Northern States Power Company – Wisconsin

Application for a Certificate of Public Convenience and Necessity

for the

Stone Lake to Couderay
69 kV Rebuild/161 kV Upgrade
Transmission Project

PSC Docket No. 4220-CE-176

September 2011

Volume III
Appendices D through I

APPENDIX D

Transmission Study

Northwest Wisconsin Load-Serving Study

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Executive Summary

This study is being performed to address various load-serving problems in Sawyer, Rusk, and Chippewa counties in northwest Wisconsin. The existing transmission system cannot support expected load growth in this area after 2012 under post-contingent conditions(N-1). Apart from these above problems, Enbridge Energy is proposing to upgrade its facilities by 2012, adding significant load to the 69 kV system between Osprey and Stone Lake and also to the 115 kV system south of Osprey.

The recommended plan is to build a 17-mile 161 kV line from Stone Lake Substation to a new 161 kV switchyard at Couderay Substation with a 70 MVA 161/69 kV transformer at Couderay. The estimated cost of this option is $14,350,000 with a proposed in-service date of June 1, 2012.

Figure 1: Stone Lake Area System

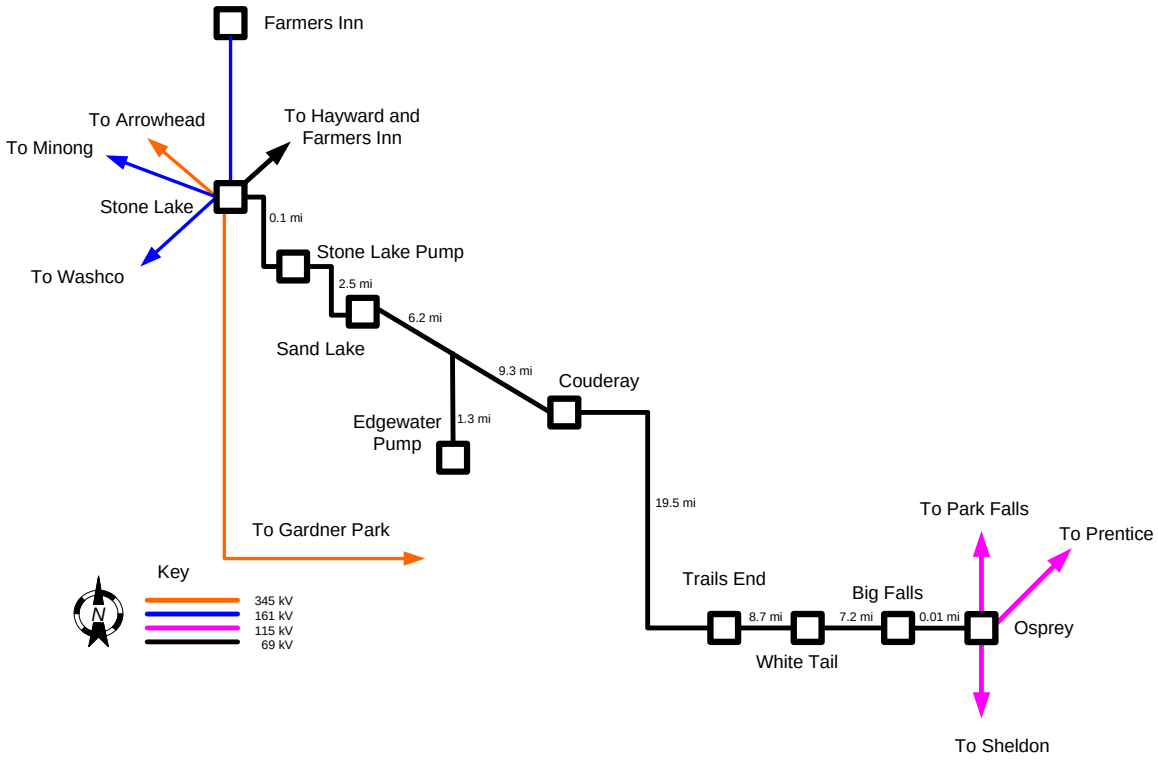
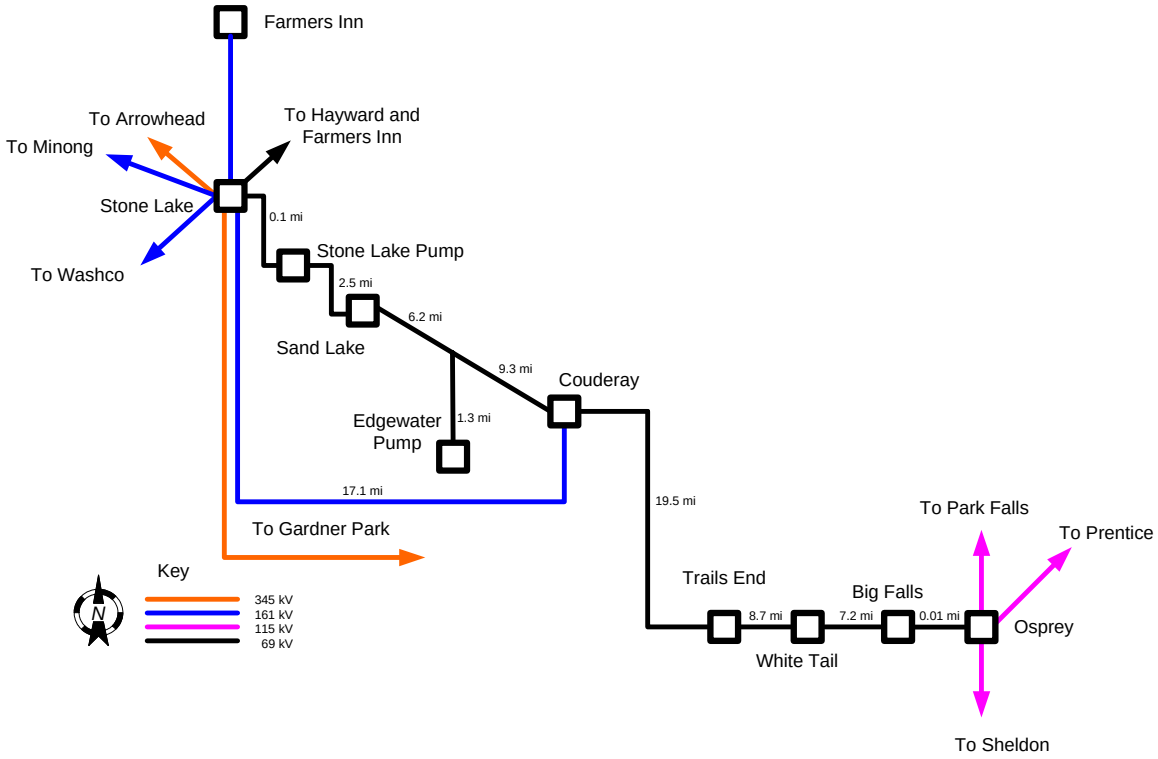


Figure 2: Option H Stone Lake-Couderay 161 kV



The alternative fix is to rebuild 56 miles of 69 kV line between Stone Lake and Osprey, install additional capacitors at Edgewater 69 kV Substation, and replace the existing 70 MVA 161/69 kV transformer at Stone Lake with a 112 MVA transformer. The estimated cost of this option is about $12,500,000.

Xcel Energy conducted this load serving study in consultation with American Transmission Company and Dairyland Power Cooperative to develop a robust long-range plan for this area.

