0	0.0	-4643.1	58.0
FE-CEI	7.0	1718.9	-1829.0	0.0	409.2	-372.9	899.2
240	0.0	342.2	0.0	0.0	0.0	-346.7	4.5
FE-CPP	0.0	69.9	-148.0	0.0	0.0	59.8	18.3
241	1995.0	1025.6	0.0	0.4	0.0	958.0	38.2
FE-MN	178.5	180.3	-144.6	2.3	254.7	5.3	396.3
242	1091.0	875.2	0.0	0.4	0.0	180.3	34.5
FE-MR	220.5	209.6	-166.5	0.8	195.8	50.0	319.2
243	3.5	1069.2	0.0	0.2	0.0	-1097.0	30.7
FE-SP	-12.6	193.9	-144.0	1.2	69.8	-169.8	173.8
244	1196.5	789.7	0.0	0.1	0.0	375.9	26.6
FE-BAY	366.0	207.1	-123.1	0.8	223.9	253.5	247.7
245	2322.0	5266.0	0.0	3.6	0.0	-3040.8	96.3
FE-TE	835.8	1375.5	-376.3	7.5	601.2	-595.3	1023.4
246	26.0	862.0	0.0	0.6	0.0	-873.7	8.3
	10.5	170.8	0.0	-16.6	87.5	-170.5	99.3
250	6193.7	6638.7	0.0	0.0	0.0	-588.3	143.2
AEP-AP	-381.7	1829.0	-1760.3	1644.3	3699.0	-207.1	1811.4
251	11153.5	5388.7	0.0	0.0	0.0	5520.6	244.2
AEP-OP	-275.6	836.3	-1695.9	2772.8	5528.0	203.7	3135.5
252	6798.1	4801.8	0.0	0.0	0.0	1766.8	229.5
AEP-IM	469.1	732.1	-981.6	1482.4	3441.2	-153.7	2831.2
253	2440.0	5404.9	0.0	0.0	0.0	-3112.4	110.3
AEP-CS	297.2	1277.3	-1516.2	0.0	703.0	176.2	1044.9
254	260.0	1403.2	0.0	0.0	0.0	-1187.7	44.5
AEP-KP	152.1	366.0	-431.1	0.0	73.9	25.8	265.4
255	363.5	1628.6	0.0	0.0	0.0	-1277.8	12.7
AEP-OP-I	56.3	669.3	-59.4	0.0	33.0	-599.0	78.5
256	0.0	573.6	0.0	0.0	0.0	-578.3	4.7
AEP-IM-I	0.0	104.3	-35.3	0.0	40.4	-54.8	26.3
257	450.0	330.3	0.0	0.0	0.0	104.8	11.3
	78.8	92.0	-13.4	0.0	74.9	-59.2	134.3
258	0.0	138.8	0.0	0.0	0.0	-102.5	0.8
AEP-CS-I	0.0	41.9	-3.8	0.0	2.0	-20.0	2.1
259	0.0	49.6	0.0	0.0	0.0	-49.6	0.0
	0.0	12.1	0.0	0.0	0.0	-12.1	0.0
260	219.0	407.2	0.0	0.0	0.0	-192.0	3.9

Appendix E – Loss Analysis

	119.0	84.6	-36.3	0.0	3.6	34.6	39.6
261	3555.0	105.2	0.0	0.0	0.0	3448.3	1.4
ITC-GN	1202.7	15.0	0.0	0.0	34.8	1193.2	29.3
262	6644.0	783.0	0.0	0.0	0.0	5824.7	36.4
ITC-GS	1959.6	176.9	-193.1	0.0	138.9	1908.1	206.7
263	1631.9	8119.0	0.0	0.1	0.0	-6558.2	71.0
ITC-DIS	361.9	3206.0	-2945.7	127.4	424.7	-19.9	418.8
264	8.0	615.0	0.0	0.0	0.0	-634.3	35.0
	7.7	185.6	-75.0	0.0	91.5	-233.4	224.1
265	2271.7	1221.8	0.0	0.0	0.0	989.9	59.3
	328.5	275.7	-187.8	1.4	481.8	150.4	569.5
266	460.0	352.5	0.0	0.0	0.0	87.5	12.9
	91.3	93.3	-111.6	0.0	36.7	18.7	126.0
267	481.0	522.5	0.0	0.0	0.0	-62.9	21.4
	201.7	186.5	-148.6	0.3	125.0	88.9	199.5
268	179.0	194.3	0.0	0.0	0.0	-18.9	3.6
	-12.7	66.0	-7.6	0.0	13.5	-95.0	37.4
269	0.0	175.5	0.0	0.0	0.0	-178.9	3.4
	0.0	57.7	0.0	0.0	6.9	-58.3	7.4
270	71.4	219.7	0.0	0.0	0.0	-149.6	1.3
MUNI	10.4	49.3	0.0	0.0	1.9	-48.7	11.7
271	419.2	507.9	0.0	0.0	0.0	-89.9	1.2
LANSING	85.7	202.9	-85.6	0.0	5.2	-34.4	8.0
272	283.2	857.4	0.0	0.0	0.0	-599.6	25.4
WOLVERIN	71.7	195.4	-122.9	0.0	41.4	-53.4	94.0
273	257.3	9323.0	-1.0	0.0	0.0	-9190.8	126.1
CE	26.8	2508.2	-2234.4	0.0	75.8	-1104.3	933.1
280	55.0	7311.4	0.2	5.6	0.0	-7765.0	382.0
DEI	61.4	1463.4	-2425.1	-6.5	1125.8	-1732.9	3827.6
281	0.0	365.1	0.0	0.0	0.0	-296.9	10.3
HE IN DE	0.0	123.2	-14.5	0.0	56.0	-56.2	35.5
282	0.0	705.8	0.0	0.0	0.0	-684.1	5.0
DEI IND	0.0	198.1	-14.1	-0.3	13.4	-198.2	38.5
283	7477.4	360.0	0.0	0.0	0.0	7067.3	0.0
DEI GENS	2495.1	233.2	0.0	0.0	0.0	2088.8	147.9
284	0.0	4955.5	0.5	2.0	0.0	-5047.0	127.8
DEO	0.0	738.6	-603.4	-77.5	507.5	-1040.2	1506.7
285	0.0	383.0	0.0	0.0	0.0	-418.9	1.1

Appendix E – Loss Analysis

DEO IND	0.0	71.0	0.0	0.0	0.9	-91.5	3.6
286	5544.5	0.0	0.0	0.2	0.0	5534.1	10.3
DEO GENS	1424.0	0.0	0.0	1.1	0.0	875.9	547.0
287	0.0	447.8	0.1	0.0	0.0	-453.7	5.6
DEK	0.0	64.4	-148.5	0.0	3.0	53.8	32.6
288	0.0	11.8	0.0	0.0	0.0	-16.8	0.4
DEK IND	0.0	7.7	0.0	0.0	0.3	-11.7	1.9
290	795.0	105.0	0.0	0.0	0.0	755.0	0.0
	400.0	56.0	0.0	0.0	0.0	249.9	134.1
299	726.0	625.0	0.0	0.0	0.0	100.9	0.1
WAR	259.9	150.0	-21.2	0.0	0.0	80.6	50.5
301	0.0	0.0	0.0	0.0	0.0	-4.3	4.3
CIL345	0.0	0.0	0.0	0.0	48.0	-38.5	86.5
302	44.0	357.8	0.0	0.0	0.0	-325.1	11.4
302	0.0	104.3	0.0	0.0	30.7	-179.1	105.5
303	1130.0	65.0	0.0	0.0	0.0	1063.8	1.2
CILGEN	431.4	40.3	0.0	0.0	0.0	352.5	38.6
304	0.0	504.2	0.0	0.0	0.0	-507.8	3.7
PEORIA	0.0	129.8	-30.4	0.0	0.3	-117.0	17.8
305	0.0	116.7	0.0	0.0	0.0	-117.4	0.7
PEKIN	0.0	30.4	0.0	0.0	0.0	-32.9	2.5
306	0.0	76.8	1.1	0.0	0.0	-78.1	0.2
EASTERN	0.0	13.8	0.0	0.0	0.0	-14.7	0.9
307	0.0	43.9	0.1	0.0	0.0	-44.2	0.2
WESTERN	0.0	9.8	0.0	0.0	0.0	-10.5	0.7
308	0.0	67.5	0.7	0.0	0.0	-68.2	0.1
LACON	0.0	16.3	-3.2	0.0	0.0	-13.5	0.4
309	0.0	37.2	0.0	0.0	0.0	-37.2	0.0
HOMER	0.0	10.9	0.0	0.0	0.0	-10.9	0.0
310	26.4	957.5	0.0	0.0	0.0	-979.1	19.5
REG E-IL	0.0	224.1	-62.2	0.0	113.3	-203.6	151.7
311	2529.0	821.3	0.0	0.0	0.0	1685.1	22.7
FRKNJEFF	773.3	170.2	0.0	0.0	172.4	271.3	504.1
312	1696.0	744.7	0.0	0.0	0.0	901.9	49.4
ST FRAN	414.9	252.8	0.0	0.0	192.2	-91.7	446.0
313	1238.0	1230.7	0.0	0.0	0.0	-20.9	28.3
STCHMOED	440.4	183.7	0.0	0.0	249.1	156.2	349.6
314	1681.6	865.5	0.0	0.0	0.0	775.4	40.7

LKSDMP&L	687.6	98.1	59.2	0.0	509.0	550.2	489.0
315	0.0	121.2	0.0	0.0	0.0	-121.8	0.6
GREENHIL	0.0	8.6	0.0	0.0	0.0	-14.8	6.2
316	0.0	890.0	5.0	0.0	0.0	-904.6	9.7
SEMO	0.0	223.6	100.0	0.0	85.2	-337.2	98.8
317	9.0	2288.0	0.0	0.0	0.0	-2290.4	11.4
N METRO	0.0	211.9	0.0	0.0	59.4	-338.6	186.1
318	949.0	2692.1	0.0	0.0	0.0	-1762.3	19.2
S METRO	302.5	408.1	-243.7	0.0	42.8	-66.1	247.0
319	135.0	159.8	0.0	0.0	0.0	116.0	0.4
ILL-IOWA	21.9	34.5	0.0	0.0	0.0	9.6	8.6
320	796.0	2.3	0.0	0.0	0.0	795.1	0.9
MOGENINI	149.4	0.4	0.0	0.0	0.0	107.9	41.5
321	0.0	653.5	0.0	0.0	0.0	-664.1	10.6
SOUTHERN	0.0	162.7	0.0	-0.3	93.2	-155.2	85.9
322	267.0	855.4	0.0	0.0	0.0	-633.8	15.5
357	15.4	180.9	0.0	0.0	105.5	-154.9	98.9
323	980.7	1887.9	0.0	0.0	0.0	-954.0	46.8
EASTERN	88.5	400.8	-36.7	0.0	334.6	-515.4	574.4
329	3494.0	235.1	0.0	0.0	0.0	3253.4	5.5
GEN&LOAD	713.8	95.4	0.0	0.0	0.0	347.2	271.2
331	0.0	0.0	0.0	0.0	0.0	-59.8	0.6
CHICAGO	0.0	0.0	0.0	0.0	2.3	-14.4	2.9
341	0.0	13.9	0.0	0.0	0.0	-2.4	0.3
IPP GEN	0.0	2.8	-12.3	0.0	6.1	16.6	0.9
342	0.0	14.8	0.0	0.0	0.0	-15.4	0.7
C-N	0.0	3.6	0.0	0.0	3.9	-3.8	4.1
344	0.0	39.8	0.0	0.0	0.0	-40.2	0.3
NO-ESS	0.0	13.6	-15.0	0.0	9.0	9.0	1.3
345	0.0	109.0	0.0	0.0	0.0	-112.1	3.2
N-R	0.0	30.1	0.0	0.0	12.1	-37.7	19.7
346	0.0	3.2	0.0	0.0	0.0	-3.2	0.0
N-S	0.0	1.6	0.0	0.0	1.7	0.1	0.0
347	0.0	8.3	0.0	0.0	0.0	-8.4	0.1
RR-ESS	0.0	2.8	0.0	0.0	5.6	2.4	0.4
348	0.0	162.3	0.0	0.0	0.0	-165.5	3.2
R-S	0.0	55.9	-15.4	0.0	20.7	-36.1	16.2
349	489.1	24.3	0.0	0.0	0.0	460.7	4.1

Appendix E – Loss Analysis

SO-ESS	47.2	6.5	90.5	62.0	216.4	4.3	100.2
351	0.0	73.7	0.0	0.0	0.0	-74.4	0.8
EEC	0.0	26.3	-16.2	-5.8	7.6	-0.8	4.0
352	0.0	129.8	0.0	0.0	0.0	-139.7	9.9
SEIEC	0.0	64.0	-24.6	-8.2	21.9	-56.1	46.8
353	0.0	35.4	0.0	0.0	0.0	-35.5	0.1
SIEC	0.0	13.4	-15.7	-0.6	0.0	2.7	0.1
356	0.0	11.0	0.0	0.0	0.0	0.0	0.0
	0.0	1.8	0.0	0.0	0.0	0.0	0.0
357	6497.4	4768.6	0.0	0.0	0.0	1609.1	119.6
357	1352.3	999.5	-552.9	0.0	595.5	-172.6	1673.8
360	619.9	489.0	0.0	0.0	0.0	128.0	3.0
360	58.7	147.2	-114.7	0.0	8.2	0.4	34.0
361	3312.2	1762.1	0.0	2.0	0.0	1498.9	47.8
SIPC	698.9	419.4	-128.5	11.4	132.2	-129.2	650.7
362	1102.4	635.3	0.0	0.1	0.0	429.0	20.4
EEI	511.2	126.2	-27.2	0.7	161.4	289.4	279.6
363	551.0	703.5	0.0	0.6	0.0	-136.4	9.8
PJM500KV	37.7	115.3	-115.7	2.4	146.6	38.2	143.2
364	1353.7	575.7	0.0	0.8	0.0	750.6	25.6
SEAST	322.1	94.2	-88.4	6.7	207.2	191.8	320.5
365	1555.4	2285.6	0.0	1.8	0.0	-780.7	47.2
	146.4	404.8	-242.5	7.1	354.2	-227.9	549.7
366	2465.9	2587.2	0.0	0.3	0.0	-195.8	74.2
WPS	434.7	614.0	-719.3	0.9	505.3	273.4	770.9
367	564.3	834.2	0.0	0.9	0.0	-299.3	13.5
MGE	62.5	257.1	-218.7	1.5	99.6	-88.3	206.1
368	11.9	136.8	0.0	0.0	0.0	-130.7	5.8
UPPC	-2.0	56.9	-64.2	0.0	32.7	16.7	21.3
371	4636.7	3405.4	0.0	0.5	0.0	896.7	111.9
WPL	1028.5	916.4	-1032.1	0.4	498.9	417.2	1138.3
372	0.0	367.3	0.0	0.0	0.0	-21.3	0.3
WPL-WPPI	0.0	132.9	-8.3	0.0	2.8	3.1	2.3
375	44.6	143.3	0.0	0.0	0.0	-103.4	4.7
ED SAULT	8.5	62.1	-19.7	0.0	55.5	-3.4	25.0
376	7637.9	5493.3	0.0	1.5	0.0	2006.3	136.8
WE-MKR	2493.4	1776.7	-1091.8	4.3	614.0	-210.6	2628.9
377	300.0	955.9	0.0	0.0	0.0	-680.6	18.3

WE-FV	81.2	281.3	-104.5	0.0	182.6	-143.2	228.9
378	50.0	181.5	0.0	0.0	0.0	-138.3	6.8
WE-IR	9.7	63.3	-60.3	0.0	44.7	7.9	43.5
379	504.2	358.6	0.0	0.0	0.0	133.5	12.1
WE-PI	24.7	53.3	-40.7	0.0	95.4	8.2	99.3
380	212.8	844.1	0.0	0.0	0.0	-741.2	7.0
WE-WPPI	7.5	168.0	-136.4	0.0	13.7	-109.6	64.6
381	0.0	23.2	0.0	0.0	0.0	-23.3	0.1
WRWL-WPS	0.0	9.3	0.0	0.0	0.1	-9.5	0.3
382	106.5	279.6	0.0	0.0	0.0	-174.4	1.3
CWP-WPS	42.5	127.3	0.0	0.0	0.0	-97.8	13.0
383	0.0	78.4	0.0	0.0	0.0	-78.9	0.5
MEWD-WPS	0.0	17.0	-25.8	0.0	2.3	8.4	2.7
384	82.6	120.3	0.0	0.0	0.0	-38.2	0.5
MPU-WPS	11.3	23.1	-9.9	0.0	0.4	-14.1	12.6
385	0.0	88.0	0.0	0.0	0.0	-88.2	0.2
WPPI-WPS	0.0	28.0	-34.5	0.0	0.9	6.9	0.5
386	14.0	33.5	0.0	0.0	0.0	-19.6	0.1
ESCANABA	7.4	3.1	0.0	0.0	0.3	4.3	0.4
390	382.8	551.8	0.0	0.0	0.0	-221.1	20.0
	49.7	204.1	-264.7	0.0	134.7	91.6	134.8
391	2454.9	257.3	0.0	0.0	0.0	567.8	33.1
ALTW_391	796.6	96.3	-451.3	0.0	316.8	385.4	493.8
392	27.9	31.0	0.0	0.0	0.0	-1311.2	21.4
ALTW_392	12.9	8.2	-50.5	0.0	50.5	-358.0	59.9
393	1441.2	106.8	0.0	0.0	0.0	1259.5	22.4
ALTW_393	109.2	9.4	67.8	0.0	186.3	-185.1	377.4
394	330.7	3943.5	0.0	0.0	0.0	-938.0	17.2
ALTW_394	-66.1	1234.3	-108.1	-64.7	61.7	-197.5	76.1
395	0.0	32.1	0.0	0.0	0.0	0.0	0.0
	0.0	18.7	-16.5	0.0	0.2	15.3	1.4
397	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
400	1371.4	1653.7	0.0	0.0	0.0	-316.0	33.6
	447.2	652.1	-288.9	0.0	126.0	-125.5	334.8
401	20561.6	23603.4	0.0	0.0	0.0	-3659.0	620.8
FPLSOUTH	4429.8	6865.8	-6919.9	0.0	4251.2	112.0	8623.2
402	9883.4	11593.8	0.0	0.0	0.0	-1994.1	283.6

Appendix E – Loss Analysis

FPC GENS	2930.3	4004.9	-3213.6	0.0	1149.4	41.8	3246.6
403	111.2	124.3	0.0	0.0	0.0	-15.0	1.9
FTP	97.9	12.3	-19.8	0.0	1.6	90.3	16.7
404	521.4	512.3	0.0	0.0	0.0	3.5	5.7
	122.7	102.5	-24.9	0.0	12.4	-16.2	73.7
405	272.2	512.4	0.0	0.0	0.0	-242.0	1.8
HST	68.0	152.0	0.0	0.0	14.4	-89.5	19.8
406	3393.6	3113.3	0.0	0.0	0.0	235.0	45.4
	1060.6	1247.3	-493.6	0.0	229.1	-216.0	752.2
407	25.1	145.5	0.0	0.0	0.0	-125.0	4.6
KEY	14.6	29.4	-69.4	0.0	6.5	29.8	31.3
408	583.3	321.9	0.0	0.0	0.0	257.0	4.4
KIS	111.9	102.1	0.0	0.0	10.0	-56.2	76.0
409	104.0	84.8	0.0	0.0	0.0	19.0	0.2
LWU	66.4	4.3	0.0	0.0	1.4	56.1	7.4
410	3673.1	90.0	0.0	0.0	0.0	3559.9	23.1
NSB	961.9	8.9	0.0	0.0	304.4	661.9	595.5
411	2103.1	1729.0	0.0	0.0	0.0	349.2	25.0
IR GEN	293.7	311.4	-51.9	0.0	253.6	-179.0	466.9
412	2239.6	1110.2	0.0	0.0	0.0	1079.6	49.9
SECI	482.3	276.2	-50.7	0.0	181.0	-326.6	764.5
413	866.9	1311.7	0.0	0.0	0.0	-456.3	11.5
MP-GEN	140.8	231.7	-123.7	0.0	30.1	-94.7	157.7
414	0.0	1638.2	0.0	0.0	0.0	-1646.6	8.3
STARKE	0.0	337.1	-96.6	0.0	32.7	-360.4	152.6
415	629.3	669.5	0.0	0.0	0.0	-90.0	17.4
	163.9	209.0	-130.9	0.0	48.1	-15.5	138.6
416	4916.0	4567.2	0.0	0.0	0.0	227.9	120.9
GENERATN	1492.5	397.3	-825.5	0.0	234.3	208.3	1946.7
417	139.9	203.5	0.0	0.0	0.0	-65.8	2.3
VERO BCH	82.1	22.5	-32.2	0.0	3.2	74.0	21.0
418	285.0	67.1	0.0	0.0	0.0	216.3	1.6
	83.7	36.4	-10.6	0.0	1.7	30.5	29.2
419	18.5	194.1	0.0	0.0	0.0	-176.0	0.4
	26.0	70.5	-79.9	0.0	9.2	41.4	3.3
420	528.6	504.5	0.0	0.0	0.0	20.0	4.0
	118.8	67.0	0.0	0.0	16.2	43.2	24.7
426	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix E – Loss Analysis

NORTH	0.0	0.0	0.0	0.0	0.0	0.0	0.0
427	406.3	0.0	0.0	0.0	0.0	406.0	0.3
DOWNTOWN	235.5	0.0	0.0	0.0	0.0	194.9	40.5
428	100.2	0.0	0.0	0.0	0.0	100.0	0.2
PLANTCTY	92.1	0.0	0.0	0.0	0.0	84.2	7.9
429	0.0	0.0	0.0	0.0	0.0	0.0	0.0
EAST	0.0	0.0	0.0	0.0	0.0	0.0	0.0
441	60.0	156.5	0.0	0.0	0.0	-111.7	8.5
	16.9	58.2	-24.3	0.0	19.1	-43.2	52.2
442	309.2	102.7	0.0	0.0	0.0	201.7	4.8
	26.0	11.4	0.0	0.0	10.3	-9.6	34.6
443	0.0	93.7	0.0	0.0	0.0	-97.7	3.2
	0.0	15.7	-43.7	0.0	8.4	22.6	9.7
444	575.0	244.5	0.0	0.0	0.0	319.1	9.1
	99.0	59.4	-35.0	0.0	10.5	-21.7	110.6
445	190.0	144.7	0.0	0.0	0.0	44.4	5.5
	30.2	29.1	-18.0	0.0	14.2	-17.9	47.5
446	0.0	174.4	0.0	0.0	0.0	-164.5	2.2
	0.0	34.0	-22.5	0.0	10.6	-14.0	13.6
447	0.0	108.0	0.0	0.0	0.0	-110.6	2.4
	0.0	37.1	0.0	0.0	3.6	-41.6	7.5
449	16.0	138.5	0.0	0.0	0.0	-130.0	0.8
	2.7	16.0	0.0	0.0	7.8	-12.8	4.6
450	0.0	0.0	0.0	0.0	0.0	-0.5	0.5
	0.0	0.0	0.0	0.0	3.0	-4.1	7.1
451	167.1	28.5	0.0	0.0	0.0	138.3	0.3
	70.0	11.0	0.0	0.0	0.0	57.8	1.2
452	0.0	43.5	0.0	0.0	0.0	-43.9	0.4
	0.0	10.1	0.0	0.0	0.0	-11.0	0.9
453	0.0	57.4	0.0	0.0	0.0	-57.6	0.2
	0.0	3.5	0.0	0.0	0.0	-4.1	0.6
454	38.0	71.2	0.0	0.0	0.0	-33.2	0.0
	18.0	16.7	0.0	0.0	0.0	1.3	0.0
455	39.0	30.0	0.0	0.0	0.0	9.0	0.0
	19.0	12.7	0.0	0.0	0.0	6.3	0.0
456	0.0	36.7	0.0	0.0	0.0	-36.7	0.0
	0.0	14.8	0.0	0.0	0.0	-14.8	0.0
457	0.0	65.0	0.0	0.0	0.0	-65.3	0.3

Appendix E – Loss Analysis

	0.0	27.1	0.0	0.0	0.0	-28.3	1.2
460	769.0	822.9	0.0	0.0	0.0	-65.0	11.2
	372.4	204.4	-25.7	0.0	47.2	87.0	153.9
477	0.0	12.5	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
512	0.0	5.0	0.0	0.0	0.0	-5.0	0.0
	0.0	1.0	0.0	0.0	0.0	-1.0	0.0
536	289.0	227.8	0.0	0.0	0.0	113.5	3.2
WERE	7.0	57.1	-3.4	0.0	2.2	-36.0	5.5
600	7573.5	384.5	0.0	0.0	0.0	7163.2	22.9
608	1008.7	228.4	0.0	0.0	158.4	123.0	825.6
601	1871.0	7583.7	0.0	0.0	0.0	-6198.1	190.6
XEL_MN	123.2	1033.8	-2268.7	592.7	2293.4	745.9	2239.0
602	14.0	391.1	0.0	0.0	0.0	-428.8	4.7
XEL_ND	-2.8	78.2	-153.9	0.0	28.8	62.7	34.2
603	0.0	410.8	0.0	0.0	0.0	-459.6	7.6
XEL_SD	0.0	80.7	-30.9	0.0	22.9	-95.9	57.0
604	161.1	1469.7	0.0	0.0	0.0	-1319.0	44.9
XEL_WI	25.5	295.9	-613.1	0.0	246.8	267.0	329.4
605	162.6	674.2	0.0	0.0	0.0	-369.7	4.1
NON-XEL	-17.5	136.2	-73.8	0.0	8.9	-63.2	18.3
608	568.1	501.4	0.0	0.2	0.0	-63.2	58.3
MP_608	-73.5	165.5	-921.8	0.9	246.1	28.3	878.0
609	-58.4	1045.4	0.0	0.0	0.0	-1050.8	5.1
MP-INDUS	84.1	369.4	-63.1	0.0	6.7	-249.6	53.2
610	1269.7	84.6	0.0	0.0	0.0	1178.3	2.3
MP-SSL	79.5	44.2	-5.3	0.0	0.3	-63.8	102.7
611	0.0	9.6	0.0	0.0	0.0	-9.6	0.1
	0.0	3.1	0.0	0.0	0.0	-4.1	0.9
613	0.0	216.0	0.0	0.0	0.0	-0.2	0.2
SMPA_613	0.0	54.0	-26.0	0.0	1.2	25.4	1.7
614	11.5	55.0	0.0	0.1	0.0	-56.7	0.5
SMPA_614	13.6	13.6	0.0	0.4	0.6	-8.6	4.7
615	22.9	61.2	0.0	0.0	0.0	-331.5	2.6
SMPA_615	12.5	14.3	-33.7	0.0	32.1	-75.1	29.9
616	118.7	459.9	0.0	0.0	0.0	-63.7	2.2
SMPA_616	12.1	150.8	-226.2	0.3	93.5	254.8	31.7
617	62.0	84.3	0.0	0.0	0.0	-29.0	0.6

SMPA_617	28.3	21.0	0.0	0.0	3.6	1.5	6.4
618	0.0	139.8	0.0	0.0	0.0	0.0	0.0
GRE-SSL	0.0	3.4	0.0	0.0	0.0	0.0	0.0
619	148.6	1503.0	0.0	0.3	0.0	-1401.2	33.0
GRE-GRE	-20.2	262.9	-666.0	0.7	143.8	326.3	195.3
620	56.0	231.1	0.0	0.1	0.0	-173.7	4.7
GRE-MP	-24.8	34.1	-32.1	0.1	62.3	14.5	20.7
621	61.0	161.7	0.0	0.1	0.0	-83.0	5.3
GRE-OTP	-22.0	30.4	0.0	0.2	26.2	-44.3	21.0
622	122.5	1114.7	0.0	0.2	0.0	-1018.6	53.9
GRE-NSP	-48.3	143.4	-10.0	0.6	122.3	-297.3	242.1
623	70.7	138.7	0.0	0.0	0.0	-62.5	3.1
GRE-ALT	-22.8	18.0	0.0	0.0	11.9	-33.0	5.7
624	1461.7	0.0	0.0	0.7	0.0	1276.8	56.3
GRE-ND	418.7	0.0	-398.2	4.2	57.9	-664.5	1531.8
625	1239.8	5.9	0.0	0.6	0.0	1233.7	5.3
GRE-S	-183.7	0.0	0.0	0.7	6.9	-324.1	146.4
626	238.6	214.3	0.0	0.1	0.0	-33.9	15.7
OTP_626	-20.9	65.7	-91.1	0.0	112.8	24.3	83.5
627	2.2	221.8	0.0	0.1	0.0	-296.8	22.7
OTP_627	-0.9	50.9	19.6	26.5	329.0	-24.2	243.8
628	497.0	39.0	0.0	0.0	0.0	446.1	11.6
OTP_628	-0.9	14.3	0.0	0.0	27.9	-68.2	80.8
630	20.2	210.5	0.0	0.2	0.0	-235.2	2.7
	-6.5	43.4	-28.7	0.1	9.9	-32.5	9.0
631	114.5	294.0	0.0	0.0	0.0	-396.5	1.0
RPU_631	117.5	73.7	0.0	0.2	14.7	-3.9	8.2
633	164.1	215.3	0.0	0.0	0.0	-52.0	0.8
MPW_633	80.7	48.1	0.0	0.0	9.1	23.6	18.0
635	49.0	156.2	0.0	0.0	0.0	-318.7	5.2
MEC_635	27.5	17.5	-91.7	0.0	32.2	58.3	34.1
636	3411.6	1702.2	0.0	0.0	0.0	1942.0	32.5
MEC_636	539.7	469.1	-126.1	0.0	222.4	-75.5	548.0
637	864.8	2138.8	0.0	0.0	0.0	-1283.6	45.7
MEC_637	47.8	321.7	-322.7	0.0	708.8	245.8	520.0
638	1023.1	1434.6	0.0	0.0	0.0	-501.7	22.9
MEC_638	263.1	369.4	-157.1	0.0	264.4	9.0	284.8
639	246.6	381.3	0.0	0.0	0.0	-143.4	1.1

MEC_639	51.3	55.8	0.0	0.0	6.7	-2.8	3.4
640	2617.8	2487.0	0.0	0.0	0.0	-146.2	96.4
NPPD_640	168.2	797.5	-669.3	25.8	1086.5	73.8	982.9
641	132.0	220.1	0.0	0.0	0.0	13.8	0.7
HAST_641	37.1	72.0	0.0	0.0	3.3	-11.1	10.6
642	191.0	196.2	0.0	0.0	0.0	-7.1	1.9
GRIS_642	17.3	11.3	0.0	0.0	2.6	-14.4	23.0
645	2477.3	2370.6	0.0	0.0	0.0	37.5	26.4
OPPD_645	412.3	414.8	-137.8	15.0	381.0	-14.4	489.9
646	43.6	44.2	0.0	0.0	0.0	-11.6	0.0
OPPD_MUN	10.2	21.5	0.0	0.0	0.0	-16.6	0.0
647	114.9	106.7	0.0	0.0	0.0	-6.4	0.6
OPPD_FRE	41.1	35.1	0.0	0.0	1.0	-12.0	11.6
648	0.0	15.7	0.0	0.0	0.0	0.0	0.0
	0.0	5.8	0.0	0.0	0.0	0.0	0.0
649	0.0	153.1	0.0	0.0	0.0	-104.0	0.3
OPPD_SSL	0.0	94.1	0.0	0.0	0.0	-69.9	6.6
650	176.4	854.9	0.0	0.0	0.0	-688.9	10.4
LES_650	17.0	147.1	-211.7	0.0	88.1	-14.0	183.8
651	-109.9	0.0	0.0	0.0	0.0	-110.0	0.1
	2.3	0.0	-121.3	0.0	1.5	25.0	100.1
652	212.5	152.3	0.0	0.0	0.0	-74.4	5.7
WAPA_652	26.7	33.0	-120.3	0.0	113.0	10.8	181.1
653	77.4	97.5	0.0	0.0	0.0	-203.9	13.4
WAPA_653	-66.2	22.8	-8.0	-0.3	170.6	-33.4	80.0
654	1434.8	370.2	0.0	0.0	0.0	357.8	70.9
WAPA_654	-1.4	61.7	-249.5	158.4	1050.3	270.4	692.7
655	506.0	30.5	0.0	0.0	0.0	370.6	30.9
WAPA_655	-56.6	5.6	-3.5	0.0	291.4	-31.1	254.6
656	0.0	465.4	0.0	0.0	0.0	-54.2	3.5
WAPA_656	0.0	135.8	-30.4	0.0	88.0	49.6	46.4
657	772.0	144.4	0.0	0.1	0.0	598.4	32.1
MPC-657	140.6	34.0	-165.4	0.0	192.0	150.0	306.3
659	75.1	1366.5	0.0	0.0	0.0	-475.9	50.0
BEPC_659	-43.5	254.7	-3.9	561.7	1207.8	-115.0	571.5
660	2389.3	202.5	0.0	0.0	0.0	2182.4	4.4
ZONE_660	295.5	126.2	0.0	0.0	0.7	-59.5	229.5
661	742.9	499.9	0.0	0.0	0.0	187.6	17.8

MDU_661	86.0	148.3	29.4	3.4	255.6	9.4	174.7
663	79.3	320.0	0.0	0.0	0.0	-223.9	7.0
NWPS_663	-5.3	70.2	-21.1	0.0	23.7	-57.2	28.5
665	128.7	464.5	0.0	0.0	0.0	-135.8	1.0
MRES_665	-6.0	146.1	-30.7	0.0	4.1	-38.2	16.4
666	0.0	17.4	0.0	0.0	0.0	0.0	0.0
	0.0	3.8	0.0	0.0	0.0	0.0	0.0
667	0.0	794.1	0.0	0.0	0.0	-821.2	14.4
MHSUBWPG	0.0	176.5	-139.5	0.0	149.8	-52.8	166.6
668	1087.0	1109.6	0.0	0.0	0.0	-257.1	253.9
MHRURALS	1522.2	231.6	-1386.1	257.5	782.6	-1583.3	4785.2
669	146.8	458.4	0.0	0.0	0.0	-328.0	16.4
MHWPGHYD	24.8	180.5	-52.3	0.0	39.1	-151.9	87.5
670	4039.5	71.0	0.0	0.0	0.0	3927.4	41.1
MHRURALN	1672.6	13.3	-783.2	148.9	350.7	1980.0	664.3
671	0.0	675.5	0.0	0.0	0.0	-686.3	4.2
MH INDUS	0.0	118.7	0.0	0.0	11.0	-128.8	20.1
672	0.0	2182.1	0.0	0.0	0.0	-2395.8	92.4
SPC	91.9	523.4	-329.4	81.8	991.7	89.2	671.9
674	0.0	641.5	0.0	0.0	0.0	-533.0	12.7
SPC-IND	0.0	127.0	5.5	0.0	122.7	-29.3	66.3
675	2652.0	138.0	0.0	0.0	0.0	2514.0	0.0
SPC-SSL	149.3	33.7	-52.2	0.0	0.0	-63.5	231.3
676	451.9	33.2	0.0	0.0	0.0	418.7	0.0
SPC-NSG	85.3	20.3	0.0	0.0	0.0	27.6	37.3
679	0.0	0.0	0.0	0.0	0.0	0.0	0.0
SPC-ALTA	0.0	0.0	0.0	0.0	0.0	0.0	0.0
680	108.2	793.1	0.0	0.0	0.0	-710.9	25.8
DPC_680	2.9	205.9	-109.1	0.0	87.8	-74.1	68.6
681	942.9	41.8	0.0	0.0	0.0	876.9	32.5
DPC_681	-27.5	13.2	-57.6	0.3	241.3	-22.1	282.2
682	0.0	48.4	0.0	0.0	0.0	-49.7	0.2
DPC_682	0.0	19.5	0.0	0.0	0.2	-19.7	0.2
683	0.0	6.4	0.0	0.0	0.0	0.0	0.0
	0.0	1.3	0.0	0.0	0.0	0.0	0.0
684	0.0	14.6	0.0	0.0	0.0	0.0	0.0
	0.0	5.5	0.0	0.0	0.0	0.0	0.0
685	0.0	18.9	0.0	0.0	0.0	0.0	0.0