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1. Background

The study area consists of the region served by the 69 kV line between Stone Lake and Osprey Substations and the 115 kV system south of Osprey Substation in northwest Wisconsin. As Enbridge Energy expands their pumping operations and load in the area grows, new high voltage transmission lines are needed to support the area.

2. Conclusion

The recommended plan is to build Option H, as described below, by 2012. This option fixes the overloads of the Sand Lake-Stone Lake Pump 69 kV line, the Big Falls-White Tail 69 kV line, and the Stone Lake 161/69 kV transformer. This option also fixes voltage issues caused by the outage of the Stone Lake Pump to Stand Lake 69 kV line.

1) Option H
    a. Construct a 161 kV bus at Couderay
    b. Expand the Stone Lake 161 kV switchyard to accept a new line termination
    c. Construct a Stone Lake-Couderay 161 kV line
    d. Install a 161/69 kV LTC transformer at Couderay
    e. Install the following substation equipment at Couderay:
        i. 161 kV motor-operated switch (high-side transformer)
        ii. 69 kV motor-operated switch (low-side transformer)
        iii. 69 kV circuit breaker (looking toward Stone Lake Substation)

The proposed configuration would leave in place the existing circuit breaker that looks toward NCP's Stacik Substation. The new 69 kV circuit breaker would look toward Stone Lake.

The 161 kV line cannot be double-circuited with the existing 69 kV line and still address the overloads associated with the outage of the Stone Lake Pump to Stand Lake 69 kV line. In order to double-circuit Option H, the new 161 kV line would need to be extended to Osprey by 2012. This would require at least 30 miles of additional 161 kV line to be constructed by 2012. The added capital expenditure for this would likely be in excess of $18,000,000.

3. Transmission Deficiencies in Study Area

The analysis was performed on the MRO 2007 Series 2012 and 2017 summer peak model. Load in this region is mainly served by a 69 kV line connecting the Stone Lake and Osprey Substations.

The thermal overloads that were found and addressed through this study were the Stone Lake 161/69 kV transformer and the Stone Lake Pump-Sand Lake 69 kV line. Both overloads are present only under post-contingent (N-1) conditions, see Table 1. The voltage issues addressed in this study are on the Ironwood and Gogobec 34.5 and 88 kV systems and the Osprey and Stone Lake area 69 kV system. The system deficiencies uncovered during base case analysis that this study attempts to address are listed below in Table 1. The deficiencies labeled 2017 indicate that the limiter shows up in the 2017 model but not in the 2012 model. Deficiencies labeled 2012 are limiters in both the 2012 and the 2017 models.

Table 1: System Deficiencies

Year	Monitored Element	Contingency	Continuous Rating (MVA)	Contingent Flow (MVA)	Loading Level (%)
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn 161 kV	70	85.6	122
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn-Gingles 161 kV	70	85.9	123
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV	48	53.1	111
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV	48	53.1	111
2012	White Tail-Big Falls 69 kV	Stone Lake Pump-Sand Lake 69 kV	48	70.7	147
2012	White Tail-Trails End 69 kV	Stone Lake Pump-Sand Lake 69 kV	48	52.9	110
2017	Stone Lake Pump-Sand Lake 69 kV	White Tail-Osprey 69 kV	48	56.8	118

Year	Contingency	Bus*	Voltage
2012	Loss of Gingles-Hurley 115 kV line	Mine Road 34.5 kV	0.888
2012	Loss of Ironwood-Park Falls 115 kV line	Mine Road 34.5 kV	0.859
2012	Loss of Stone Lake-Farmers Inn 161 kV line	Herb Street 34.5 kV	0.898
2012	Loss of Farmers Inn-Gingles 161 kV line	Herb Street 34.5 kV	0.898
2012	Loss of Stone Lake-Farmers Inn-Gingles 161 kV line	Herb Street 34.5 kV	0.900
2012	Loss of White Tail-Osprey 69 kV line	White Tail 69 kV	0.837
2012	Loss of Stone Lake Pump-Sand Lake 69 kV line	Sand Lake 69 kV	0.455
2017	Loss of Sheldon Pump-Holcombe 115 kV line	Herb Street 34.5 kV	0.899

*Only the lowest voltage was listed per contingency

4. Analysis

4.1 Models

All study analysis was performed on 2007 series 2012 and 2017 summer peak models. The models are updated with Xcel Energy loads and input from ATC and DPC. The models include the Arrowhead-Weston 345 kV line. The models do not include the Chisago Co-Apple River line.

The performance of the options was tested to meet the voltage and line loading criteria for NERC category A, B and C contingencies. Voltages must be within ten percent of nominal voltage post contingent. Line loadings cannot exceed the continuous rating (rate A) under system intact conditions and cannot exceed their emergency rating under post-contingent conditions (N-1). Emergency ratings are only valid for the first thirty minuets after an outage at which point continuous ratings apply. Contingencies were performed on the following:

- Stinson – Lakeside 115 kV Line
- Bayfront – Ashland 69 kV Line
- Bayfront – Gingles 115 kV Line
- Gingles – Hurley 115 kV Line
- Ironwood – Hurley 115 kV Line
- Ironwood – Park Falls 115 kV Line
- Stone Lake - Gingles 161 kV Line
- Stone Lake – Washco 161 kV Line
- Stone Lake 345/161 kV Transformer #9
- Osprey – Sheldon Pump 115 kV Line
- Sheldon Pump – Holcombe 115 kV Line
- Holcombe – Cornell 115 kV Line
- Hydro Lane – Jim Falls 115 kV Line
- Stone Lake – Stone Lake Pump 69 kV Line
- White Tail – Osprey 69 kV Line
- Stinson Phase Shifter
- All 69, 115 and 138-kV Category B contingencies plus ties within the ATC portion of the study area
- All 345-kV Category B contingencies plus ties within ATC
    - Eau Claire-Arpin 345 kV
    - King-Eau Claire-Arpin 345 kV
- Weston #4 (550 MW)
- Oak Creek #1 (650 MW)
- Kewaunee #1 (579 MW)
- Columbia #1 (520 MW)
- Presque Isle #6 (80 MW)
- Pulliam #8 (132 MW)

The Alliant East, DPC, WPS, WE and Xcel Energy control areas were monitored for violations. The various options considered for the study region are discussed in section 4.2.

Loads in the study area were increased to their actual summer peak levels and pump loads were increased to the forecasted levels provided by Enbridge Energy. The buses in the table below will see their load levels increased to the levels indicated for the 2012 and 2017 cases.

Table 2: Study Area Load Levels

Substation	Bus Number	Load ID	12SUPK	MVAR	17SUPK	MVAR
XEL Sand Lake 69 kV	61205	X2	6.08	1.24	6.65	1.35
XEL Farmers Inn 69 kV	60664	X0	13.20	2.68	14.441	2.93
XEL Stone Lake Pump 69 kV	61205	X2	4.21	1.38	4.21	1.38
XEL Edgewater Pump 115 kV	61136	X2	11.58	3.81	11.58	3.81
XEL Big Falls 69 kV	60297	X0	2.52	0.51	2.66	0.54
XEL Sheldon Pump 69 kV	60296	X2	26.51	8.71	26.51	8.71
XEL City Forest 69 kV	61208	X0	9.30	1.89	9.30	1.89
XEL White Tail 69 kV	61206	X0	9.49	1.93	10.46	2.12
XEL Ladysmith Pump 69 kV	61204	X2	3.52	1.16	3.52	1.16
XEL Doughty Road 69 kV	61207	X0	6.78	1.38	7.56	1.54
XEL Trails End 69 kV	61130	X0	3.29	0.69	3.54	0.72
XEL Cameron 69 kV	61074	X0	3.51	0.71	3.78	0.77
XEL Rice Lake 69 kV	61054	50	6.02	1.22	6.61	1.34
XEL Birchwood 69 kV	61065	X0	5.74	1.17	6.08	1.23
XEL North Fork 34.5 kV	61138	X0	5.66	1.15	5.95	1.21
XEL Butternut 34.5 kV	61110	X0	2.13	0.43	2.35	0.48
XEL Sanguine 34.5 KV	61099	X2	3.68	0.75	3.68	0.75
XEL Mellen 34.5 kV	61097	X0	1.62	0.33	1.66	0.34
XEL Iron Belt 34.5 kV	61105	X0	0.26	0.05	0.26	0.05
XEL Montreal 34.5 kV	61108	X0	1.89	0.38	1.96	0.40
XEL Ironwood 34.5 kV	60665	X0	2.50	0.51	2.59	0.53
XEL Hurley 115 kV	60289	X0	6.51	1.32	7.21	1.46
XEL Saxon Pump 88 kV	61104	X2	4.09	1.34	4.09	1.34
XEL Great Lakes 88 kV	61210	X0	0.55	0.11	0.62	0.13
XEL Gogebic 88 kV	61212	X0	3.43	0.70	3.61	0.73
XEL Ino Pump 115 kV	60291	X2	2.47	1.53	2.47	1.53
XEL Owen 69 kV	61014	X0	9.88	3.25	9.88	3.25
XEL Glidden 34.5 kV	69096	X0	0.95	0.19	0.97	0.20

4.2 Options Studied

Option A: Prentice-Clear Lake 115 kV Line:

Option A is a new 115 kV line from the Prentice Substation to ATC's Clear Lake Substation southeast of Minocqua. This option helps in addressing the low voltage issues associated with the Ironwood-Hurley 115 kV outage at Pine Lake. Option A also fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage.

Option A did not address the Stone Lake 161/69 kV transformer issues or the low voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses. Due to the fact that the above system deficiencies were not addressed, Option A is not considered a viable option.

Table 3: Thermal Overloads Alleviated by Option A

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2017	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2017	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2017	Gardner Park-Black Brook 115 kV	Gardner Park-Kelly 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Hilltop 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Pine 115 kV
2017	Metomen 138/69 kV Transformer	System Intact
2017	Wheaton-Presto Tap 161 kV	Weston Unit 4
2017	Dayton-T RC 69 kV	WKA-Grangrae 69 kV
2017	Tomahawk-Sparta 69 kV	Sigel-Arpin 138 kV
2017	Tomahawk-Sparta 69 kV	Council Creek (DPC)-Oakdale 69 kV

Option B: Prentice-Highway 8 115 kV Line:

Option B is a new 115 kV line from Prentice Substation to ATC's Highway 8 Substation. This option addresses several low voltage issues in the ATC control area. It also helps in addressing the low voltage issues associated with the Ironwood-Hurley 115 kV outage at Pine Lake. In addition, this option fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage.

As with Option A, Option B did not address the Stone Lake 161/69 kV transformer issues or the low voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses. Due to the fact that the above system deficiencies were not addressed, Option B is not considered a viable option.

Table 4: Thermal Overloads Alleviated by Option B

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2017	Gardner Park-Black Brook 115 kV	Gardner Park-Kelly 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Hilltop 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Pine 115 kV

Option C: Prentice-Tomahawk 115 kV Line:

Option C is a new 115 kV line from Prentice Substation to ATC's Tomahawk Substation. This option addresses several low voltage issues in the ATC control area. It also helps in addressing the low voltage issues associated with the Ironwood-Hurley 115 kV outage at Pine Lake. Additionally, Option C fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage.

As with Options A and B, Option C did not address the Stone Lake 161/69 kV transformer issues or the low voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses. Due to the fact that the above system deficiencies were not addressed, Option C is not considered a viable option.

Table 5: Thermal Overloads Alleviated by Option C

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2017	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2017	Gardner Park-Black Brook 115 kV	Gardner Park-Kelly 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Hilltop 115 kV
2017	Gardner Park-Black Brook 115 kV	Maine-Pine 115 kV

Option D: Big Falls-Stone Lake 161 kV Line:

Option D is a new 161 kV line between Stone Lake and Osprey Substations. This option addresses several low voltage issues in the Ironwood area and also fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage. Unlike Options A, B, and C, Option D addresses the Stone Lake 161/69 kV transformer issues associated with the outage of the Stone Lake-Farmers Inn 161 kV line.

Option D failed to address the 69 kV overloads or the voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses. As Option H demonstrates, these issues may be fixed by installing a 161/69 kV transformer on the Big Falls-Stone Lake 161 kV line at Couderay.

Table 6: Thermal Overloads Alleviated by Option D

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn 161 kV
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn-Gingles 161 kV
2012	Wheaton-Presto Tap 161 kV	System Intact
2012	Eau Claire-Presto Tap 161 kV	System Intact
2012	Eau Claire 161/69 kV Transformer	Hydro Lane-Wheaton Tap-Red Cedar 161 kV

Option E: Stone Lake-Edgewater Pump 69 kV Reconductor:

Option E proposes to reconductor the 69 kV line from Stone Lake Pump-Sand Lake-Edgewater. This option fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of the Holcombe-Cornell 115 kV line or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage. This option has no impact on voltages.

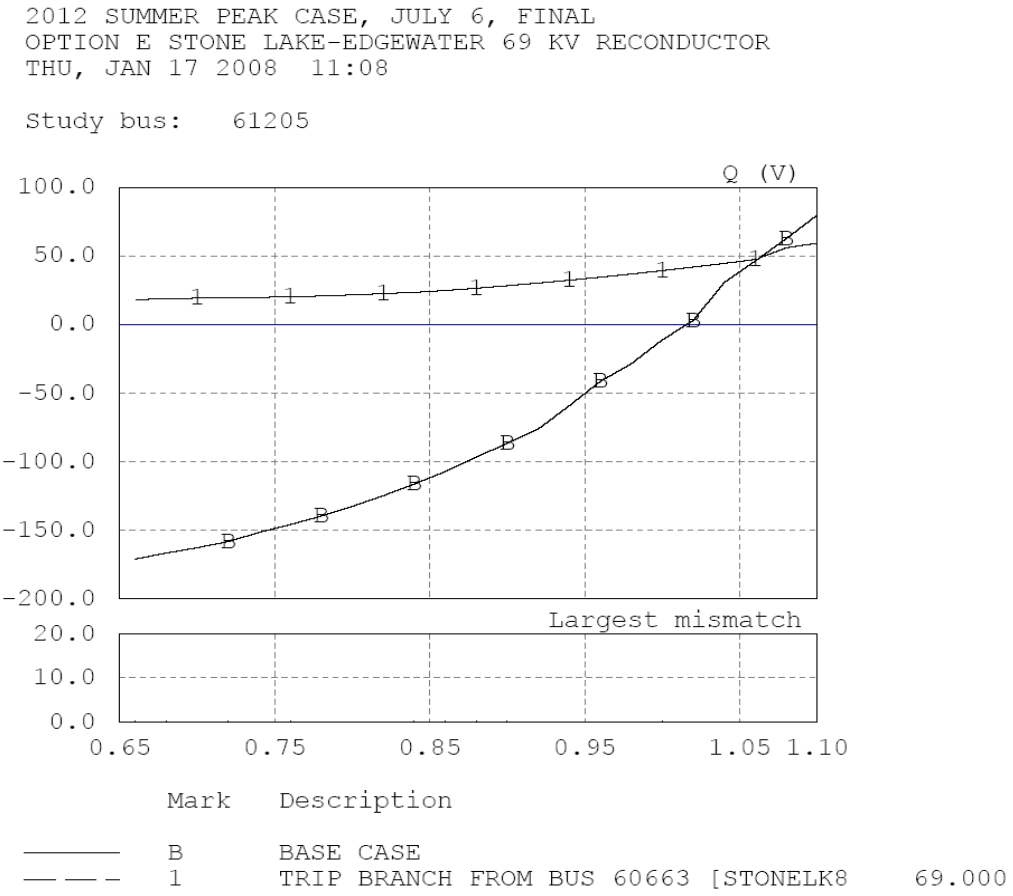
Option E did not address the Stone Lake 161/69 kV transformer issues or the low voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses. Due to the fact that the above system deficiencies were not addressed, Option E is not considered a viable option.