	0.0	5.8	0.0	0.0	0.0	0.0	0.0
704	11.9	0.0	0.0	0.0	0.0	11.9	0.0
	4.0	0.0	0.0	0.0	0.0	4.0	0.0
707	28178.9	29430.7	6.4	213.3	0.0	-2132.1	660.6
MEPCO	5848.2	5450.6	-6972.5	29.9	4708.2	845.7	11202.7
726	463.0	221.0	0.0	0.0	0.0	145.5	7.9
CENTRAL	8.9	61.0	28.2	0.0	121.1	-88.2	92.8
727	0.0	274.1	0.0	0.0	0.0	-296.0	17.2
EASTERN	0.0	75.6	28.7	0.0	264.0	30.8	126.7
728	788.3	177.3	0.0	0.0	0.0	338.4	13.0
NORTHERN	-31.8	48.9	-111.3	0.0	132.4	-173.0	267.1
729	1370.7	249.7	0.0	0.0	0.0	776.5	13.1
SOUTHERN	49.5	68.8	-42.0	0.0	306.6	-37.6	252.2
730	191.1	128.0	0.0	0.0	0.0	-96.6	6.9
WESTERN	29.5	35.3	-72.4	0.0	323.1	159.2	168.3
731	0.0	89.7	0.0	0.0	0.0	0.0	0.0
	0.0	36.6	0.0	0.0	0.0	0.0	0.0
732	0.0	4.7	0.0	0.0	0.0	0.0	0.0
	0.0	2.2	0.0	0.0	0.0	0.0	0.0
733	0.0	237.5	0.0	0.0	0.0	0.0	0.0
	0.0	53.0	0.0	0.0	0.0	0.0	0.0
734	0.0	287.2	0.0	0.0	0.0	0.0	0.0
	0.0	84.3	0.0	0.0	0.0	0.0	0.0
735	0.0	152.8	0.0	0.0	0.0	0.0	0.0
	0.0	62.4	0.0	0.0	0.0	0.0	0.0
736	0.0	65.0	0.0	0.0	0.0	0.0	0.0
	0.0	46.0	0.0	0.0	0.0	0.0	0.0
737	0.0	160.0	0.0	0.0	0.0	-161.2	1.2
PEI	0.0	40.0	0.0	0.0	83.3	41.4	1.9
738	0.0	15.0	0.0	0.0	0.0	-15.0	0.0
EMCOOP	0.0	6.0	0.0	0.0	0.0	-6.0	0.0
739	85.2	125.8	0.0	0.0	0.0	-43.6	3.0
MPS	7.0	28.4	-10.9	0.0	10.9	-7.5	7.9
751	1302.3	1651.8	7.9	2.6	0.0	-418.6	58.5
NMPC WES	541.9	747.5	-103.9	-46.1	347.0	-429.8	721.3
752	4633.2	1634.8	4.5	0.0	0.0	2922.3	71.6
NMPC CEN	1185.5	759.9	-192.5	-21.2	473.1	-166.4	1278.9
753	1214.0	599.0	0.5	0.0	0.0	465.0	149.5

Appendix E – Loss Analysis

NMPC MVN	165.0	222.6	-756.0	-4.1	1264.3	-90.7	2057.7
754	2286.2	1954.6	7.2	0.1	0.0	238.5	85.8
NMPC EAS	831.9	866.7	-1067.0	-17.7	283.7	402.3	931.3
755	684.8	463.2	-3.1	0.0	0.0	207.9	16.8
NYSEG WE	193.8	247.5	-148.8	-7.3	299.7	178.7	223.5
756	752.4	1284.1	3.4	2.1	0.0	-601.5	64.3
NYSEG CE	207.1	630.7	-454.1	-183.8	351.3	-162.0	727.6
757	0.0	264.1	1.2	0.5	0.0	-269.0	3.1
NYSEG EA	0.0	122.6	-71.1	-77.4	17.4	28.8	14.5
758	0.0	9.8	0.0	0.0	0.0	-10.2	0.4
NYSEG HU	0.0	4.6	-2.6	0.0	0.0	-2.6	0.6
759	680.1	1597.5	0.1	0.3	0.0	-949.3	31.7
RG&E	67.1	534.8	-641.4	-87.4	265.3	138.8	387.5
760	1369.1	1213.9	0.0	0.2	0.0	74.1	81.0
CENT HUD	417.4	340.7	-422.2	-3.3	185.6	-322.2	1010.1
761	1879.0	1067.6	0.1	0.3	0.0	792.4	18.5
O&R	717.4	363.7	-2.6	-62.5	23.6	102.4	340.0
762	4142.7	5286.0	6.5	0.0	0.0	-1217.1	67.4
LIPA	639.9	2017.7	-804.9	-0.8	1814.6	230.3	1012.1
763	2738.0	515.7	0.0	0.0	0.0	2218.8	3.5
NYPA WES	496.9	245.3	-1.9	0.0	0.9	89.2	165.2
764	906.5	532.4	0.0	0.0	0.0	368.8	5.4
NYPA NOR	13.0	210.8	-178.6	0.0	36.5	-108.3	125.7
765	7959.5	11796.8	0.0	0.0	0.0	-3976.0	138.6
CON ED C	3395.9	5697.8	-2297.0	0.0	3996.2	-559.8	4551.2
768	33.3	34.5	0.0	0.0	0.0	-1.2	0.0
NYPA E	9.8	16.7	0.0	0.0	0.0	-6.9	0.0
769	241.5	77.3	0.0	0.0	0.0	162.3	1.9
NYSEG NO	17.0	59.5	-15.4	-11.1	2.3	-45.7	32.0
770	500.0	0.0	0.0	0.0	0.0	500.0	0.0
NYPA F	180.0	0.0	0.0	0.0	0.0	180.0	0.0
771	16.5	92.7	0.2	0.0	0.0	-79.5	3.1
NYSEG ME	0.0	47.3	-35.0	-7.4	9.0	-11.4	15.5
772	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NYPA H	0.0	0.0	0.0	0.0	0.0	0.0	0.0
773	946.5	367.6	0.0	0.1	0.0	545.9	33.0
CON ED N	568.7	167.4	-355.6	0.0	333.9	295.2	795.7
775	0.0	1483.5	0.0	0.0	0.0	-1519.1	35.6

Appendix E – Loss Analysis

CON ED C	0.0	686.7	-196.2	0.0	1494.8	-102.5	1106.9
776	145.0	0.0	0.0	0.0	0.0	145.0	0.0
NYPA J	58.5	0.0	0.0	0.0	0.0	43.0	15.5
777	184.0	0.0	0.5	0.0	0.0	183.1	0.4
NYPA K	57.7	0.0	9.2	0.0	0.0	26.5	22.0
778	5.0	0.0	0.0	0.0	0.0	5.0	0.0
NYPA G	0.0	0.0	0.0	0.0	0.0	0.0	0.0
779	45.5	354.7	0.0	3.7	0.0	-342.9	30.0
NMPC GNS	18.2	113.0	-187.6	-5.2	25.0	17.6	105.4
780	0.0	273.8	3.0	0.0	0.0	-279.5	2.7
NYSEG BR	0.0	131.7	-11.7	0.0	2.3	-158.2	40.4
781	1.9	126.4	1.1	0.2	0.0	-134.0	8.1
NMPC NTH	-1.1	59.2	108.7	0.4	292.1	48.0	74.7
782	0.0	0.0	0.0	0.0	0.0	-14.2	14.2
CE UPNY	0.0	0.0	0.0	0.0	466.8	160.0	306.8
783	0.0	4.8	0.0	0.0	0.0	-4.8	0.0
CENT H C	0.0	1.7	0.0	0.0	0.0	-1.7	0.0
786	608.3	1830.4	0.0	8.5	0.0	-1290.5	59.9
	29.8	882.6	-703.2	38.2	359.4	-393.5	565.2
787	0.0	2168.8	0.0	4.3	0.0	-2194.9	21.8
	0.0	1124.8	-755.3	21.3	266.8	-561.5	437.5
788	350.2	2183.2	0.0	8.1	0.0	-1872.8	31.7
	137.0	1086.4	-937.7	53.1	69.9	-458.3	463.2
789	0.0	367.1	0.0	1.7	0.0	-376.4	7.6
	0.0	143.3	-174.7	7.7	10.3	-34.5	68.6
790	350.6	1327.4	0.0	5.8	0.0	-1014.9	32.3
	-4.7	631.9	-636.4	27.6	65.2	-291.7	329.0
791	337.9	456.8	0.0	5.4	0.0	-144.3	19.5
	6.0	251.6	-20.8	41.9	170.1	-227.5	130.6
792	608.8	832.0	0.0	6.0	0.0	-261.9	33.2
	49.5	402.4	-28.9	29.1	191.9	-434.5	273.5
793	1612.7	1718.2	0.0	8.4	0.0	-152.8	38.9
	273.6	850.1	-183.3	68.4	507.4	-606.1	651.9
794	52.8	666.2	0.1	1.0	0.0	-618.3	3.9
	23.2	363.0	-212.8	5.4	122.8	-109.4	99.9
795	28.1	3513.3	0.0	7.1	0.0	-3538.6	46.3
	0.0	1589.8	-1804.9	49.8	131.1	-834.3	1130.7
796	166.2	2162.1	0.0	4.1	0.0	-2018.7	18.5

N-RICHVW	-10.5	1026.6	-717.9	28.5	146.0	-940.5	738.6
797	0.0	3286.0	0.0	6.9	0.0	-3334.1	41.2
W-RICHVW	0.0	1613.3	-1704.7	31.0	255.5	-572.3	888.3
798	0.0	904.1	0.0	7.5	0.0	-946.7	35.0
	0.0	420.9	311.7	18.4	306.3	-900.8	456.2
799	1271.6	1490.6	0.0	6.5	0.0	-274.3	48.8
	438.3	727.4	-385.5	31.5	338.9	-498.6	902.4
800	441.0	1549.0	0.0	10.5	0.0	-1160.3	41.8
	87.1	742.7	-820.2	33.5	498.1	-98.2	727.2
801	699.1	70.6	0.0	2.6	0.0	617.8	8.1
	174.4	32.5	0.0	7.8	47.3	19.4	161.9
802	949.0	426.0	0.0	6.1	0.0	489.3	27.6
	-44.1	208.4	-192.4	51.4	243.4	-224.7	356.6
803	0.0	0.0	0.0	0.0	0.0	-10.1	10.1
	0.0	0.0	0.0	0.0	349.5	285.2	64.3
804	2200.0	59.2	0.0	1.0	0.0	2135.1	4.8
	563.6	30.4	0.0	3.6	0.0	290.6	239.0
805	3669.0	220.0	0.0	1.2	0.0	3442.8	5.1
	1254.6	124.0	0.0	23.7	6.4	649.7	463.6
806	3084.9	96.0	0.0	2.3	0.0	2979.4	7.1
	1158.9	56.0	0.0	15.9	2.9	694.1	395.8
807	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
809	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	-95.7	0.0	0.0	95.7	0.0
810	4816.0	350.0	0.0	1.6	0.0	4454.1	10.3
	1451.4	200.0	0.0	10.1	0.0	683.8	557.4
811	3539.6	90.3	0.0	1.8	0.0	3438.1	9.3
	1455.8	48.0	0.0	9.3	0.0	961.8	436.7
812	215.6	60.0	0.0	1.1	0.0	153.7	0.8
	242.0	30.4	0.0	4.5	0.0	179.7	27.4
813	203.8	12.0	0.0	0.1	0.0	191.2	0.5
	-38.6	6.0	0.0	2.1	0.0	-66.3	19.6
814	315.9	20.0	0.0	0.3	0.0	294.9	0.8
	213.1	10.0	0.0	2.7	0.0	160.2	40.2
815	0.0	0.0	0.0	0.5	0.0	-137.0	136.5
	0.0	0.0	0.0	250.2	5095.4	3244.3	1600.8
816	285.1	244.2	0.0	0.4	0.0	31.3	9.2

Appendix E – Loss Analysis

	102.5	112.4	0.0	4.5	67.5	-11.3	64.5
817	10.2	6.8	0.0	0.6	0.0	2.6	0.1
	13.9	15.3	0.0	6.3	8.7	0.0	1.0
818	4.1	-3.4	0.0	0.2	0.0	7.1	0.2
	-6.9	-1.6	0.0	1.0	7.6	-0.1	1.4
825	0.0	35.1	0.0	0.0	0.0	-35.7	0.5
PHQMAURS	0.0	12.0	0.0	0.0	7.8	-7.8	3.6
826	1691.4	0.0	0.0	0.0	0.0	1687.3	4.2
PHQRICHE	406.6	0.0	0.0	0.0	0.0	303.5	103.1
827	0.0	450.3	0.0	0.0	0.0	-455.6	8.0
MATAPED	-102.4	103.7	0.0	0.0	504.1	250.7	48.0
828	0.0	435.9	0.1	0.0	0.0	-442.6	6.6
MAURICIE	0.0	108.7	-105.2	0.0	80.1	-5.3	81.9
829	0.0	2086.2	0.2	0.0	0.0	-2133.5	47.1
MONTMOR	0.0	532.6	-509.1	0.0	675.9	169.2	483.4
831	0.0	491.4	0.1	0.0	0.0	-501.2	9.8
OUTAOUAI	0.0	113.0	-84.1	0.0	100.7	14.1	57.8
832	0.0	3492.9	0.3	0.0	0.0	-3511.6	18.4
STLAUREN	0.0	871.1	-1195.2	0.0	508.0	461.5	370.6
833	35.0	544.5	0.2	0.0	0.0	-511.6	2.0
LAVAL	5.4	231.9	-175.6	0.0	5.2	-99.6	53.9
834	5760.7	0.0	0.0	0.0	0.0	5748.0	12.7
PHQMANIC	898.2	0.0	0.0	0.0	0.0	417.3	480.8
835	1249.8	0.0	0.0	0.0	0.0	1246.0	3.8
PHQMAURN	414.0	0.0	0.0	0.0	0.0	314.6	99.4
836	317.6	490.7	0.0	0.0	0.0	-178.3	5.2
CHM	146.4	138.1	-22.4	0.0	3.9	-18.2	52.7
837	1832.0	1989.4	0.0	0.0	0.0	-198.9	41.5
ALCANP	641.4	771.3	-361.1	0.0	378.1	-14.0	623.3
838	0.0	182.4	0.0	0.0	0.0	-182.4	0.1
ALCANC	0.0	52.3	0.0	0.0	0.6	-52.1	0.4
839	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTEROUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0
840	0.0	45.0	0.0	0.0	0.0	-46.3	1.3
INTERRIC	0.0	6.0	0.0	0.0	0.6	-55.4	50.0
841	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTERABI	0.0	0.0	0.0	0.0	0.0	0.0	0.0
843	0.0	0.0	0.0	0.0	0.0	-0.1	0.1

Appendix E – Loss Analysis

INTERMAT	-21.5	0.0	-113.1	0.0	75.8	161.7	5.7
844	0.0	2675.2	0.6	0.0	0.0	-2720.7	44.9
RICHELIE	-41.4	586.5	-1117.7	0.0	186.5	-290.6	966.9
845	276.0	0.0	0.0	0.0	0.0	275.2	0.8
PHQLAURE	111.1	0.0	0.0	0.0	0.0	89.5	21.6
846	493.1	0.0	0.0	0.0	0.0	491.2	2.0
PHQOUTAO	58.5	0.0	0.0	0.0	0.0	24.7	33.9
847	165.1	96.0	0.0	0.0	0.0	67.5	1.6
MACLAREN	1.7	-12.3	0.0	0.0	3.4	1.3	16.1
848	0.0	177.5	0.0	0.0	0.0	-189.4	11.9
MANIC	0.0	46.5	9.5	0.0	171.5	-136.3	251.9
849	0.0	1534.4	0.2	0.0	0.0	-1546.8	12.3
RIVENORD	0.0	382.6	-278.5	0.0	234.8	-4.6	135.3
850	247.4	0.0	0.0	0.0	0.0	246.2	1.2
PHQABITI	80.3	0.0	0.0	0.0	0.0	53.7	26.6
851	0.0	299.6	0.0	0.0	0.0	-312.6	13.1
ABITIBI	0.0	94.3	0.0	0.0	186.2	7.2	84.7
852	3915.0	394.0	0.0	0.0	0.0	3503.6	17.4
CHURCHIL	385.2	21.3	486.8	0.0	0.0	-916.7	793.8
853	0.0	0.0	0.0	0.0	0.0	-112.5	112.5
735MANIC	0.0	0.0	4980.7	0.0	5477.3	-1348.6	1845.2
854	0.0	0.0	0.0	0.0	0.0	-76.5	76.5
735SAGMM	-2.0	0.0	2519.6	0.0	6028.1	1716.1	1790.4
855	0.0	0.0	0.0	0.0	0.0	-96.7	96.7
735SUD	223.8	0.0	2869.4	0.0	7030.7	2359.6	2025.6
856	0.0	0.0	0.0	0.0	0.0	-22.3	22.3
735LAVAL	-49.5	0.0	333.7	0.0	1473.6	428.2	662.2
857	0.0	0.0	0.0	0.0	0.0	-158.7	158.7
735BJSAG	-362.5	0.0	11918.1	0.0	13970.6	-1489.3	3179.4
858	0.0	279.6	0.1	0.0	0.0	-299.5	19.9
SAGUENAY	0.0	84.1	-4.2	0.0	39.7	-234.3	194.2
859	9405.0	9.0	0.0	0.0	0.0	9383.0	12.9
PHQBAIEJ	708.5	1.8	0.0	0.0	0.0	-121.3	828.0
860	892.3	-49.5	0.0	0.0	0.0	936.1	2.9
PRODPRIV	257.8	16.4	0.0	0.0	17.1	210.1	47.8
861	0.0	128.9	0.0	0.0	0.0	-129.1	0.2
BTLAUREN	0.0	33.9	-5.3	0.0	0.0	-33.2	4.5
863	0.0	224.3	0.0	0.0	0.0	-228.8	4.5

HQALCAN	0.0	68.0	-12.0	0.0	35.0	-37.5	16.5
864	0.0	15.0	0.0	0.0	0.0	-116.1	101.1
BAIEJAME	0.0	7.7	-579.2	20.8	374.3	-879.0	1803.9
869	0.0	2798.5	0.0	0.0	0.0	-2810.5	12.1
CHTEST	0.0	798.3	-11.3	0.0	35.3	-867.6	116.0
870	0.0	20.2	0.0	0.0	0.0	-20.2	0.0
CHTSTLAU	0.0	5.7	0.0	0.0	2.1	-3.5	0.0
871	0.0	339.9	0.0	0.0	0.0	-340.3	0.4
CHTSAGUE	0.0	78.9	-5.6	0.0	12.8	-63.3	2.9
872	0.0	245.8	0.0	0.0	0.0	-246.1	0.3
CHTOUTRN	0.0	62.8	0.0	0.0	2.9	-61.4	1.5
873	0.0	340.0	0.0	0.0	0.0	-340.5	0.4
CHTABITI	0.0	111.8	0.0	0.0	10.7	-104.9	3.8
874	0.0	1429.3	0.0	0.0	0.0	-1431.4	2.1
CHTMAURI	0.0	470.7	-11.4	0.0	5.2	-463.6	9.6
875	0.0	1841.0	0.0	0.0	0.0	-1841.7	0.7
CHTRICHE	0.0	436.5	0.0	0.0	2.9	-438.7	5.1
876	0.0	158.6	0.0	0.0	0.0	-169.9	11.6
NSEAST-B	0.0	78.5	0.0	0.0	95.3	-60.2	77.0
877	0.0	203.6	0.0	0.0	0.0	-205.0	7.4
NSCENT-B	0.0	100.3	-91.3	0.0	267.9	190.0	71.6
878	0.0	475.4	0.0	0.0	0.0	-434.0	7.2
NSMETR-B	0.0	209.6	-133.8	0.0	119.3	-6.2	72.7
879	0.0	268.4	0.0	0.0	0.0	-272.9	10.1
NSWEST-B	0.0	132.8	-58.5	0.0	87.3	-46.7	62.4
880	-189.0	86.6	0.0	0.0	0.0	-277.2	1.7
NSEAST-I	39.0	25.2	0.0	0.0	2.7	-15.8	32.2
881	23.0	49.2	0.0	0.0	0.0	-26.5	0.2
NSCENT-I	-3.0	20.5	0.0	0.0	0.6	-25.2	2.3
882	0.0	20.1	0.0	0.0	0.0	-27.3	0.0
NSMETR-I	0.0	6.9	0.0	0.0	1.0	-10.3	0.2
883	-61.0	57.5	0.0	0.0	0.0	-123.5	0.7
NSWEST-I	0.0	20.4	-6.3	0.0	3.6	-17.1	5.2
884	904.9	48.0	0.0	0.0	0.0	853.3	3.3
NSEAST-G	91.3	24.1	0.0	0.0	9.6	-23.5	100.2
885	178.2	15.4	0.0	0.0	0.0	156.8	0.1
NSCENT-G	19.4	7.8	0.0	0.0	0.7	-2.7	12.4
886	317.3	15.8	0.0	0.0	0.0	263.5	0.8

Appendix E – Loss Analysis

NSMETR-G	59.6	6.5	0.0	0.0	1.1	13.6	23.2
887	68.4	0.0	0.0	0.0	0.0	62.7	0.1
NSWEST-G	28.9	0.0	0.0	0.0	0.2	23.0	3.4
900	0.0	0.0	0.0	0.0	0.0	-0.6	0.6
	0.0	0.0	0.0	0.0	0.0	-10.3	10.3
901	0.0	32.5	0.0	0.0	0.0	0.0	0.0
	0.0	10.7	0.0	0.0	0.0	0.0	0.0
918	0.0	118.5	0.0	0.0	0.0	-119.2	0.7
	0.0	11.4	0.0	0.0	1.5	-13.4	3.5
950	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	9.0	0.0	-1.9	0.0	0.0	10.1	0.8
970	156.5	667.7	0.0	0.0	0.0	-512.0	0.8
	19.4	65.4	0.0	-1.6	5.7	-42.6	3.9
998	0.1	-186.0	0.0	0.0	0.0	186.0	0.1
	0.0	123.0	0.0	0.0	0.0	-124.2	1.2
999	240.1	500.0	0.0	0.0	0.0	-260.2	0.3
	-32.5	0.0	-222.5	0.0	260.3	0.1	450.2
1600	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1604	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1628	0.0	77.3	0.0	0.0	0.0	0.0	0.0
	0.0	24.1	0.0	0.0	0.0	0.0	0.0
1629	0.0	0.0	0.0	0.0	0.0	-79.6	2.3
	0.0	0.0	0.0	0.0	26.6	-25.9	28.3
1636	36.0	0.0	0.0	0.0	0.0	33.7	2.3
	-11.8	0.0	0.0	0.0	15.3	-13.8	17.3
1666	0.0	1.4	0.0	0.0	0.0	-2.0	0.6
	0.0	0.4	0.0	0.0	3.6	-1.4	4.6
TOTALS	695832.2	678337.9	63.2	491.3	0.0	0.0	16927.1
	149945.2	200475.6	-136618.8	4504.5	166401.9	0.0	248022.8

Appendix F - Cost Analysis

Estimates in 2009 $

Transmission Lines:

New Construction

kV	ACSR	Construction Type[1]	Right of Way Width (Feet)		Line Construction (Per Mile)	Right of Way and Construction (Per Mile)		
			Rural	Metro		Rural	Metro	Urban
	336	SWP	100	70	$230,000	$362,250	$861,350	$1,401,850
	477	SWP	100	70	$241,500	$373,750	$872,850	$1,401,850
69	795	SWP	100	70	$276,000	$408,250	$907,350	$1,447,850
	336	SWP	100	80	$264,500	$411,700	$966,000	$1,567,450
	477	SWP	100	80	$276,000	$423,200	$977,500	$1,578,950
	795	SWP	100	80	$333,500	$480,700	$1,035,000	$1,636,450
115	795	STP	100	80	$414,000	$561,200	$1,115,500	$1,716,950
	336	SWP	100	80	$264,500	$411,700	$966,000	$1,567,450
	477	SWP	100	80	$276,000	$423,200	$977,500	$1,578,950
	795	SWP	100	80	$333,500	$480,700	$1,035,000	$1,636,450
161	795	STP	100	80	$414,000	$561,200	$1,115,500	$1,716,950

Deconstruction of existing lines (per mile):	$46,000
Temperature Upgrade (per mile):	$20,000

Reconductoring ACSR to ACSS:

kV	Conductor	Cost/Mile
69	477	$92,000
115	795	$149,500

Appendix F - Cost Analysis

Non-LTC Transformers:

kV	300 MVA Top Base	Multiplier/50 MVA
345/230	$5,344,000	20%
345/115	$4,415,000	20%
230/115	$4,183,000	20%
kV	30 MVA Top Base	Multiplier/30 MVA
115/46	$929,400	---
69/34.5	$698,000	---
69/12.5	$582,000	---

Example: 448 MVA, 345/115 kV Transformer

$4,415,000 * 1.2 ^ ((448-300)/50) = $7,573,684

LTC Transformers:

kV	30 MVA Top Base	Multiplier/30 MVA
230/115	$2,906,000	15%
230/69	$1,744,000	15%
161/69	$1,500,000	15%
115/69	$1,162,000	15%
115/34.5	$929,400	15%

Example: 180 MVA, 230/69 kV Transformer

$1,744,000 * 1.15 ^ ((180-30)/30) = $3,507,807

1 DRG Stability Study

1.1 Introduction

After the final 40 locations were chosen for potential Dispersed Renewable Generation (DRG) based on the DRG Phase II power flow studies, the sites were tested for stability. Each potential DRG plant was modeled in the Northern MAPP Operating Review Working Group (NWORWG) stability package with a typical generation plant model. The stability analysis tested the critical regional faults for the state of Minnesota and the interconnected Mid-Continent Area Power Pool (MAPP) system to determine if adding 600 MW of DRG would affect regional system stability. Local stability near the DRG Points of Interconnection (POIs) was not assessed.

1.2 DRG Plant Models

All of the DRG II sites were represented as equivalent wind farms using the model shown in Figure 1.1. Connected to the POI is a typical wind farm substation transformer that steps down to 34.5 kV. Next is an equivalent branch representing the impedance (series and shunt) of the 34.5 kV collector system. Then comes an equivalent GSU (generator step-up) transformer from 34.5 kV down to 0.575 kV. Finally, a single equivalent generator is connected to the 0.575 kV bus. The wind farm is sized based on the MW level determined in the AC power flow analysis.

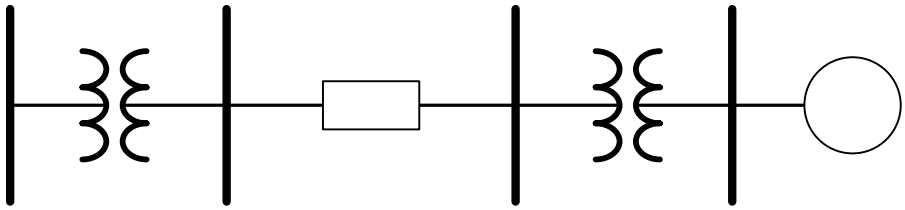


Figure 1.1 DRG Wind Farm Model

For this study, the TRC decided that GE 1.5 MW wind turbines would be used for all DRG wind farms, as was done in the DRG Phase I study. GE wind generators are of the DFIG (doubly-fed induction generator) type that is commonly installed today and is expected to be installed in the future as well. These generators have a reactive power

capability from 0.90 leading to 0.95 lagging. They can dynamically supply the reactive power losses of their collector systems and regulate voltage at the point of interconnection. The DRG sites are listed below.

Table 1.1 DRG II Locations and Sizes

Planning Zone	Site Name	Stability Bus #	MW
NE	Bena	62480	11
	Pine Lake	62859	13
	Dewing	62175	16
	Hubbard	62898	16
	National Taconite Plant	61733	16
	Palmer Lake	62410	16
	Verndale	61842	16
	West Union	62820	16
NW	Compton	61842	11
	Moranville	66999	21
	Nashua Tintah	63220	8
	Osage	62411	13
	Parkers Prairie	62753	11
	Shooks	67017	21
	Stafford	66999	19
	Williams	66760	16
WC	Albany	60756	13
	Benton County	62297	13
	Big Swan	62617	13
	Crooks	60679	13
	Douglas County	60749	13
	Fiesta	60689	14
	Glenwood	60746	14
	Hutchinson Plant 1 Tap	62984	14
	Willmar Municipal	62990	13
SE	Altura	60779	19
	Elgin	34318	19
	Harmony	68726	18
	Henderson	60724	19
	St. Charles Tap	34325	19
	Wabaco	69549	19
	Whitewater	68705	7
SW	Granite Falls	66298	16
	Hardwick	60123	16
	Holland	66505	12
	Ivanhoe	66295	16
	Lake Sarah Tap	62713	15
	Lyon County	60171	15
	Milroy	62738	15
	Walnut Grove	62740	15
	Total		600

1.3 System Stability Model

The software package used for stability studies in Minnesota is the NMORWG (Northern MAPP Operating Reliability Working Group) package. This package includes a set of programs built on top of the commercially available simulation program PSS/E (Power System Simulator for Engineering). The NMORWG package automates the simulation of many faults, special controls, and operating procedures used in the MAPP region.

The 07-29-2009 NMORWG package was used for this study. This package included a 2015 summer off-peak case that was used as the starting point. The power flow file name is "urg-so15aa.sav". The prefix "urg" indicates that the North Dakota coal-fired generators are dispatch at their maximum URGE rating, which they can achieve for short periods during capacity shortages. Summer off-peak is usually the most critical for stability in the MAPP region since this is when the maximum amount of power is being transmitted from Manitoba and North Dakota to and through the state of Minnesota. The "urg-so15aa.sav" case has the MHEX interface (Manitoba Hydro Export) loaded to its maximum of 2,175 MW, the NDEX interface (North Dakota Export) loaded to its maximum of 2,080 MW, and the MWEX interface (Minnesota to Wisconsin Export) loaded to its maximum of 1,525 MW. MHEX is the sum of the flows on the three 230 kV and one 500 kV tie lines that cross the Manitoba-USA border. NDEX is the sum of the flows on the 18 lines that make up the "North Dakota Export" Boundary. MWEX is the sum of the flows on the Arrowhead - Stone Lake and the King - Eau Claire 345 kV lines.

This 2015 summer off-peak case was reviewed and updated. The following transmission projects were added to the model:

Projects add to the stability model	
1. CapX Project	Brookings Co. - Hampton 345kV
	Monticello - Waite Park 345kV
	North Rochester - North Lacrosse 345kV
2. RIGO Project	Pleasant Valley - Byron 161kV
	Pleasant Valley - Willow Creek 161kV
	Byron - Maple Leaf 161kV Circuit 2
	Maple Leaf - Cascade Creek 161kV Circuit 2

In addition, the original 2015 case had most existing wind farms in the region dispatched at 20% of their rated capacity. These wind farms were increased to 90% of their rated capacity to reflect off-peak conditions that are both realistic and stressful to the transmission grid. The resulting case was named "ug2-so15aa.sav".

1.4 Adding DRG to the Stability Model

A software program was written in the IPLAN language during the DRG Phase I study to add the DRG wind projects to the NMORWG model. IPLAN is a programming language used for interacting with and automating the PSS/E software. This program was used again in the DRG Phase II study. As before, a few of the buses chosen in the steady-state

analysis do not exist in the NMORWG model due to its slightly less detailed representation of the subtransmission system. For these buses, the nearest bus that is represented in the NMORWG model was chosen as a replacement.

When injecting the desired power levels into the chosen buses, voltage frequently rises, sometimes significantly if the bus is relatively weak. In cases where the voltage rose above 105% of nominal, the reactive power capability of the DRG units was used to limit the voltage at the POI to 105%. At buses where overvoltage was not an issue, the voltage schedules were set to achieve a nominal power factor of 1.0 at the POI. In other words, approximately zero exchange of reactive power between the system and the DRG.

The sink generators used in the steady-state study were also used in building the stability model. The sinks were chosen to represent a Midwest ISO market dispatch. The most expensive units were taken off-line first.

The DRG Phase I plants were added first, and the resulting case was named "dg1-so15aa.sav". The addition of DRG Phase I generators dispatched to the Midwest ISO market caused the MWEX interface flow to go well above its rating. This flow was reduced back to its rated value with the "setexports.irf" program, and the resulting case was named "d1a-so15aa.sav".

The DRG Phase II plants were added next, creating the case "dg2-so15aa.sav". The MWEX flow was reset again, resulting in case "d2a-so15aa.sav".

The DRG IPLAN program also generates the standard GE wind turbine dynamic model for each DRG location, assuming each wind farm is running at 100% of capability.

1.5 Regional Faults

Only regionally significant faults were tested in this stability analysis. This includes all of the faults listed in Appendix K of the MAPP Reliability Criteria and Study Procedures Manual. Faults were added near the Square Butte HVDC rectifier, the Arrowhead-Weston 345 kV line, the White – Split Rock 345 kV line, and the Nobles – Lakefield 345 kV line. The complete list of regional faults simulated in this study is given in Table 1.2.

Fault FDS is a future version of FD3 with the clearing time at Square Butte reduced from 5 cycles to 4 cycles. This upgrade is considered firm and committed. Due to upgrades completed at Forbes, fault NBZ is no longer valid, and fault NMZ replaces it.

Table 1.2 Simulated Faults

Fault	Description
AG1	SLG fault with breaker failure at Leland Olds on the Ft. Thompson 345 kV line
AG3	3ph fault at Leland Olds on the Ft. Thompson 345 kV line.
EF3	5-cycle 3ph fault at Stanton 230, clear Stanton-Coal Creek-McHenry 230 kV line
EI2	CU DC permanent bipole fault with tripping of both Coal Creek units.
EQ1	SLG fault with breaker failure at Coal Creek on CU DC pole 1 with cross-trip of Coal Creek unit #2.
FD3	5-cycle 3ph fault @ square butte 230 on Stanton line, clear square butte end at 5-cycle, Stanton end at 5cy
FDS	5-cycle 3ph fault @ square butte 230 on Stanton line, clear square butte end at 4-cycle, Stanton end at 5cycle
MTS	SLG fault with breaker failure at Monticello
NAD	4-cycle 3 phase fault on the Dorsey to Forbes 500 kV line D602F at Forbes.
NLZ	4 cycle 3 phase fault at Nobles 345, clear the Nobles-Lakefield Jct. 345 kV line
NMZ	4-cycle 3ph fault at Chisago, trip f601c, cross trip d602f, use new 100% reduction init from Chisago, leave SVS on MP system
OAS	SLG fault with breaker failure at Dorsey with 602L stuck.
PAS	SLG fault with breaker failure at Forbes with 602L stuck. Trip D602F.
PCS	SLG fault with breaker failure at King with 8P6 stuck.
PCT	Eau Claire - Arpin 345kV line trip without a fault.
PYS	SLG fault with breaker failure at Prairie Island with 8H9 stuck.
PYT	Prairie Island - Byron 345kV line trip without a fault.
SWZ	4 cycle 3 phase fault at White 345, clear the White-Split Rock 345 kV line
YAS	4-cycle SLG fault at Arrowhead 230 on AHD-GDP ckt #1, AHD breaker stuck, clear at 17 cycles by tripping AHD-GDP bus section

In a normal interconnection impact study for a single generation plant, many faults around the POI are studied. However, with so many DRG locations and a tight deadline, this was not feasible for this study. In addition, these chosen sites are simply representative of possible sites for DRG, and the overall regional impact is more relevant to the goals of the DRG study. When an individual generation project requests interconnection, detailed local faults will be studied at that time.

1.6 Stability Study Results

The regional faults were simulated on the following previously described cases:

urg-so15aa.sav	Pre-DRG1 case with coal generation at URGE levels
ug2-so15aa.sav	Pre-DRG1 case with updated transmission, existing wind increased to 90%, and interface flows reset to rated values
dg1-so15aa.sav	DRG1 case without resetting interface flows
d1a-so15aa.sav	DRG1 case with the MWEX interface reset to its rated value
dg2-so15aa.sav	DRG2 case without resetting interface flows
d2a-so15aa.sav	DRG2 case with the MWEX interface reset to its rated value

The urg and ug2 cases showed no violations of MAPP stability criteria. This includes generator stability, transient voltage dip criteria, damping criteria, and wind farms not

tripping. These cases have MHEX, NDEX, and MWEX flows at their maximum rated values.

Both the dg1 and dg2 cases had transient low voltage violations in the Arrowhead area for the PCS fault. Dispatching DRG to the Midwest ISO market increases MWEX flow well above its 1525 MW rating.