Table 7: Thermal Overloads Alleviated by Option E

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2017	Stone Lake Pump-Sand Lake 69 kV	White Tail-Big Falls 69 kV

Figure 3 shows a graph of the VQ analysis that was performed on Option E to identify the amount of capacitance required to address the voltage issues caused by the Stone Lake Pump to Sand Lake 69 kV outage. It was determined that seven 7.2 MVAR capacitor banks would be needed. Three 7.2 MVAR capacitor steps would be placed at Sand Lake 69 kV substation with two 7.2 MVAR steps placed at Edgewater and Couderay 69 kV substations.

Figure 3: QV Analysis of Stone Lake – Edgewater Pump 69 kV Reconductor



By installing the capacitors identified above along with a 112 MVA 161/69 kV transformer at Stone Lake Substation and rebuilding the Big Falls-White Tail-Trails End 69 kV line, Option E becomes a viable option.

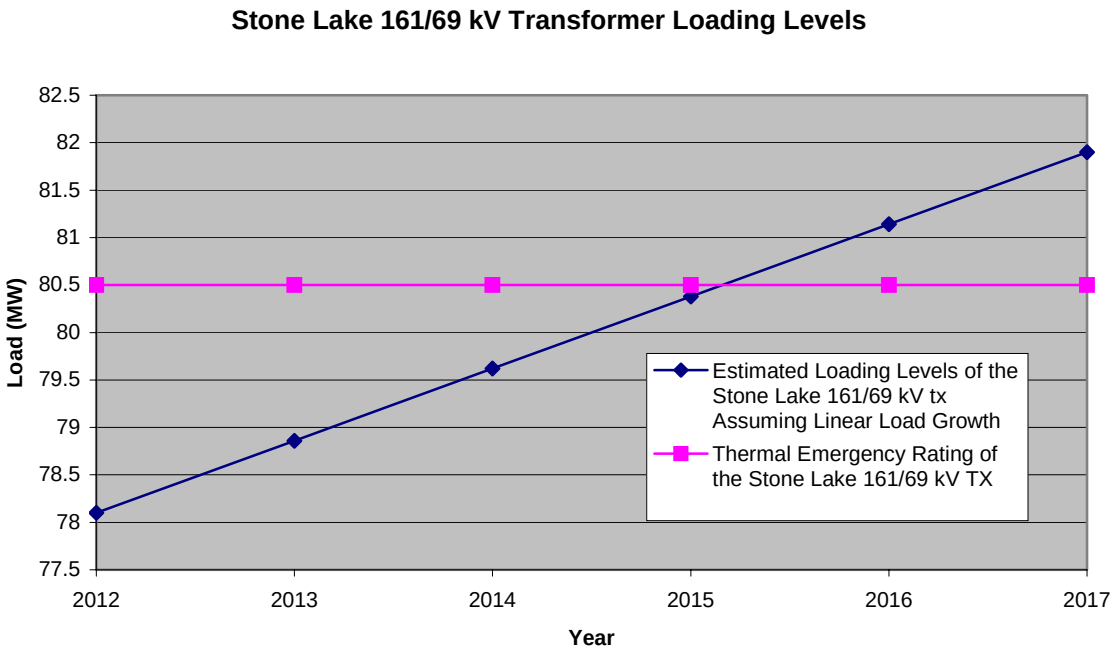
Option F: Stone Lake-Edgewater 161 kV Line:

Option F is a new 161 kV line from Stone Lake Substation to a new 161 kV bus at Edgewater Substation. The Edgewater 69 kV load will be moved to the new 161 kV bus. In order to provide adequate space for new 161 kV equipment, this option requires that the existing 69 kV capacitors at Edgewater Substation be moved to Sand Lake Substation and the existing switchyard be expanded. No new Edgewater 161/69 kV transformer is included as part of this plan. This option fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage. It also fixes the Stone Lake 161/69 kV transformer issues associated with the outage of the Stone Lake-Farmers Inn 161 kV line for 2012.

The incremental load serving capabilities of Option F are determined by taking a linear approximation of loading levels between 2012 and 2017. Using this method,

Option F will serve area load through 2015 but more fixes would be needed by summer peak 2016. See graph below:

Figure 4: Option F Projected Stone Lake 161/69 kV Transformer Loading Levels



Option F did not address the low voltage issues on the Stone Lake, Edgewater, North Central, White Tail, Trails End or Big Falls 69 kV buses, or the Stone Lake 161/69 kV transformer loading issues after 2015. Due to the fact that the above system deficiencies were not addressed, Option F is not considered a viable option.

Table 8: Thermal Overloads Alleviated by Option F

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn 161 kV
2012	Stone Lake 161/69 kV Transformer	Stone Lake-Farmers Inn-Gingles 161 kV
2017	Stone Lake Pump-Sand Lake 69 kV	White Tail-Big Falls 69 kV

By installing the capacitors identified in the analysis of Option E along with a 112 MVA 161/69 kV transformer at Stone Lake Substation and rebuilding the Big Falls-White Tail-Trails End 69 kV line (approximately 16 miles of rebuild), Option F becomes a viable option.

Option G: Ironwood-Gogebic 115 kV Gogebic-Watersmeet-Lakota Road 138 kV Line:

Option G requires rebuilding the Ironwood-Gogebic 88 kV line to 115 kV then stepping the voltage up to 138 kV where it would meet a new 138 kV line from Gogebic to the ATC Watersmeet and Lakota Road 138 kV Substations. This option does not fix any of the Stone Lake area issues and is not considered a viable option.

Table 9: Thermal Overloads Alleviated by Option G

Year	Limiting Element	Contingency
2017	Gardner Park-Black Brook 115 kV	Gardner Park-Kelly 115 kV
2017	Gardner Park-Black Brook 115 kV	Main E-Hill Top 115 kV
2017	Gardner Park-Black Brook 115 kV	Main E-Pine 115 kV

Option H: Stone Lake-Couderay 161 kV Line:

Option H is a new 161 kV line between Stone Lake and Couderay Substations with a 161/69 kV transformer at Couderay. This option addresses all low voltage issues caused by the outage of the Stone Lake Pump to Sand Lake 69 kV or White Tail-Big Falls 69 kV lines. Option H also fixes the Stone Lake Pump-Sand Lake 69 kV overload for the outage of Holcombe-Cornell 115 kV or the Holcombe-Cornell-Anderson-Jim Falls 115 kV outage. Option H addresses the Stone Lake 161/69 kV transformer issues associated with the outage of the Stone Lake-Farmers Inn 161 kV line.

Table 10: Thermal Overloads Alleviated by Option H

Year	Limiting Element	Contingency
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell 115 kV
2012	Stone Lake Pump-Sand Lake 69 kV	Holcombe-Cornell-Anderson-Jim Falls 115 kV
2012	Stone lake Pump-Sand Lake 69 kV	Whit Tail-Big Fall 69 kV
2012	White Tail-Trails End 69 kV	Stone Lake Pump-Sand Lake 69 kV
2012	Big Falls-White Tail 69 kV	Stone Lake Pump-Sand Lake 69 kV
2012	Stone Lake 161/69 kV transformer	Stone Lake-Farmers Inn 161 kV
2012	Stone Lake 161/69 kV transformer	Stone Lake-Farmers Inn-Gingles 161 kV
2017	Holcombe-Cornell 115 kV	Gingles-Hurley 115 kV
2017	Holcombe-Cornell 115 kV	Bayfront-Gingles 115 kV

Option H is the only option that successfully addresses all of the Stone Lake and Osprey area concerns. The 161 kV line **cannot** be double-circuited with the existing 69 kV line in order for it to address the overloads and low voltages associated with the outage of the Stone Lake Pump to Sand Lake 69 kV line. If the 161 kV line was double-circuited, it would not address any of the 69 kV voltage or line loading issues caused by the outage of Stone Lake Pump-Sand Lake 69 kV. This is due to the fact that the double-circuit outage of the new 161 kV line and the Stone Lake – Sand Lake 69 kV line would have be considered a NERC contingency under the TPL standards. This double-circuit

contingency would leave the system in the same condition it is in today during the loss of only the 69 kV line.

As noted above, Option H alleviates these issues if the line is not double-circuited. In order to double-circuit Option H with the existing 69 kV line, the new 161 kV line would need to be extended to Osprey Substation by 2012. This would require at least 30 miles of additional 161 kV line and an additional 161/115 kV transformer (at Osprey) to be installed by 2012.

To further support Option H, a TLTG analysis was performed that slowly stepped up load in the study area to approximate when the proposed 161 kV line would need to be extended to Osprey Substation. The results of that analysis show that, even after taking into account fluctuations in load growth, the proposed solution will last until well beyond 2030, at which time the final 30 miles of line would need to be constructed in order to connect the line to Osprey Substation.

These results indicate that the line to Osprey would be needed for regional reliability before it will be needed for local load serving between Stone Lake and Osprey. The benefit of a completed Stone Lake-Osprey 161 kV line is that it would cut the large 161 and 115 kV loop between Ironwood and Eau Claire, Wisconsin in half. This would help address voltage and thermal issues that may be caused by the loss of either end of the loop.

5. Financial Analysis

The financial analysis is an indicative analysis only and is intended for comparing the options at high level. Due to the fact that only Options D, E, F, and H were considered viable options, only these four options were considered in the financial analysis. The following tables detail the estimated cost of constructing the facilities to address the 2012 summer peak issues.

Table 11: Option D Financial Analysis

Option D		
Upgrade	**Mileage**	**Cost**
Osprey Substation		$3,580,000.00
Stone Lake Substation		$800,000.00
Stone Lake-Osprey 161 kV line	56	$32,200,000.00
Couderay 161 kV Substation		$2,100,000.00
Stone Lake 69 kV capacitor bank		$475,000.00
Total		**$39,155,000.00**

Table 12: Option E Financial Analysis

Option E		
Upgrade	**Mileage**	**Cost**
Stone Lake-Edgewater 69 kV Rebuild	8.7	$2,392,500.00
Big Falls-Trails End 69 kV Rebuild	15.9	$4,372,500.00
7x7.2 MVAR 69 kV cap banks at 3 sites		$2,250,000.00
Stone Lake 112 MVA 161/69 kV TX		$3,580,000.00
Total		**$12,595,000.00**

Option F would require additional facilities to address the 2017 summer peak issues by 2016 (see section 4).

Table 13: Option F Financial Analysis

Option F		
Upgrade	**Mileage**	**Cost**
Stone Lake Substation		$800,000.00
Stone Lake-Edgewater 161 kV line	8.7	$5,002,500.00
Big Falls-Trails End 69 kV Rebuild	15.9	$4,372,500.00
7x7.2 MVAR 69 kV cap banks at 3 sites		$2,250,000.00
Total		**$12,425,000.00**

Table 14: Option H Financial Analysis

Option H		
Upgrade	**Mileage**	**Cost**
Stone Lake Substation		$800,000.00
Stone Lake-Couderay 161 kV line	8.7	$9,947,500.00
Couderay 112 MVA 161/69 kV TX*		$3,580,000.00
Total		**$14,327,500.00**
*112 MVA used for estimate. 70 MVA transformer is required.		

While Option H has a slightly higher installed cost than Options E and F, it provides a much more robust, longer-term solution than either Option E or Option F. In addition, the 161 kV line proposed could be extended to Osprey Substation when the need arises. While Options E, and F address thermal overload issues past the scope of this particular study, their effectiveness is particularly limited in the scope of how much voltage support is provided to the area. Specifically, Options E and F require the installation of significant amounts of capacitance. Installed capacitance at the levels proposed could lead to voltage flicker problems during switching. Option D provides very robust support to the system in the area, but it proposes more new construction than is necessary at this time.

When all factors are considered, Option H would provide a significant increase in reliability to Xcel Energy's northwest Wisconsin service territory, and it would do so at a good value when compared to its alternatives.

Development of Route and Configuration Alternatives

The Public Service Commission of Wisconsin (PSCW) requires that any project under consideration before it have a robust discussion of alternatives, including alternative routes and configurations for any new transmission lines being proposed. In consideration of these requirements, a discussion of alternatives was undertaken that sought to develop two or more alternatives for presentation to the PSCW.

These alternatives, outlined below, will be brought forward to the PSCW during the permitting proceedings that will accompany this line.

1. 161 kV line from Stone Lake Substation to Couderay Substation using existing right-of-way through Lac Courte Oreilles reservation lands. This line would be on separate structures from the existing 69 kV line.

2. Double-circuit 161/69 kV line from Stone Lake Substation to Couderay Substation using existing right-of-way through Lac Courte Oreilles reservation lands.

3. Conversion of existing 69 kV line from Osprey to Couderay to 161 kV and installation of 161/69 kV transformer at Couderay. This line would involve conversion of the Trails End Substation to 161 kV and would also require approximately 7.2 miles of double-circuit 161/69 kV construction in order to maintain service to the Ladysmith, Wisconsin area. Two-way transmission service to Ladysmith would be obtained by constructing a short Doughty Road – Doughty Road Tap 69 kV line.

The 69 kV line between Stone Lake and Osprey Substations passes through the Lac Courte Oreilles tribal lands on a 100-foot easement that Xcel Energy maintains. Options 1 and 2 both utilize this right-of-way. Option 1 would place the two lines on separate structures in order to avoid the 161 /69 kV double-circuit outage. Such an outage could result in voltage problems on the 69 kV system in the area.

Option 2 involves double-circuiting the 161 and 69 kV circuits. Despite the voltage problems that could result on the 69 kV system, this does not constitute a NERC Category C (TPL-003-0) violation, as NERC requirements apply to systems 100 kV and higher. While Option 2 involves one set of transmission poles, it comes with an added cost of nearly $6.4 million.