The PCS disturbance is a single-phase fault on the King – Eau Claire 345 kV line near King, with one King breaker failing to open. The breaker failure results in tripping of the King-Chisago 345 kV line as well. One option for improving the stability response of the PCS fault is to install two new breakers at King. This will allow the King-Chisago line to stay in service following breaker failure on the King – Eau Claire line, reducing the severity of the disturbance. This solution was tested on the DRG 2 case, and the number of buses with voltage violations was reduced from 18 to 3. The three remaining violations are at the Minong, Stinson, and Dahlberg buses.

To address the remaining violations, a 60 Mvar fast-switching capacitor was added at the Stone Lake 161 kV bus, set to switch on 8 cycles after the initial voltage drop. This cleared up the remaining violations.

The recommended solution to the PCS violations is:

- Installation of two 345 kV breakers at King for an estimated cost of $2,000,000, and
- Installation of one 60 Mvar fast-switching capacitor at Stone Lake 161 kV station for an estimated cost of $1,000,000

A more detailed study of this solution will be needed to confirm its effectiveness at increasing the rating of the MWEX interface.

A second possible solution is construction of a 345 kV transmission line from La Crosse, WI, to Madison, WI. This is a much more expensive option with a much longer lead time, and it was not tested in this study.

A final option to eliminate the PCS fault violation is to reduce the MWEX interface flow back to its rated value by dispatching the DRG to the Twin Cities zone of Minnesota. This was modeled by using the “setexports” program included with the NMORWG package. While this does eliminate the stability violations, this dispatch method does not align with Midwest ISO interconnection study practices. DRG would not be approved as a “Network Resource” with this dispatch option.

Outputs tables from the NMORWG package are given in Appendix H. The voluminous RPT reports and PDF plots are available upon request.

1.7 Conclusions

In Phase I of the DRG study, DRG was dispatched to Twin Cities area gas turbines. No stability problems were found. In Phase II of the DRG study, another 600 MW of DRG was added in Minnesota, and all 1200 MW of DRG was dispatched to the greater Midwest ISO market.

The MWEX interface was already loaded to its limit in the base case used for this stability study. Adding DRG and dispatching it to the Midwest ISO market increased the loading of MWEX well above its capability, and low voltage violations were seen for the PCS fault.

The recommended solution is to install two breakers at King and a 60 Mvar fast-switched capacitor at Stone Lake. The total cost is estimated to be $3,000,000.

Another option is to construct a 345 kV line from La Crosse, WI, to Madison, WI, but this option has a much higher cost and lead time.

Dispatching DRG to the Twin Cities avoids stability violations, but this method does not follow Midwest ISO study procedures.

This study shows that new DRG in Minnesota may have a difficult time getting access to the Midwest ISO market without system upgrades. The Minnesota-Wisconsin interface is currently constrained to 1525 MW. The network upgrades described above are possible solutions to increasing the capability of the Minnesota-Wisconsin interface and allowing DRG access to the Midwest ISO market.

Important note: The results of this study are applicable to the assumed conditions. Some of the significant assumptions are:

- *Using an updated 2015 off-peak power flow case. For a specific DRG interconnection impact study, a model would be built to represent the in-service year for the requested plant and would include all prior-queued generation.*
- *Only regional faults were simulated. For a specific DRG interconnection impact study, faults in the local area around the POI would be tested.*

For a specific DRG interconnection impact study, it is possible that there could be additional detrimental impact on stability that would need mitigation, with a wide range of possible cost and time implications.

POWER FLOW AND STABILITY SUMMARY TABLE

Case No.	1	2	3	4	5	6	7	8	9	10	11	12
Case Name	d1a-so15aa-ag1	d1a-so15aa-ag3	d1a-so15aa-ef3	d1a-so15aa-ei2	d1a-so15aa-eq1	d1a-so15aa-fd3	d1a-so15aa-fds	d1a-so15aa-mts	d1a-so15aa-nad	d1a-so15aa-nlz	d1a-so15aa-nmz	d1a-so15aa-oas
Disturbance	ag1	ag3	ef3	ei2	eq1	fd3	fds	mts	nad	nlz	nmz	oas
Prior Outage	None	None	None	None	None	None	None	None	None	None	None	None
Date/Time	AUG 15 2009 11:06	AUG 15 2009 11:09	AUG 15 2009 11:12	AUG 15 2009 11:15	AUG 15 2009 11:18	AUG 15 2009 11:22	AUG 15 2009 11:25	AUG 15 2009 11:28	AUG 15 2009 11:31	AUG 15 2009 11:35	AUG 15 2009 11:38	AUG 15 2009 11:41
Comments												
Steady State Flows												
NDEX / EAST BIAS	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283	2077 / 283
MHEX / L20D	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203	2174 / 203
ECL-ARP / PRI-BYN	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576	610 / 576
MWEX / AHD-SLK	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656	1524 / 656
D602F / F601C	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520	1797 / 1520
B10T / MH>SPC	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60
OH E-W / OH>MH	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196
R50M / OH>MP	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151	156 / 151
G82R	16	16	16	16	16	16	16	16	16	16	16	16
Dorsey bipole / CU bipole	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075
Dorsey Reserve / Wtrtn SVC	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0	285 / 0
Forbes SVC / MSC	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600	50 / 600
RCDC	0	0	0	0	0	0	0	0	0	0	0	0
Steady State Vltgs												
Dorsey 500/Dorsey 230	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045	1.033 / 1.045
Roseau 500/Forbes 500	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018	1.021 / 1.018
Chisago 500/EauClaire 345	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023	1.016 / 1.023
Int Falls 115/Badoura 115	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024	1.024 / 1.024
Drayton 230/Groton 345	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012
SS OS Relay Margins												
D602F at Forbes/Dorsey	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%	237% / 373%
82R at Rugby/L20D at Drayton	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%	999% / 999%
R50M/F3M	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%	809% / 325%
B10T	339%	339%	339%	339%	339%	339%	339%	339%	339%	339%	339%	339%
Min/MaxTransientVltg												
Arrowhd 230	0.98 | 1.01	0.97 | 1.01	0.97 | 1.02	0.95 | 1.04	0.97 | 1.03	0.95 | 1.02	0.96 | 1.02	0.95 | 1.02	1.01 | 1.05	0.99 | 1.00	0.93 | 1.05	1.03 | 1.07
Boise 115	1.00 | 1.03	1.00 | 1.03	1.00 | 1.04	0.99 | 1.04	1.00 | 1.03	1.00 | 1.04	1.01 | 1.04	1.00 | 1.04	0.91 | 1.03	1.02 | 1.03	0.96 | 1.04	0.95 | 1.03
Dorsey 230	1.03 | 1.05	1.03 | 1.06	1.03 | 1.06	1.03 | 1.05	1.03 | 1.05	1.03 | 1.07	1.03 | 1.07	1.02 | 1.06	1.04 | 1.13	1.04 | 1.05	1.04 | 1.17	1.05 | 1.25
Forbes 230	1.01 | 1.03	1.01 | 1.03	1.00 | 1.04	0.98 | 1.03	1.00 | 1.03	1.00 | 1.04	1.00 | 1.04	1.01 | 1.04	1.00 | 1.03	1.02 | 1.02	1.00 | 1.04	1.04 | 1.09
Riverton 230	0.99 | 1.03	0.98 | 1.04	0.97 | 1.04	0.94 | 1.04	0.97 | 1.04	0.95 | 1.04	0.97 | 1.04	0.98 | 1.04	0.97 | 1.04	1.01 | 1.02	0.93 | 1.05	0.99 | 1.05
Coal Creek 230	0.97 | 1.11	0.97 | 1.11	1.01 | 1.10	1.02 | 1.10	1.00 | 1.16	0.95 | 1.13	0.96 | 1.13	0.97 | 1.07	0.99 | 1.08	1.03 | 1.04	0.96 | 1.07	1.01 | 1.08
Jamestown 345	0.94 | 1.03	0.93 | 1.04	0.88 | 1.05	0.89 | 1.04	0.91 | 1.06	0.85 | 1.05	0.88 | 1.05	0.94 | 1.01	0.92 | 1.01	0.98 | 0.99	0.89 | 1.03	0.94 | 1.02
Drayton 230	1.00 | 1.04	0.99 | 1.04	0.99 | 1.07	0.95 | 1.04	0.99 | 1.07	0.99 | 1.10	0.99 | 1.08	0.99 | 1.02	0.97 | 1.05	1.00 | 1.01	0.99 | 1.07	1.04 | 1.07
Groton 345	0.91 | 1.03	0.91 | 1.03	0.91 | 1.06	0.89 | 1.05	0.92 | 1.05	0.90 | 1.05	0.93 | 1.04	0.97 | 1.03	0.95 | 1.03	1.01 | 1.02	0.89 | 1.05	0.97 | 1.04
Minong 161	0.99 | 1.03	0.99 | 1.04	0.99 | 1.04	0.99 | 1.06	1.01 | 1.05	0.98 | 1.04	0.99 | 1.04	0.97 | 1.06	1.04 | 1.08	1.01 | 1.02	0.97 | 1.08	1.04 | 1.08
Wahpeton 115	0.97 | 1.04	0.96 | 1.05	0.93 | 1.06	0.91 | 1.05	0.94 | 1.06	0.91 | 1.06	0.94 | 1.06	0.99 | 1.04	0.94 | 1.04	1.01 | 1.02	0.91 | 1.06	0.96 | 1.04
Watertown 345	0.98 | 1.04	0.98 | 1.04	0.96 | 1.05	0.94 | 1.04	0.97 | 1.04	0.95 | 1.04	0.97 | 1.04	1.00 | 1.04	0.99 | 1.03	1.02 | 1.03	0.93 | 1.04	0.99 | 1.04
Dynamic Voltage Warnings												
	none	none	none	none	none	none	none	none	none	none	none	
Worst Case Angle Damping												
Dorsey SUVP / UdHold			/ 0.158			/ 0.150	/ 0.150		/ 0.133		/ 0.133	/ 0.133
Forbes DC Red (DCAR)	447%	438%	417%	507%	507%	418%	438%	370%	507%	483%	507%	507%
K22W (max +dP @ t, d-ang)	9.1@(2.31666,1.1)	12.9@(2.29166,-0.1)	12.9@(2.41666,-1.5)	61.5@(2.36666,-28.6)	43.0@(2.29166,-16.8)	16.4@(2.37499,-2.7)	13.1@(2.34999,-2.2)	21.5@(2.30833,-4.2)	90.9@(2.02500,-45.4)	4.9@(2.34999,-1.0)	115.3@(2.14166,-52.4)	161.4@(1.62500,-58.9)
K22W (max -dP @ t, d-ang)	17.0@(0.72500,4.4)	18.6@(0.65000,5.0)	13.2@(0.61666,1.5)	7.1@(0.50000,1.1)	8.9@(0.33333,1.0)	20.3@(0.57500,3.2)	16.9@(0.55833,2.4)	24.5@(0.35833,4.6)	109.6@(0.25833,11.3)	5.2@(0.59166,2.0)	84.9@(0.23333,7.1)	75.9@(0.37500,6.0)
K22W (max d-ang @ t, dP)	6.5@(0.99166,-6.4)	7.5@(0.93333,-8.1)	4.3@(1.01666,-4.6)	-29.8@(4.99995,24.6)	-17.3@(2.49999,35.2)	6.4@(0.94166,-6.7)	4.8@(0.92500,-4.6)	13.3@(0.90000,-14.5)	-52.1@(4.99995,33.1)	3.0@(0.91666,-4.0)	-54.6@(4.99995,56.4)	-71.1@(4.99995,83.8)
OS Rel Trip / Marg												
MH - OH												
D602F at Forbes/Dorsey	189% / 293%	185% / 286%	185% / 286%	158% / 243%	186% / 289%	189% / 295%	193% / 301%	171% / 263%	0.16667 sec / 0.16667 sec	220% / 345%	0.18333 sec / 0.18333 sec	0.16667 sec / 0.16667 sec
82R at Rugby/L20D at Drayton	999% / 822%	999% / 786%	999% / 801%	999% / 715%	999% / 613%	999% / 818%	999% / 846%	999% / 789%	999% / 402%	999% / 953%	999% / 522%	999% / 461%
R50M / F3M	682% / 275%	670% / 271%	653% / 268%	640% / 236%	694% / 254%	657% / 278%	666% / 280%	620% / 279%	276% / 112%	763% / 313%	471% / 177%	237% / 114%
B10T	188%	183%	174%	109%	122%	164%	185%	156%	126%	292%	119%	185%
FSCAPS (SS/Unav/Final)												
Balta 230	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 2 | 0)	(0 | 2 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)
Eau Cl 345 / Park Lk 115	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 3 | 3)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)
Prairie 115 / Ramsey 230	(0 | 8 | 2) / (1 | 1 | 1)	(0 | 2 | 1) / (1 | 2 | 2)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 3 | 0) / (1 | 1 | 0)	(0 | 5 | 1) / (1 | 2 | 1)	(0 | 4 | 1) / (1 | 2 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 3 | 2) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 2 | 0) / (1 | 1 | 1)	(0 | 3 | 2) / (1 | 1 | 1)
Roseau 230 / Running 230	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 1) / (1 | 2 | 2)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 5 | 3)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 2 | 1)	(0 | 1 | 0) / (1 | 3 | 1)
Shey 115 / Split Rock 115	(1 | 2 | 2) / (1 | 1 | 1)	(1 | 3 | 3) / (1 | 2 | 2)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 2 | 2) / (1 | 2 | 2)	(1 | 4 | 4) / (1 | 2 | 2)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 5 | 3) / (1 | 2 | 2)	(1 | 2 | 2) / (1 | 1 | 1)
Damping Performance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