More detailed scoping estimates for the three options above are provided below.

Option 1		
Upgrade	**Mileage**	**Cost**
Stone Lake Substation		$800,000
Stone Lake - Couderay 161 kV line	17.9	$5,378,000

Stone Lake - Couderay 69 kV line	9.6	$3,202,000
Couderay 161 kV Substation		$3,650,000
Total		**$13,030,000**

Option 2		
Upgrade	**Mileage**	**Cost**
Stone Lake Substation		$800,000
Stone Lake - Couderay 161 kV line (portion of double-circuit cost)	17.9	$11,376,000
Stone Lake - Couderay 69 kV line (portion of double-circuit cost)	9.6	$3,595,000
Couderay 161 kV Substation		$3,650,000
Total		**$19,421,000**

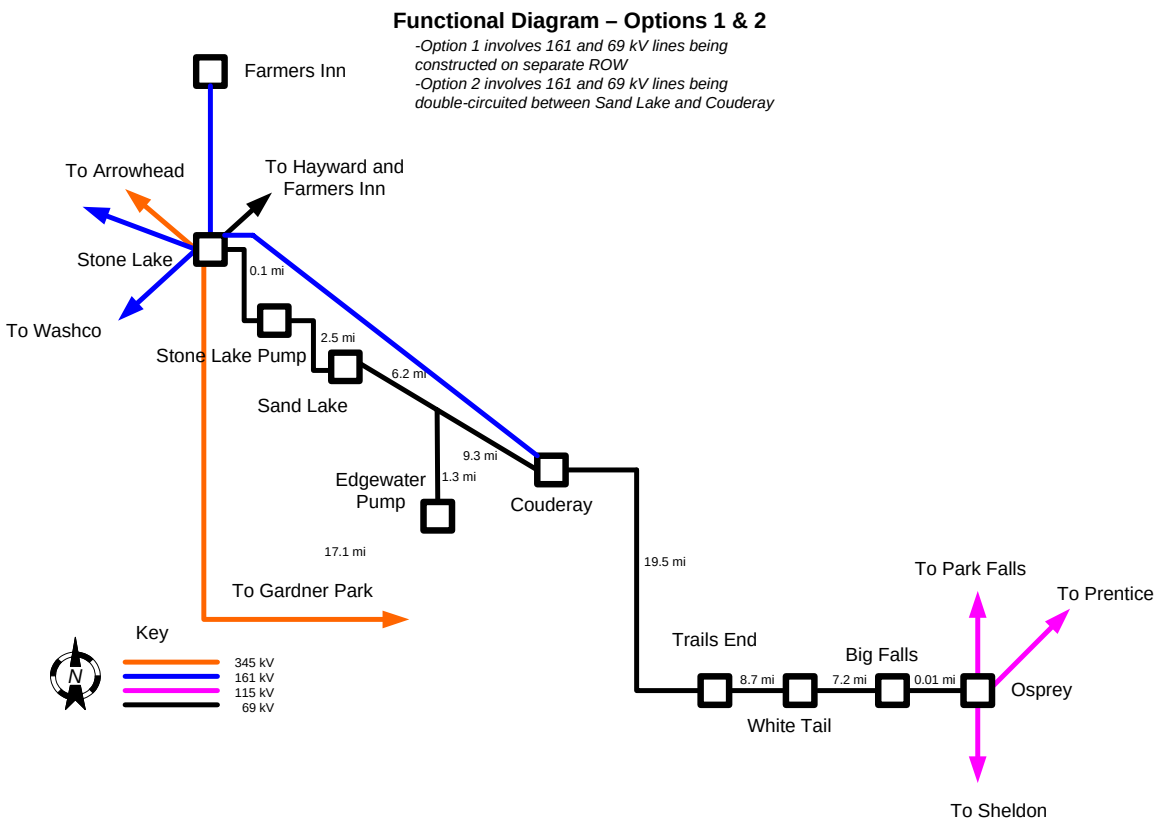
Option 3		
Upgrade	**Mileage**	**Cost**
Osprey Substation		$3,580,000
Osprey - Couderay 161 kV line	35.9	$19,498,000
Osprey - Whitetail Tap 69 kV line (portion of double-circuit cost)	7.2	$1,566,000
Couderay 161 kV Substation		$3,650,000
Doughty Road - Doughty Road Tap 69 kV Line	1.4	$458,000
Total		**$28,752,000**

While Option 3 proposes a configuration that is geographically diverse from the other alternatives, it is more than twice the cost of Option 1 and connects to a source that is not as strong as Stone Lake Substation. The 345 kV line termination provided at Stone Lake Substation makes it a very attractive source for system support in the area.

In addition to being the most expensive alternative presented, Option 3 also does not capture the opportunity to rebuild the 69 kV line Stone Lake and Couderay Substations. This line is currently in acceptable condition but sometime in the near future it will likely be in need of significant maintenance repairs. Options 1 and 2 both afford the opportunity to rebuild this line and allow it to continue reliably serving load in the area in the years to come.

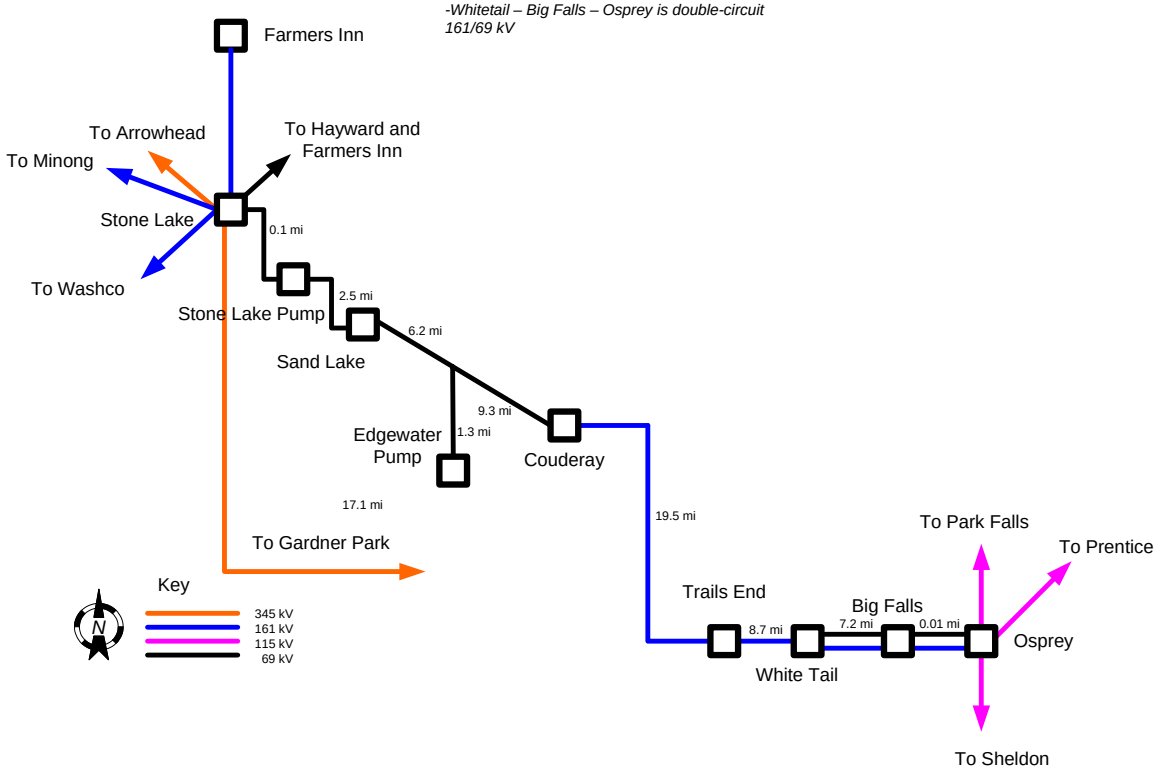
For the reasons addressed above, and in consideration of the superior reliability benefits and cost savings brought by Option 1, it is Xcel Energy's recommendation that Option 1 be pursued as the preferred alternative, with Options 2 and/or 3 presented as possible route and configuration alternatives.