POWER FLOW AND STABILITY SUMMARY TABLE

	Case No.	1	2	3	4	5	6	7	8	9	10	11	12
2	**Case Name**	d2a-so15aa-ag1	d2a-so15aa-ag3	d2a-so15aa-ef3	d2a-so15aa-ei2	d2a-so15aa-eq1	d2a-so15aa-fd3	d2a-so15aa-fds	d2a-so15aa-mts	d2a-so15aa-nad	d2a-so15aa-nlz	d2a-so15aa-nmz	d2a-so15aa-oas
3	**Disturbance**	ag1	ag3	ef3	ei2	eq1	fd3	fds	mts	nad	nlz	nmz	oas
4	**Prior Outage**	None	None	None	None	None	None	None	None	None	None	None	None
5	**Date/Time**	AUG 15 2009 15:01	AUG 15 2009 15:05	AUG 15 2009 15:09	AUG 15 2009 15:14	AUG 15 2009 15:18	AUG 15 2009 15:22	AUG 15 2009 15:26	AUG 15 2009 15:30	AUG 15 2009 15:34	AUG 15 2009 15:38	AUG 15 2009 15:42	AUG 15 2009 15:47
6	**Comments**												
7													
8	**Steady State Flows**												
9	NDEX / EAST BIAS	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273	2087 / 273
10	MHEX / L20D	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206	2176 / 206
11	ECL-ARP / PRI-BYN	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541	612 / 541
12	MWEX / AHD-SLK	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667	1520 / 667
13	D602F / F601C	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604	1825 / 1604
14	B10T / MH>SPC	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60
15	OH E-W / OH>MH	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196
16	R50M / OH>MP	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150
17	G82R	20	20	20	20	20	20	20	20	20	20	20	20
18	Dorsey bipole / CU bipole	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075
19	Dorsey Reserve / Wtrtn SVC	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7	219 / 7
20	Forbes SVC / MSC	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600	-8 / 600
21	RCDC	0	0	0	0	0	0	0	0	0	0	0	0
22	**Steady State Vltgs**												
23	Dorsey 500/Dorsey 230	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045	1.029 / 1.045
24	Roseau 500/Forbes 500	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001	1.023 / 1.001
25	Chisago 500/EauClaire 345	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021	1.007 / 1.021
26	Int Falls 115/Badoura 115	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030	1.023 / 1.030
27	Drayton 230/Groton 345	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010	1.007 / 1.010
28	**SS OS Relay Margins**												
29	D602F at Forbes/Dorsey	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%	219% / 346%
30	32R at Rugby/L20D at Drayton	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%	999% / 988%
31	R50M/F3M	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%	999% / 326%
32	B10T	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%
33	**Min/MaxTransientVltg**												
34	Arrowhd 230	0.96 | 1.00	0.96 | 1.00	0.96 | 1.01	0.94 | 1.03	0.95 | 1.02	0.94 | 1.02	0.95 | 1.01	0.94 | 1.01	1.00 | 1.04	0.99 | 0.99	0.91 | 1.04	1.03 | 1.08
35	Boise 115	1.00 | 1.03	1.00 | 1.03	1.00 | 1.04	0.99 | 1.01	1.00 | 1.02	1.00 | 1.04	1.01 | 1.04	1.00 | 1.04	0.91 | 1.02	1.02 | 1.03	0.96 | 1.04	0.95 | 1.03
36	Dorsey 230	1.03 | 1.05	1.03 | 1.05	1.03 | 1.06	1.03 | 1.05	1.03 | 1.05	1.03 | 1.07	1.03 | 1.06	1.02 | 1.06	1.05 | 1.15	1.04 | 1.05	1.04 | 1.19	1.05 | 1.26(0.42)
37	Forbes 230	0.99 | 1.02	0.99 | 1.02	0.99 | 1.03	0.96 | 1.01	0.98 | 1.02	0.98 | 1.03	0.99 | 1.02	0.99 | 1.03	0.99 | 1.02	1.00 | 1.01	0.99 | 1.03	1.04 | 1.09
38	Riverton 230	0.99 | 1.03	0.99 | 1.03	0.97 | 1.04	0.94 | 1.03	0.97 | 1.04	0.96 | 1.04	0.97 | 1.04	0.99 | 1.04	0.97 | 1.04	1.01 | 1.02	0.92 | 1.04	1.00 | 1.05
39	Coal Creek 230	0.97 | 1.10	0.97 | 1.11	1.00 | 1.10	1.02 | 1.10	1.00 | 1.16	0.95 | 1.13	0.96 | 1.13	0.96 | 1.07	0.99 | 1.08	1.03 | 1.04	0.96 | 1.07	1.01 | 1.08
40	Jamestown 345	0.94 | 1.03	0.93 | 1.03	0.89 | 1.05	0.89 | 1.04	0.91 | 1.06	0.85 | 1.06	0.88 | 1.05	0.94 | 1.01	0.92 | 1.02	0.99 | 0.99	0.89 | 1.03	0.95 | 1.02
41	Drayton 230	0.99 | 1.03	0.98 | 1.03	0.98 | 1.07	0.95 | 1.04	1.00 | 1.07	0.98 | 1.09	0.98 | 1.07	0.99 | 1.02	0.97 | 1.05	1.00 | 1.01	0.99 | 1.07	1.04 | 1.07
42	Groton 345	0.91 | 1.03	0.90 | 1.03	0.91 | 1.05	0.89 | 1.04	0.92 | 1.05	0.90 | 1.04	0.93 | 1.04	0.96 | 1.03	0.95 | 1.03	1.01 | 1.02	0.88 | 1.04	0.96 | 1.04
43	Minong 161	0.98 | 1.03	0.98 | 1.03	0.98 | 1.03	0.98 | 1.05	0.99 | 1.04	0.97 | 1.05	0.98 | 1.03	0.96 | 1.05	1.04 | 1.07	1.00 | 1.02	0.96 | 1.08	1.04 | 1.08
44	Wahpeton 115	0.98 | 1.04	0.96 | 1.04	0.94 | 1.06	0.92 | 1.06	0.95 | 1.06	0.92 | 1.06	0.95 | 1.06	0.99 | 1.04	0.95 | 1.04	1.01 | 1.02	0.91 | 1.06	0.97 | 1.04
45	Watertown 345	0.97 | 1.03	0.97 | 1.04	0.96 | 1.05	0.94 | 1.04	0.97 | 1.04	0.95 | 1.04	0.97 | 1.04	1.00 | 1.03	0.98 | 1.03	1.02 | 1.03	0.93 | 1.04	0.99 | 1.04
46	**Dynamic Voltage Warnings**												
47		none	none	none	none	none	none	none	none	none	none		
48													
49													
50													
51													
52													
53													
54	Worst Case Angle Damping												
55	Dorsey SUVP / UdHold			/ 0.150			/ 0.150	/ 0.150		/ 0.133		/ 0.133	/ 0.133
56	Forbes DC Red (DCAR)	451%	447%	416%	507%	507%	415%	445%	368%	507%	483%	507%	507%
57	K22W (max +dP @ t, d-ang)	7.3@(2.32499,1.8)	10.7@(2.29166,0.6)	12.1@(2.40832,-1.4)	64.3@(2.36666,-27.5)	43.9@(2.27499,-17.0)	17.3@(2.36666,-3.4)	11.3@(2.34999,-1.6)	19.3@(2.29166,-3.2)	92.7@(2.01666,-45.8)	4.6@(2.34999,-0.9)	115.2@(2.14166,-52.5)	167.0@(1.61666,-60.3)
58	K22W (max -dP @ t, d-ang)	17.7@(0.72500,4.5)	19.1@(0.66666,5.3)	13.4@(0.60833,1.5)	7.9@(0.51666,1.5)	9.0@(0.33333,1.0)	20.2@(0.57500,3.2)	17.0@(0.55000,2.4)	24.3@(0.35000,4.4)	112.4@(0.25833,11.5)	5.2@(0.59166,2.0)	88.0@(0.23333,7.2)	76.6@(0.37500,6.2)
59	K22W (max d-ang @ t, dP)	6.8@(1.00000,-6.7)	7.8@(0.95000,-8.1)	4.2@(1.01666,-4.4)	-29.0@(4.99995,26.9)	-17.5@(2.48332,36.5)	6.1@(0.93333,-6.2)	4.9@(0.93333,-4.7)	13.3@(0.91666,-15.5)	-53.8@(4.99995,33.4)	3.0@(0.92500,-4.1)	-55.5@(4.99995,58.3)	-73.7@(4.99995,83.8)
60	**OS Rel Trip / Marg**												
61	MH - OH												
62	D602F at Forbes/Dorsey	172% / 267%	169% / 261%	169% / 261%	144% / 221%	170% / 264%	173% / 269%	176% / 274%	157% / 241%	.16667 sec / 0.16667 sec	203% / 319%	.18333 sec / 0.18333 sec	0.16667 sec / 0.16667 sec
63	32R at Rugby/L20D at Drayton	999% / 812%	999% / 788%	999% / 793%	999% / 684%	999% / 626%	999% / 810%	999% / 837%	999% / 782%	999% / 391%	999% / 941%	999% / 511%	999% / 450%
64	R50M / F3M	965% / 278%	951% / 275%	921% / 270%	919% / 230%	986% / 257%	922% / 279%	935% / 281%	876% / 284%	364% / 114%	999% / 315%	669% / 176%	303% / 112%
65	B10T	189%	191%	175%	107%	122%	165%	187%	159%	129%	294%	118%	185%
66	**FSCAPS (SS/Unav/Final)**												
67	Balta 230	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 2 | 0)	(0 | 2 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)
68	Eau Cl 345 / Park Lk 115	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 3 | 3)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)
69	Prairie 115 / Ramsey 230	(0 | 7 | 1) / (1 | 1 | 1)	(0 | 1 | 1) / (1 | 2 | 2)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 3 | 0) / (1 | 1 | 1)	(0 | 4 | 1) / (1 | 2 | 1)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 3 | 2) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 1 | 1)	(0 | 3 | 2) / (1 | 1 | 1)
70	Roseau 230 / Running 230	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 5 | 4)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 2 | 1)
71	Shey 115 / Split Rock 115	(1 | 2 | 2) / (1 | 1 | 1)	(1 | 2 | 2) / (1 | 2 | 2)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 4 | 4) / (1 | 2 | 2)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 5 | 3) / (1 | 2 | 2)	(1 | 2 | 2) / (1 | 1 | 1)
72	**Damping Performance**	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

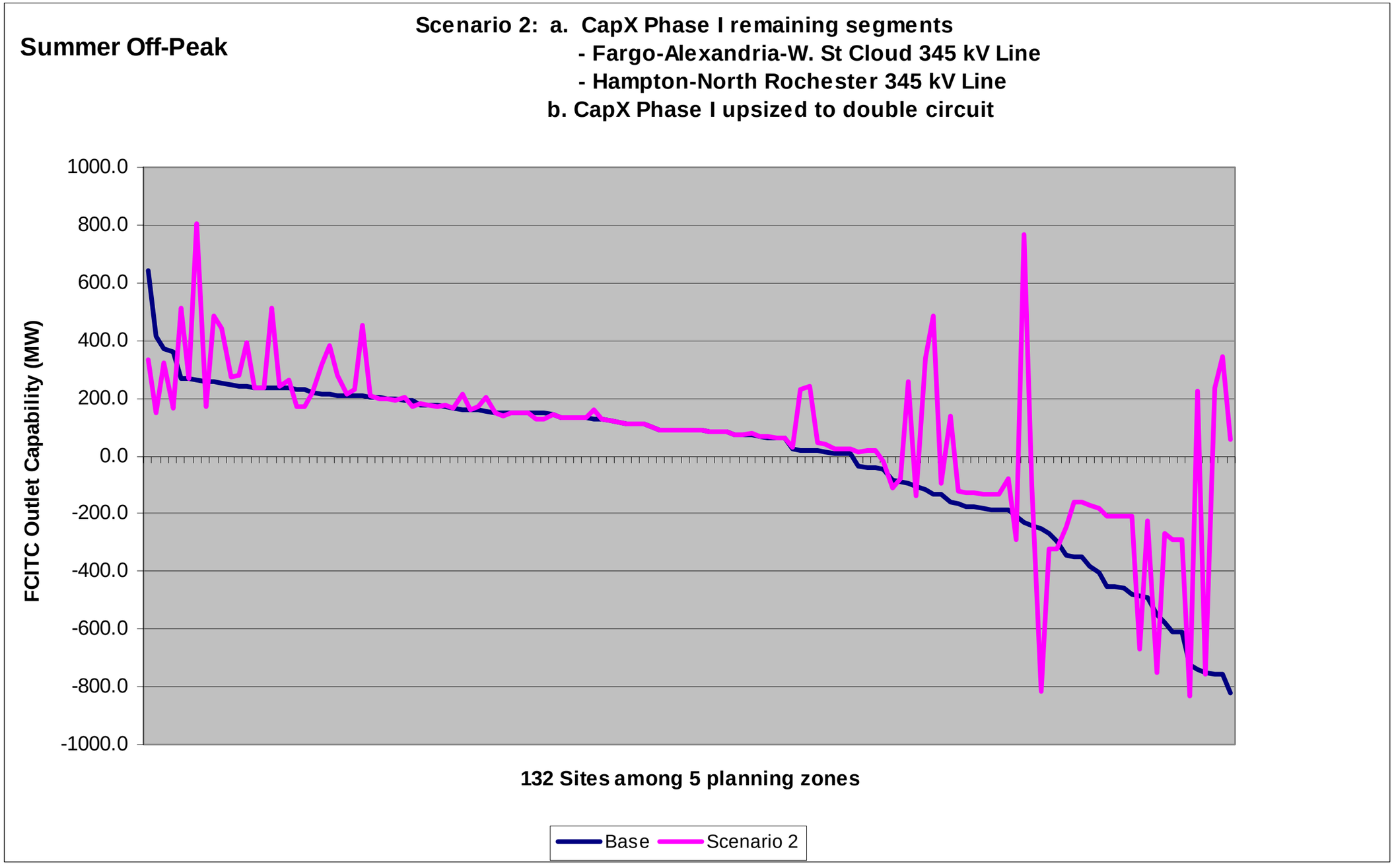
POWER FLOW AND STABILITY SUMMARY TABLE

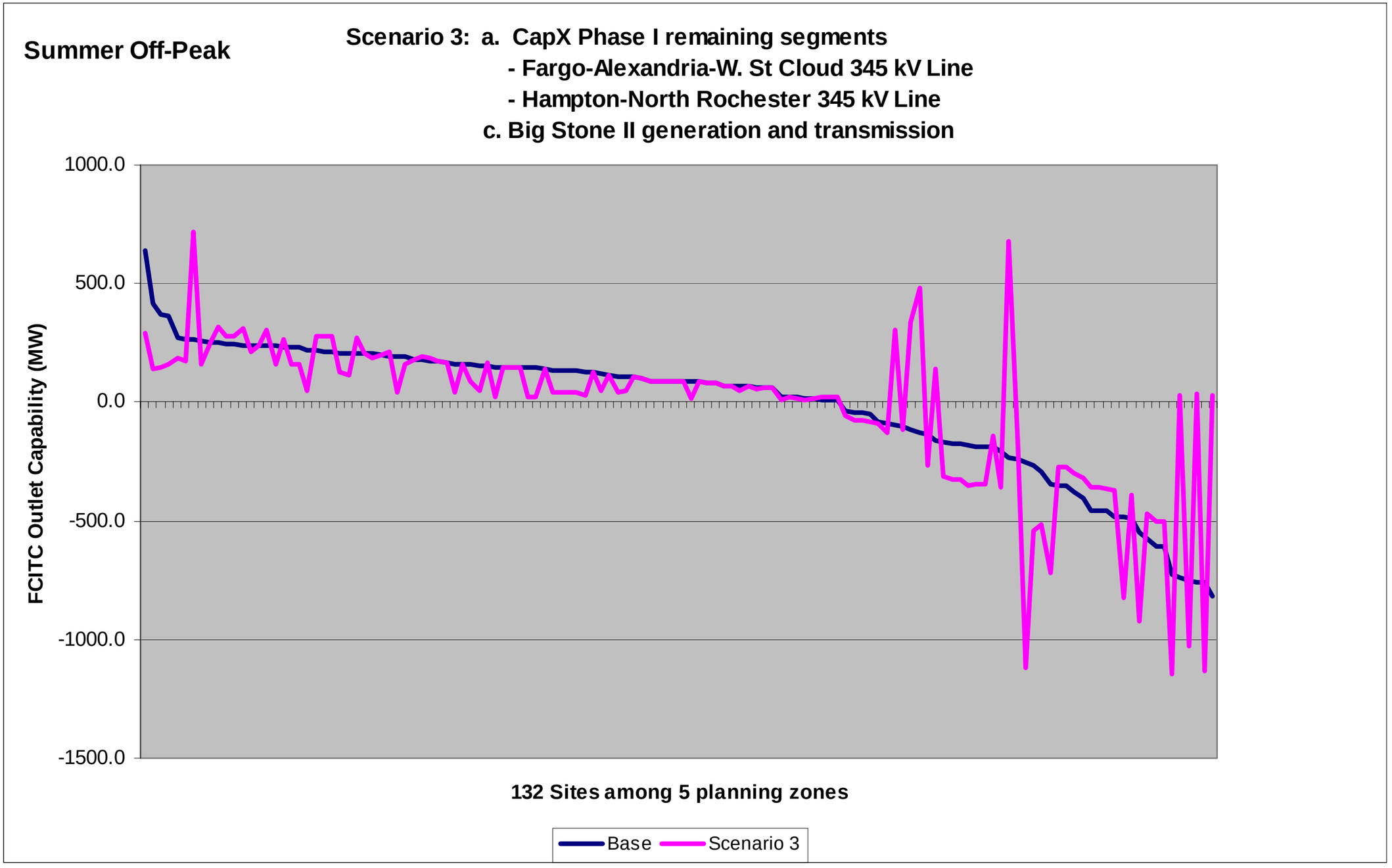
	Case No.	1	2	3	4	5	6	7	8	9	10	11	12
	Case Name	dg1-so15aa-ag1	dg1-so15aa-ag3	dg1-so15aa-ef3	dg1-so15aa-ei2	dg1-so15aa-eq1	dg1-so15aa-fd3	dg1-so15aa-fds	dg1-so15aa-mts	dg1-so15aa-nad	dg1-so15aa-nlz	dg1-so15aa-nmz	dg1-so15aa-oas
	Disturbance	ag1	ag3	ef3	ei2	eq1	fd3	fds	mts	nad	nlz	nmz	oas
	Prior Outage	None	None	None	None	None	None	None	None	None	None	None	None
	Date/Time	AUG 14 2009 21:27	AUG 14 2009 21:30	AUG 14 2009 21:33	AUG 14 2009 21:36	AUG 14 2009 21:39	AUG 14 2009 21:42	AUG 14 2009 21:46	AUG 14 2009 21:49	AUG 14 2009 21:52	AUG 14 2009 21:55	AUG 14 2009 21:58	AUG 14 2009 22:01
	Comments												
	Steady State Flows												
	NDEX / EAST BIAS	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272	2080 / 272
	MHEX / L20D	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208	2174 / 208
	ECL-ARP / PRI-BYN	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702	679 / 702
	MWEX / AHD-SLK	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688	1631 / 688
	D602F / F601C	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489	1787 / 1489
	B10T / MH>SPC	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60	165 / 60
	OH E-W / OH>MH	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196
	R50M / OH>MP	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150	156 / 150
	G82R	22	22	22	22	22	22	22	22	22	22	22	22
	Dorsey bipole / CU bipole	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074	3173 / 1074
	Dorsey Reserve / Wtrtn SVC	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6	294 / -6
	Forbes SVC / MSC	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600	53 / 600
	RCDC	0	0	0	0	0	0	0	0	0	0	0	0
	Steady State Vltgs												
	Dorsey 500/Dorsey 230	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045	1.034 / 1.045
	Roseau 500/Forbes 500	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019	1.022 / 1.019
	Chisago 500/EauClaire 345	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002	1.016 / 1.002
	Int Falls 115/Badoura 115	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027	1.020 / 1.027
	Drayton 230/Groton 345	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012	1.007 / 1.012
	SS OS Relay Margins												
	D602F at Forbes/Dorsey	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%	240% / 378%
	82R at Rugby/L20D at Drayton	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%	999% / 973%
	R50M/F3M	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%	810% / 322%
	B10T	338%	338%	338%	338%	338%	338%	338%	338%	338%	338%	338%	338%
	Min/MaxTransientVltg												
	Arrowhd 230	0.96 | 1.01	0.96 | 1.01	0.96 | 1.01	0.94 | 1.03	0.96 | 1.02	0.94 | 1.02	0.95 | 1.02	0.93 | 1.02	1.00 | 1.05	0.99 | 1.00	0.92 | 1.05	1.02 | 1.08
	Boise 115	1.00 | 1.03	0.99 | 1.03	1.00 | 1.04	0.99 | 1.03	0.99 | 1.02	1.00 | 1.04	1.00 | 1.04	0.99 | 1.04	0.90 | 1.02	1.01 | 1.03	0.94 | 1.04	0.94 | 1.03
	Dorsey 230	1.03 | 1.05	1.03 | 1.05	1.03 | 1.06	1.03 | 1.05	1.03 | 1.05	1.03 | 1.07	1.03 | 1.07	1.02 | 1.06	1.04 | 1.13	1.04 | 1.05	1.04 | 1.17	1.05 | 1.25
	Forbes 230	1.01 | 1.03	1.01 | 1.03	1.00 | 1.04	0.97 | 1.03	1.00 | 1.03	1.00 | 1.04	1.00 | 1.04	1.01 | 1.04	1.00 | 1.04	1.02 | 1.02	1.00 | 1.04	1.05 | 1.09
	Riverton 230	0.99 | 1.03	0.98 | 1.03	0.97 | 1.05	0.94 | 1.04	0.97 | 1.05	0.96 | 1.05	0.97 | 1.04	0.98 | 1.04	0.98 | 1.05	1.01 | 1.02	0.93 | 1.05	1.00 | 1.06
	Coal Creek 230	0.97 | 1.10	0.97 | 1.11	1.01 | 1.10	1.02 | 1.11	1.00 | 1.16	0.95 | 1.13	0.96 | 1.13	0.96 | 1.07	0.99 | 1.08	1.03 | 1.04	0.96 | 1.07	1.01 | 1.08
	Jamestown 345	0.94 | 1.03	0.92 | 1.03	0.88 | 1.05	0.89 | 1.04	0.91 | 1.06	0.85 | 1.06	0.88 | 1.05	0.94 | 1.02	0.92 | 1.02	0.99 | 0.99	0.89 | 1.04	0.95 | 1.02
	Drayton 230	0.99 | 1.03	0.98 | 1.03	0.98 | 1.07	0.96 | 1.04	0.99 | 1.07	0.98 | 1.09	0.98 | 1.07	0.99 | 1.02	0.97 | 1.06	1.00 | 1.01	0.99 | 1.07	1.03 | 1.07
	Groton 345	0.91 | 1.03	0.90 | 1.03	0.91 | 1.06	0.90 | 1.05	0.93 | 1.05	0.90 | 1.05	0.93 | 1.04	0.96 | 1.03	0.95 | 1.04	1.01 | 1.02	0.89 | 1.05	0.97 | 1.04
	Minong 161	0.98 | 1.04	0.97 | 1.04	0.98 | 1.03	0.98 | 1.06	0.99 | 1.04	0.97 | 1.05	0.97 | 1.05	0.94 | 1.05	1.03 | 1.07	1.00 | 1.01	0.97 | 1.08	1.03 | 1.09
	Wahpeton 115	0.97 | 1.04	0.96 | 1.04	0.94 | 1.06	0.91 | 1.06	0.95 | 1.06	0.91 | 1.06	0.94 | 1.06	0.98 | 1.04	0.94 | 1.04	1.01 | 1.02	0.91 | 1.06	0.96 | 1.04
	Watertown 345	0.98 | 1.03	0.97 | 1.04	0.96 | 1.05	0.95 | 1.04	0.97 | 1.05	0.95 | 1.04	0.97 | 1.04	0.99 | 1.04	0.99 | 1.04	1.02 | 1.03	0.94 | 1.04	1.00 | 1.04
	Dynamic Voltage Warnings												
		none	none	none	none	none	none	none	none	none	none	none	
	Worst Case Angle Damping												
	Dorsey SUVP / UdHold			/ 0.158			/ 0.150	/ 0.150		/ 0.133		/ 0.133	/ 0.133
	Forbes DC Red (DCAR)	438%	434%	418%	507%	507%	409%	432%	371%	507%	484%	507%	507%
	K22W (max +dP @ t, d-ang)	9.7@(2.33332,0.8)	13.5@(2.30833,-0.5)	12.6@(2.41666,-1.5)	64.3@(2.35832,-29.7)	45.3@(2.27499,-17.6)	18.2@(2.36666,-3.5)	13.8@(2.34999,-2.6)	21.9@(2.34166,-4.5)	96.3@(2.02500,-46.8)	5.1@(2.34999,-1.1)	121.8@(2.14166,-53.6)	168.1@(1.63333,-60.1)
	K22W (max -dP @ t, d-ang)	18.3@(0.73333,4.8)	19.8@(0.67500,5.6)	13.1@(0.61666,1.5)	6.4@(0.50000,1.0)	8.6@(0.33333,0.9)	20.4@(0.58333,3.3)	17.1@(0.55833,2.5)	24.7@(0.59166,9.9)	108.5@(0.25833,11.2)	5.5@(0.58333,2.0)	84.2@(0.23333,7.0)	74.3@(0.37500,6.1)
	K22W (max d-ang @ t, dP)	6.9@(0.99166,-7.3)	7.9@(0.94166,-8.8)	4.3@(1.02500,-4.6)	-30.3@(2.58332,56.3)	-18.0@(2.47499,38.5)	6.3@(0.94166,-6.7)	4.9@(0.92500,-5.0)	13.6@(0.90833,-15.4)	-52.1@(4.99995,33.7)	3.1@(0.91666,-4.0)	-55.0@(4.99995,57.2)	-71.3@(4.99995,85.0)
	OS Rel Trip / Marg												
	MH - OH												
	D602F at Forbes/Dorsey	187% / 290%	184% / 284%	187% / 290%	160% / 246%	188% / 293%	192% / 299%	195% / 304%	174% / 268%	.16667 sec / 0.16667 sec	223% / 350%	.18333 sec / 0.18333 sec	0.16667 sec / 0.16667 sec
	82R at Rugby/L20D at Drayton	999% / 802%	999% / 776%	999% / 784%	999% / 693%	999% / 618%	999% / 801%	999% / 825%	999% / 764%	999% / 397%	999% / 926%	999% / 521%	999% / 454%
	R50M / F3M	669% / 268%	660% / 266%	652% / 266%	641% / 231%	695% / 250%	657% / 275%	665% / 277%	621% / 278%	276% / 110%	764% / 311%	443% / 164%	236% / 109%
	B10T	188%	188%	176%	107%	121%	165%	186%	155%	119%	290%	110%	176%
	FSCAPS (SS/Unav/Final)												
	Balta 230	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 2 | 0)	(0 | 2 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)
	Eau Cl 345 / Park Lk 115	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 3 | 3)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)
	Prairie 115 / Ramsey 230	(0 | 7 | 1) / (1 | 1 | 1)	(0 | 1 | 1) / (1 | 2 | 2)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 3 | 0) / (1 | 1 | 1)	(0 | 4 | 1) / (1 | 2 | 1)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 2 | 0) / (1 | 1 | 1)	(0 | 3 | 1) / (1 | 1 | 1)
	Roseau 230 / Running 230	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 1) / (1 | 2 | 2)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 5 | 3)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 3 | 1)	(0 | 1 | 0) / (1 | 3 | 1)
	Shey 115 / Split Rock 115	(1 | 2 | 2) / (1 | 1 | 1)	(1 | 2 | 2) / (1 | 2 | 2)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 2 | 2) / (1 | 2 | 2)	(1 | 4 | 4) / (1 | 2 | 2)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 5 | 3) / (1 | 2 | 2)	(1 | 2 | 2) / (1 | 1 | 1)
	Damping Performance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