Route and Configuration Alternative One-Lines



Functional Diagram – Option 3

-Whitetail – Big Falls – Osprey is double-circuit 161/69 kV



Power Flow Contingency File

SINGLE BRANCH IN SYSTEM ATC_con
SINGLE TIE FROM SYSTEM ATC_con

CONTINGENCY 'JRN1'
COM TRIP STINSON-LAKESIDE 115 KV LINE
TRIP BRANCH FROM BUS 61684 TO BUS 61632
END

CONTINGENCY 'JRN2'
COM TRIP GINGLES-ASHLAND 69 KV LINE
TRIP BRANCH FROM BUS 60661 TO BUS 69040
END

CONTINGENCY 'JRN3'
COM TRIP BAYFRONT-GINGLES 69 KV LINE
TRIP BRANCH FROM BUS 60295 TO BUS 60350
END

CONTINGENCY 'JRN4'
COM TRIP GINGLES-HURLEY 115 KV LINE
TRIP BRANCH FROM BUS 60350 TO BUS 60289
END

CONTINGENCY 'JRN5'
COM TRIP IRONWOOD-HURLEY 115 KV LINE
TRIP BRANCH FROM BUS 60289 TO BUS 60288
END

CONTINGENCY 'JRN6'
COM TRIP IRONWOOD-PARK FALLS 115 LINE
TRIP BRANCH FROM BUS 60288 TO BUS 60298
END

CONTINGENCY 'JRN7A'
COM TRIP STONE LAKE-FARMERS INN 161 KV LINE
TRIP BRANCH FROM BUS 60290 TO BUS 60293
END

CONTINGENCY 'JRN7B'
COM TRIP FARMERS INN-GINGLES 161 KV LINE
TRIP BRANCH FROM BUS 60293 TO BUS 60294
END

CONTINGENCY 'JRN7AB'
COM TRIP STONE LAKE-FARMERS INN-GINGLES 161 KV LINE
TRIP BRANCH FROM BUS 60290 TO BUS 60293
TRIP BRANCH FROM BUS 60293 TO BUS 60294
END

CONTINGENCY 'JRN8'
COM TRIP STONE LAKE-WASHCO 161 KV LINE
TRIP BRANCH FROM BUS 60290 TO BUS 69561
END

CONTINGENCY 'JRN9'
COM TRIP OSPREY-SHELDON PUMP 115 KV LINE
TRIP BRANCH FROM BUS 60297 TO BUS 60296
END

CONTINGENCY 'JRN10'
COM TRIP SHELDON PUMP-HOLCOMBE 115 KV LINE
TRIP BRANCH FROM BUS 60296 TO BUS 60306
END

CONTINGENCY 'JRN11'
COM TRIP HOLCOMBE-CORNELL 115 KV LINE
TRIP BRANCH FROM BUS 60306 TO BUS 60322
END

CONTINGENCY 'JRN12'
COM TRIP STONE LAKE-STONE LAKE PUMP 69 KV LINE
TRIP BRANCH FROM BUS 60663 TO BUS 61205
END

CONTINGENCY 'JRN13'
COM TRIP WHITE TAIL-OSPREY 69 KV LINE
TRIP BRANCH FROM BUS 61129 TO BUS 60662
END

CONTINGENCY 'JRN14'
COM TRIP STINSON PHASE SHIFTER
TRIP BRANCH FROM BUS 61683 TO BUS 61684
END

CONTINGENCY 'JRN15'
COM TRIP WESTON UNIT 4
TRIP BRANCH FROM BUS 39662 TO BUS 39676
END

CONTINGENCY 'JRN16'
COM TRIP OAK CREEK UNIT 1
TRIP BRANCH FROM BUS 39367 TO BUS 39389
END

CONTINGENCY 'JRN17'
COM TRIP KEWAUNEE UNIT 1
TRIP BRANCH FROM BUS 39631 TO BUS 39630
END

CONTINGENCY 'JRN18'
COM TRIP COLUMBIA UNIT 1
TRIP BRANCH FROM BUS 39152 TO BUS 39157
END

CONTINGENCY 'JRN19'
COM TRIP PRESQUE ISLE UNIT 6
TRIP BRANCH FROM BUS 39594 TO BUS 39589
END

CONTINGENCY 'JRN20'
COM TRIP PLLIAM UNIT 8
TRIP BRANCH FROM BUS 38771 TO BUS 39904
END

CONTINGENCY 'JRN21'
COM TRIP ARPIN-EAU CLAIRE 345 KV LINE
TRIP BRANCH FROM BUS 60304 TO BUS 39244
END

CONTINGENCY ' NSP 8251'
COM TRIP NOBLES CO - LAKEFIELD JC 345 KV LINE
COM TRIP BREWSTER - ELK 161 KV LINE (4 MILE DOUBLE CKT)
TRIP BRANCH FROM BUS 34006 TO BUS 60286
TRIP BRANCH FROM BUS 34005 TO BUS 62709
TRIP BRANCH FROM BUS 60128 TO BUS 60370
END

CONTINGENCY ' NSP 8252'
COM TRIP NOBLES CO - LAKEFIELD JC 345 KV LINE
COM TRIP LAKEFIELD JC - TRIBOJI 161 KV LINE (6 MILE DOUBLE CKT)
TRIP BRANCH FROM BUS 34006 TO BUS 60286
TRIP BRANCH FROM BUS 34137 TO BUS 34007
END

CONTINGENCY ' NSP 8253'
COM TRIP SPLIT ROCK - NOBLES CO 345 KV LINE
COM TRIP ELK - MAGNOLIA 161 KV LINE (8 MILE DOUBLE CKT)
TRIP BRANCH FROM BUS 60126 TO BUS 60286
TRIP BRANCH FROM BUS 34003 TO BUS 34004
END

CONTINGENCY ' NSP 8254'
COM TRIP SPLIT ROCK - NOBLE CO 345 KV
COM TRIP SPLIT ROCK - SIOUX CITY 345 KV (5 MILES DOUBLE CKT)
TRIP BRANCH FROM BUS 60126 TO BUS 60286
TRIP BRANCH FROM BUS 60131 TO BUS 60126
END

CONTINGENCY 'NSP MANKATO'
COM TRIP EASTWOOD - SUMMIT 115 KV LINE
COM TRIP EASTWOOD - LOON TAP 115 KV LINE
TRIP BRANCH FROM BUS 60830 TO BUS 60380 CKT 1
TRIP BRANCH FROM BUS 60830 TO BUS 60265 CKT 1
END

CONTINGENCY 'NSP WESTGATE'
COM TRIP WESTGATE - EDEN PRAIRIE 115 KV CKT 1
COM TRIP WESTGATE - EDEN PRAIRIE 115 KV CKT 2
TRIP BRANCH FROM BUS 60256 TO BUS 60263 CKT 1
TRIP BRANCH FROM BUS 60256 TO BUS 60263 CKT 2
END