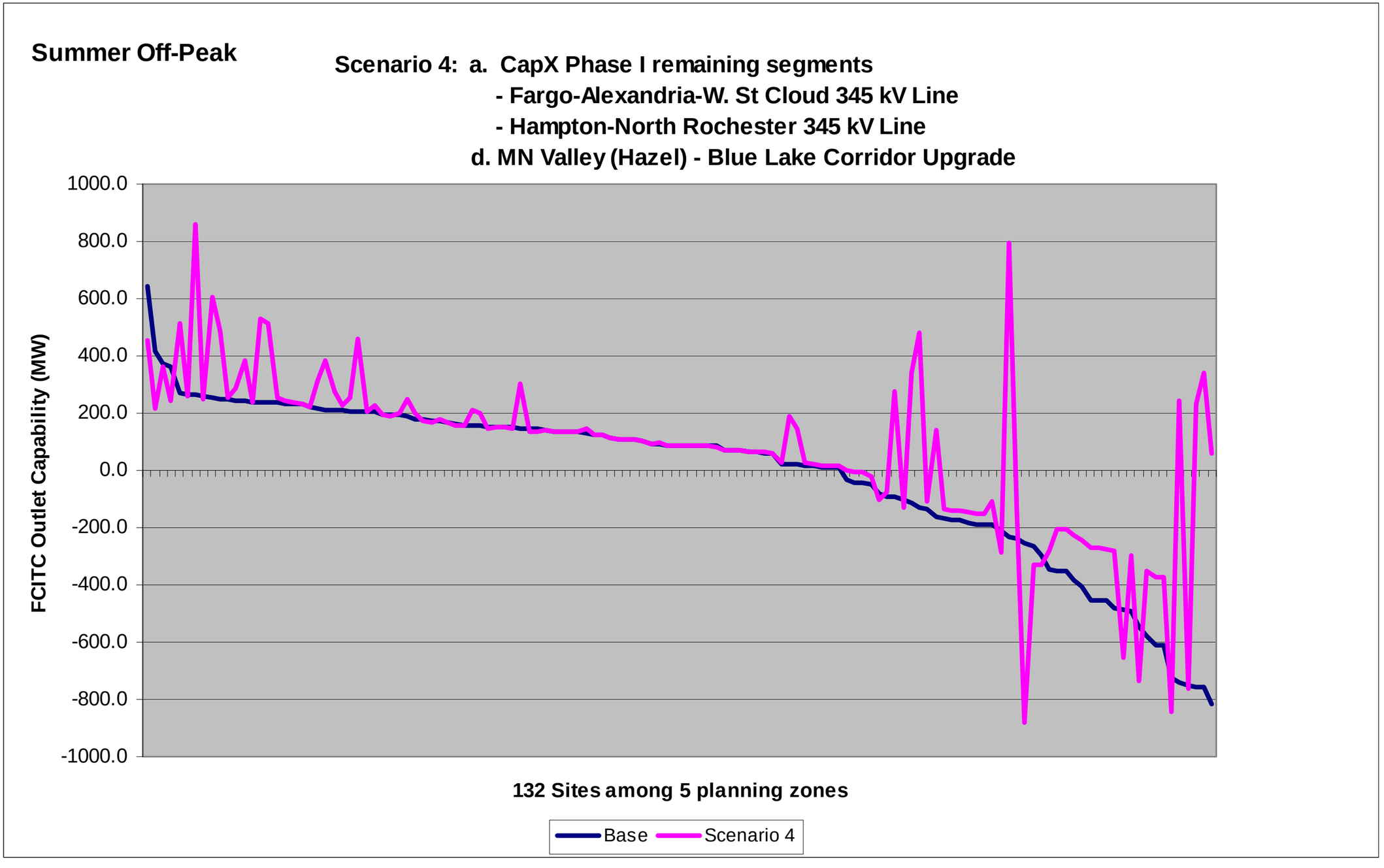
POWER FLOW AND STABILITY SUMMARY TABLE

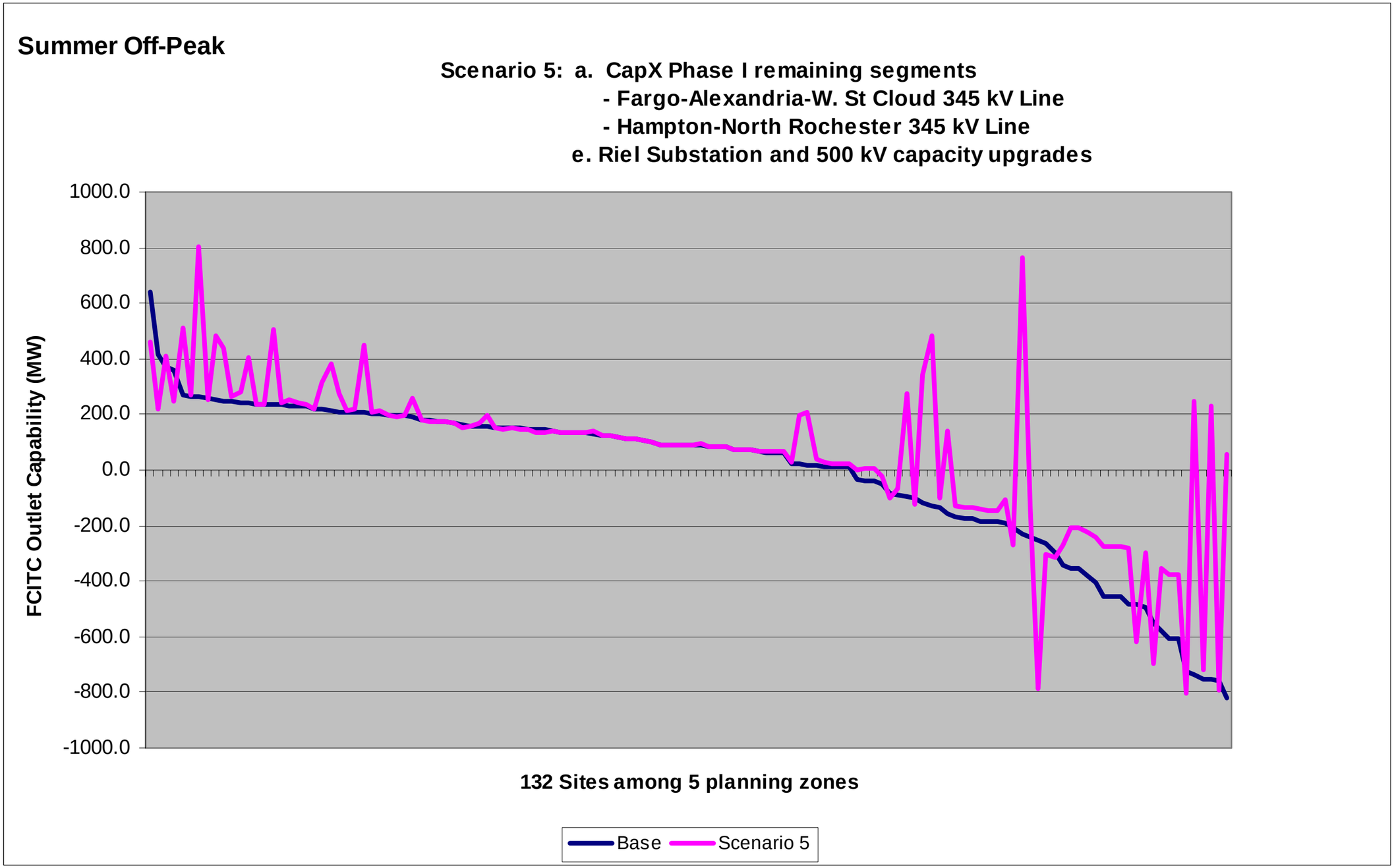
	Case No.	1	2	3	4	5	6	7	8	9	10	11	12
	Case Name	dg2-so15aa-ag1	dg2-so15aa-ag3	dg2-so15aa-ef3	dg2-so15aa-ei2	dg2-so15aa-eq1	dg2-so15aa-fd3	dg2-so15aa-fds	dg2-so15aa-mts	dg2-so15aa-nad	dg2-so15aa-nlz	dg2-so15aa-nmz	dg2-so15aa-oas
	Disturbance	ag1	ag3	ef3	ei2	eq1	fd3	fds	mts	nad	nlz	nmz	oas
	Prior Outage	None	None	None	None	None	None	None	None	None	None	None	None
	Date/Time	AUG 15 2009 13:40	AUG 15 2009 13:44	AUG 15 2009 13:48	AUG 15 2009 13:53	AUG 15 2009 13:57	AUG 15 2009 14:01	AUG 15 2009 14:05	AUG 15 2009 14:09	AUG 15 2009 14:13	AUG 15 2009 14:17	AUG 15 2009 14:21	AUG 15 2009 14:26
	Comments												
	Steady State Flows												
	NDEX / EAST BIAS	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262	2089 / 262
	MHEX / L20D	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210	2176 / 210
	ECL-ARP / PRI-BYN	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665	679 / 665
	MWEX / AHD-SLK	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712	1638 / 712
	D602F / F601C	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566	1817 / 1566
	B10T / MH>SPC	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60	164 / 60
	OH E-W / OH>MH	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196	188 / -196
	R50M / OH>MP	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150	123 / 150
	G82R	24	24	24	24	24	24	24	24	24	24	24	24
	Dorsey bipole / CU bipole	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075	3173 / 1075
	Dorsey Reserve / Wtrtn SVC	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0	236 / 0
	Forbes SVC / MSC	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600	27 / 600
	RCDC	0	0	0	0	0	0	0	0	0	0	0	0
	Steady State Vltgs												
	Dorsey 500/Dorsey 230	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045	1.030 / 1.045
	Roseau 500/Forbes 500	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004	1.024 / 1.004
	Chisago 500/EauClaire 345	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002	1.004 / 1.002
	Int Falls 115/Badoura 115	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031	1.018 / 1.031
	Drayton 230/Groton 345	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011	1.007 / 1.011
	SS OS Relay Margins												
	D602F at Forbes/Dorsey	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%	223% / 352%
	82R at Rugby/L20D at Drayton	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%	999% / 965%
	R50M/F3M	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%	999% / 320%
	B10T	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%	340%
	Min/MaxTransientVltg												
	Arrowhd 230	0.96 | 1.00	0.96 | 1.00	0.96 | 1.01	0.94 | 1.03	0.96 | 1.02	0.94 | 1.01	0.95 | 1.01	0.92 | 1.01	1.01 | 1.05	0.98 | 0.99	0.91 | 1.04	1.02 | 1.08
	Boise 115	1.00 | 1.03	0.99 | 1.03	1.00 | 1.03	0.98 | 1.01	0.99 | 1.02	1.00 | 1.04	1.00 | 1.03	0.99 | 1.04	0.89 | 1.02	1.01 | 1.02	0.95 | 1.03	0.93 | 1.03
	Dorsey 230	1.03 | 1.05	1.03 | 1.05	1.03 | 1.06	1.03 | 1.05	1.03 | 1.05	1.03 | 1.07	1.03 | 1.06	1.02 | 1.06	1.05 | 1.14	1.04 | 1.05	1.04 | 1.19	1.05 | 1.26(0.42)
	Forbes 230	0.99 | 1.02	0.99 | 1.02	0.99 | 1.03	0.96 | 1.02	0.99 | 1.02	0.98 | 1.03	0.99 | 1.03	1.00 | 1.03	0.99 | 1.02	1.01 | 1.01	0.99 | 1.03	1.04 | 1.09
	Riverton 230	1.00 | 1.03	0.99 | 1.03	0.98 | 1.04	0.94 | 1.04	0.98 | 1.04	0.96 | 1.04	0.98 | 1.04	0.98 | 1.04	0.98 | 1.04	1.01 | 1.02	0.93 | 1.05	1.00 | 1.05
	Coal Creek 230	0.97 | 1.10	0.97 | 1.11	1.01 | 1.10	1.02 | 1.10	1.00 | 1.16	0.95 | 1.13	0.96 | 1.13	0.96 | 1.07	0.99 | 1.08	1.03 | 1.04	0.96 | 1.08	1.02 | 1.08
	Jamestown 345	0.94 | 1.03	0.93 | 1.03	0.89 | 1.05	0.89 | 1.04	0.92 | 1.06	0.85 | 1.06	0.89 | 1.05	0.94 | 1.01	0.92 | 1.02	0.99 | 0.99	0.89 | 1.04	0.95 | 1.01
	Drayton 230	0.99 | 1.03	0.98 | 1.03	0.98 | 1.07	0.96 | 1.04	0.99 | 1.07	0.98 | 1.09	0.98 | 1.07	0.99 | 1.02	0.97 | 1.06	1.00 | 1.01	0.99 | 1.07	1.04 | 1.07
	Groton 345	0.91 | 1.03	0.90 | 1.03	0.91 | 1.06	0.90 | 1.05	0.93 | 1.05	0.91 | 1.05	0.93 | 1.04	0.96 | 1.03	0.95 | 1.03	1.01 | 1.02	0.89 | 1.05	0.97 | 1.04
	Minong 161	0.99 | 1.03	0.98 | 1.03	0.99 | 1.04	0.99 | 1.07	1.00 | 1.05	0.98 | 1.04	0.98 | 1.04	0.93 | 1.04	1.04 | 1.09	1.01 | 1.02	0.97 | 1.08	1.03 | 1.09
	Wahpeton 115	0.98 | 1.04	0.97 | 1.04	0.95 | 1.06	0.92 | 1.06	0.96 | 1.06	0.93 | 1.07	0.95 | 1.06	0.99 | 1.04	0.95 | 1.05	1.02 | 1.02	0.92 | 1.06	0.97 | 1.04
	Watertown 345	0.97 | 1.03	0.97 | 1.04	0.96 | 1.05	0.94 | 1.04	0.97 | 1.04	0.96 | 1.04	0.97 | 1.04	0.99 | 1.03	0.99 | 1.04	1.02 | 1.03	0.94 | 1.04	1.00 | 1.04
	Dynamic Voltage Warnings												
		none	none	none	none	none	none	none	none	none	none	none	
	Worst Case Angle Damping												
	Dorsey SUVP / UdHold			/ 0.150			/ 0.150	/ 0.150		/ 0.133		/ 0.133	/ 0.133
	Forbes DC Red (DCAR)	450%	446%	416%	507%	507%	424%	446%	381%	507%	484%	507%	507%
	K22W (max +dP @ t, d-ang)	7.3@(2.33332,1.9)	10.9@(2.29166,0.7)	11.9@(2.40832,-1.4)	67.4@(2.36666,-28.7)	44.2@(2.28333,-17.1)	14.5@(2.36666,-2.0)	11.4@(2.34999,-1.6)	18.4@(2.34166,-2.9)	97.6@(2.01666,-46.8)	4.9@(2.34999,-1.0)	116.8@(2.13333,-53.5)	168.0@(1.62500,-60.7)
	K22W (max -dP @ t, d-ang)	18.3@(1.74166,1.2)	19.7@(0.67500,5.4)	13.0@(0.61666,1.5)	6.9@(0.50000,1.3)	8.9@(0.33333,1.0)	19.9@(0.57500,3.1)	16.6@(0.55000,2.4)	25.5@(0.59166,10.0)	111.3@(0.25833,11.5)	5.5@(0.59166,2.0)	87.2@(0.23333,7.1)	74.4@(0.37500,6.3)
	K22W (max d-ang @ t, dP)	6.9@(1.00833,-6.6)	8.0@(0.95000,-8.6)	4.1@(1.02500,-4.4)	-29.4@(4.99995,27.6)	-17.6@(2.48332,36.9)	6.1@(0.95000,-6.3)	4.8@(0.93333,-4.8)	14.1@(0.93333,-17.1)	-53.2@(4.99995,33.8)	3.1@(0.92500,-4.1)	-55.5@(4.99995,58.8)	-72.9@(4.99995,84.9)
	OS Rel Trip / Marg												
	MH - OH												
	D602F at Forbes/Dorsey	175% / 272%	172% / 266%	172% / 266%	146% / 225%	173% / 270%	176% / 274%	180% / 280%	163% / 250%	.16667 sec / 0.16667 sec	207% / 325%	.18333 sec / 0.18333 sec	0.16667 sec / 0.16667 sec
	82R at Rugby/L20D at Drayton	999% / 797%	999% / 774%	999% / 781%	999% / 668%	999% / 629%	999% / 801%	999% / 822%	999% / 760%	999% / 388%	999% / 919%	999% / 513%	999% / 446%
	R50M / F3M	964% / 273%	950% / 270%	921% / 265%	919% / 222%	989% / 251%	924% / 274%	936% / 276%	887% / 284%	365% / 110%	999% / 309%	661% / 171%	303% / 110%
	B10T	190%	193%	177%	106%	122%	169%	190%	159%	123%	293%	115%	180%
	FSCAPS (SS/Unav/Final)												
	Balta 230	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 2 | 0)	(0 | 2 | 0)	(0 | 1 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 0 | 0)	(0 | 1 | 0)
	Eau Cl 345 / Park Lk 115	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 3 | 3)	(4 | 4 | 3) / (0 | 0 | 0)	(4 | 4 | 4) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)	(4 | 4 | 2) / (0 | 0 | 0)
	Prairie 115 / Ramsey 230	(0 | 7 | 1) / (1 | 1 | 1)	(0 | 1 | 1) / (1 | 2 | 2)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 3 | 0) / (1 | 1 | 0)	(0 | 4 | 1) / (1 | 2 | 1)	(0 | 3 | 0) / (1 | 2 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 3 | 1) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 1 | 1)	(0 | 3 | 2) / (1 | 1 | 1)
	Roseau 230 / Running 230	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 1 | 0) / (1 | 5 | 4)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 1 | 1)	(0 | 0 | 0) / (1 | 2 | 1)
	Shey 115 / Split Rock 115	(1 | 2 | 2) / (1 | 1 | 1)	(1 | 2 | 2) / (1 | 2 | 2)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 4 | 2) / (1 | 1 | 1)	(1 | 4 | 2) / (1 | 1 | 1)	(1 | 4 | 3) / (1 | 1 | 1)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 4 | 4) / (1 | 2 | 2)	(1 | 1 | 1) / (1 | 2 | 2)	(1 | 4 | 3) / (1 | 2 | 2)	(1 | 1 | 1) / (1 | 1 | 1)
	Damping Performance	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

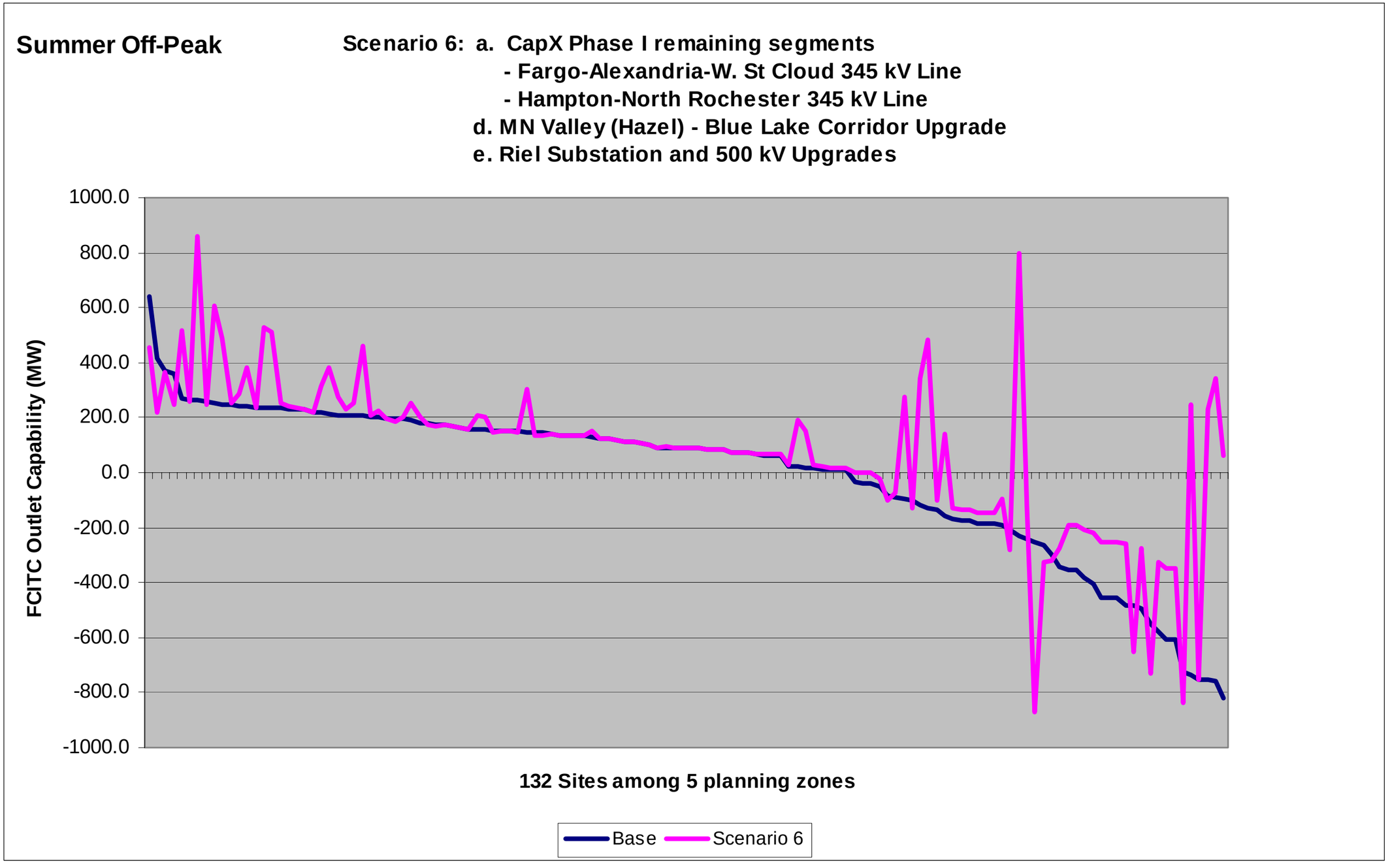
Summer Off-peak
Scenario 1: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
FCITC Outlet Capability (MW)
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
132 Sites among 5 planning zones
Base Case
Scenario 1

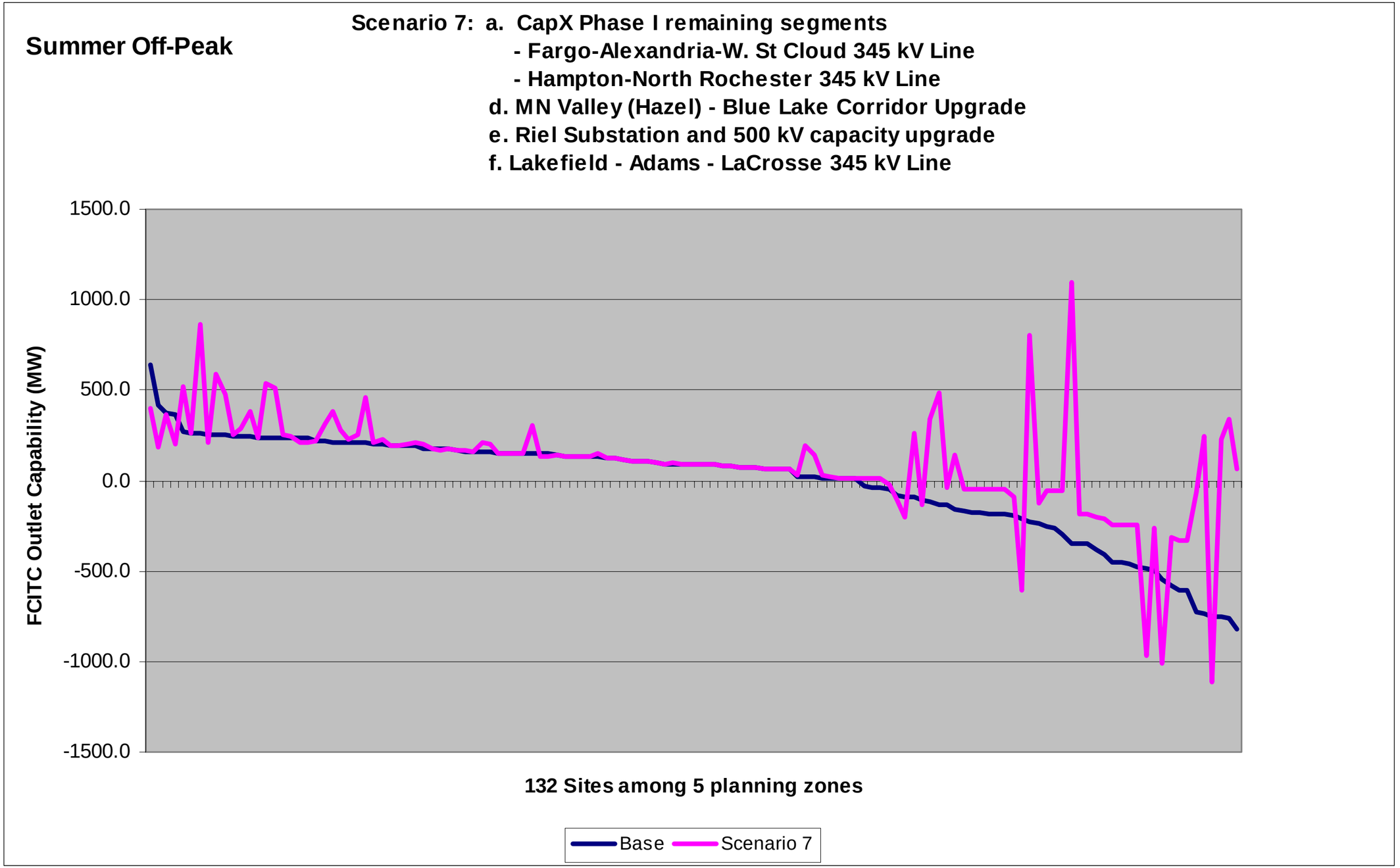

Summer Off-Peak
Scenario 2: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
b. CapX Phase I upsized to double circuit
FCITC Outlet Capability (MW)
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
132 Sites among 5 planning zones
Base
Scenario 2

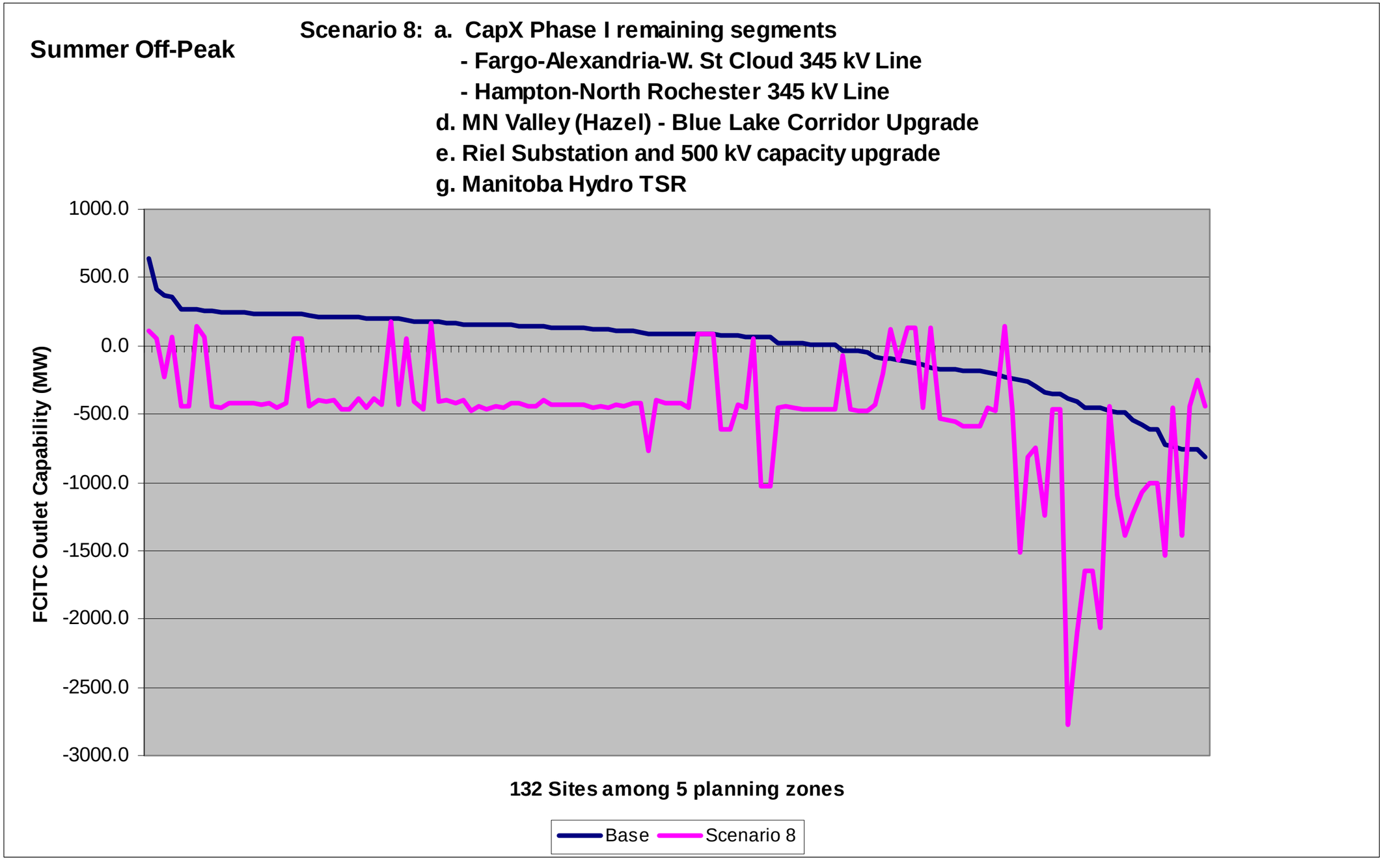

Summer Off-Peak
Scenario 3: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
c. Big Stone II generation and transmission
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 3


Summer Off-Peak
Scenario 4: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
d. MN Valley (Hazel) - Blue Lake Corridor Upgrade
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 4


Summer Off-Peak
Scenario 5: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
e. Riel Substation and 500 kV capacity upgrades
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 5


Summer Off-Peak
Scenario 6: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
d. MN Valley (Hazel) - Blue Lake Corridor Upgrade
e. Riel Substation and 500 kV Upgrades
1000.0
800.0
600.0
400.0
200.0
0.0
-200.0
-400.0
-600.0
-800.0
-1000.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 6


Summer Off-Peak
Scenario 7: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
d. MN Valley (Hazel) - Blue Lake Corridor Upgrade
e. Riel Substation and 500 kV capacity upgrade
f. Lakefield - Adams - LaCrosse 345 kV Line
1500.0
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 7


Summer Off-Peak
Scenario 8: a. CapX Phase I remaining segments
- Fargo-Alexandria-W. St Cloud 345 kV Line
- Hampton-North Rochester 345 kV Line
d. MN Valley (Hazel) - Blue Lake Corridor Upgrade
e. Riel Substation and 500 kV capacity upgrade
g. Manitoba Hydro TSR
1000.0
500.0
0.0
-500.0
-1000.0
-1500.0
-2000.0
-2500.0
-3000.0
FCITC Outlet Capability (MW)
132 Sites among 5 planning zones
Base
Scenario 8

Appendix I - References

- Center for Urban and Regional Affairs (CURA), GIS mapping efforts.
- Federal Aviation Administration (FAA), wind turbine GPS coordinates.
- Midwest ISO (MISO), Generation Interconnection Queue, March 2008.
- Minnesota Department of Commerce, Wind Integration Study 2006.
- United Services Group (USG), GIS mapping efforts.
- WindLogics, state wind profile map.