CONTINGENCY 'NSP SPS 2'
COM TRIP WILMARTH - BLUE LAKE 345 KV CKT 1
COM TRIP MEC STEAM TURBINE
TRIP BRANCH FROM BUS 60108 TO BUS 60192 CKT 1
REMOVE MACHINE 1 FROM BUS 60062
END

CONTINGENCY 'NSP SPS 3'
COM TRIP LAKEFIELD JC - LGS 345 KV LINE

```
COM TRIP LAKEFIELD JC
- NOBLES CO 345 KV
LINE
TRIP LINE FROM BUS
34006 TO BUS 60331
TRIP LINE FROM BUS
34006 TO BUS 60286
END


CONTINGENCY 'NSP-
GRE SPS 3-4 COMBO'\par
COM TRIP 345 KV LINE
FROM LGS - FIELDON /
WILMARTH\par
COM TRIP LAKEFIELD JC
- NOBLES CO 345 KV
LINE\par
COM TRIP TRIMONT
WIND GENERATION\par
COM TRIP LAKEFIELD
GENERATING
STATION\par
TRIP LINE FROM BUS
60331 TO BUS 60364\par
TRIP LINE FROM BUS
34006 TO BUS 60286\par
REMOVE MACHINE 1
FROM BUS 63090\par
REMOVE MACHINE 1
FROM BUS 63011\par
REMOVE MACHINE 2
FROM BUS 63012\par
REMOVE MACHINE 3
FROM BUS 63013\par
REMOVE MACHINE 4
FROM BUS 63014\par
REMOVE MACHINE 5
FROM BUS 63015\par
REMOVE MACHINE 6
FROM BUS 63016\par
END

CONTINGENCY
'WILMARTH - BLUELAKE1'
TRIP LINE FROM BUS
60108 TO BUS 60192
TRIP LINE FROM BUS
60108 TO BUS 60103 CKT
1 / MEC
TRIP LINE FROM BUS
60110 TO BUS 60360 CKT
1 / MEC
END

CONTINGENCY
'WILMARTH - BLUELAKE1
TRIP LINE FROM BUS
60108 TO BUS 60192
TRIP LINE FROM BUS
60215 TO BUS 60261
TRIP LINE FROM BUS
60108 TO BUS 60103 CKT
1 / MEC
TRIP LINE FROM BUS
60110 TO BUS 60360 CKT
1 / MEC
END

CONTINGENCY
'WILMARTH - LGS1
TRIP LINE FROM BUS
60331 TO BUS 60364
TRIP LINE FROM BUS
60331 TO BUS 63091 CKT
1 / LGS 1-2
TRIP LINE FROM BUS
60331 TO BUS 63092 CKT
1 / LGS 3-4
TRIP LINE FROM BUS
60331 TO BUS 63093 CKT
1 / LGS 5-6
END

CONTINGENCY
'WILMARTH - LGS2
TRIP LINE FROM BUS
60364 TO BUS 60365
TRIP LINE FROM BUS
60331 TO BUS 63091 CKT
1 / LGS 1-2
TRIP LINE FROM BUS
60331 TO BUS 63092 CKT
1 / LGS 3-4
TRIP LINE FROM BUS
60331 TO BUS 63093 CKT
1 / LGS 5-6
END

CONTINGENCY
'WILMARTH - LGS3
TRIP LINE FROM BUS
60365 TO BUS 60108
TRIP LINE FROM BUS
60331 TO BUS 63091 CKT
1 / LGS 1-2
TRIP LINE FROM BUS
60331 TO BUS 63092 CKT
1 / LGS 3-4
TRIP LINE FROM BUS
60331 TO BUS 63093 CKT
1 / LGS 5-6
END

CONTINGENCY 'FOX
LAKE1'
TRIP LINE FROM BUS
34007 TO BUS 67470
TRIP LINE FROM BUS
34007 TO BUS 34008
END

CONTINGENCY 'FOX
LAKE2'
TRIP LINE FROM BUS
34008 TO BUS 67470
TRIP LINE FROM BUS
34007 TO BUS 34008
END


COM ' '
COM ' '
COM ' '
COM ' START DAKOTA
AREA CONTINGENCIES'
COM ' '
COM ' '
COM ' '


COM 'NSP - 1 Defined as
multi-circuit'
COM 'SPLIT ROCK-WHITE
& SPLIT ROCK-SIOUX
CITY 345'
COM 'A 60126-60130
SPLT RK3-SPLTRTA3
CKT 1 OPENS C tower,
B MTL'
COM 'B 60130-66537
SPLTRTA3-WHITE 3 CKT
1 OPENS A MTL'
COM 'C 60126-60131
SPLT RK3-SPLTRTB3
CKT 1 OPENS A tower,
D MTL'
COM 'D 60131-66564
SPLTRTB3-SIOUXCY3
CKT 1 OPENS C MTL'
COM '----------
----------'
CONTINGENCY 'NSP - 1'
TRIP LINE FROM BUS
60126 TO BUS 60130 CKT
1
TRIP LINE FROM BUS
60130 TO BUS 66537 CKT
1
TRIP LINE FROM BUS
60126 TO BUS 60131 CKT
1
TRIP LINE FROM BUS
60131 TO BUS 66564 CKT
1
END

COM 'NSP - 2 DEFINED
AS MULTI-CIRCUIT'
COM 'SPLIT ROCK-
CHERRY CREEK/WEST
SIOUX FALLS'
COM 'A 60129-60117
SPLT RK7-CHERRYC7
CKT 1 OPENS B TOWER'
COM 'B 60129-60132
SPLT RK7-WSX FLS7 CKT
1 OPENS A TOWER'
COM '----------
----------'
CONTINGENCY 'NSP - 2'
TRIP LINE FROM BUS
60129 TO BUS 60117 CKT
1
TRIP LINE FROM BUS
60129 TO BUS 60132 CKT
1
END

COM 'NSP - 3 DEFINED
AS MULTI-CIRCUIT'
COM 'MAPLE RIVER-
SHEYENE/WAHPETON'
COM 'A 66754-60133
MAPLE R4-SHEYNNE4
CKT 1 OPENS B TOWER'
COM 'B 66754-63329
MAPLE R4-WAHPETN4
CKT 1 OPENS A TOWER'
COM '----------
----------'
CONTINGENCY 'NSP - 3'
TRIP LINE FROM BUS
66754 TO BUS 60133 CKT
1
TRIP LINE FROM BUS
66754 TO BUS 63329 CKT
1
END

COM 'NSP - 4 DEFINED
AS MULTI-CIRCUIT'
COM 'PRAIRIE-NODIC'
COM 'A 66712-60141
PRAIRIE7-NORDIC 7 CKT
1 OPENS B TOWER'
COM 'B 66712-60141
PRAIRIE7-NORDIC 7 CKT
2 OPENS A TOWER'
COM '----------
----------'
CONTINGENCY 'NSP - 4'
TRIP LINE FROM BUS
66712 TO BUS 60141 CKT
1
TRIP LINE FROM BUS
66712 TO BUS 60141 CKT
2
END

COM '535 Defined as
multi-circuit tower and mtl'
COM 'A 60134-60135
SHEYNNE7-CASS CO7
CKT 1 OPENS B,C tower
only'
COM 'B 66761-60134
MODEROW7-SHEYNNE7
CKT 1 OPENS A,C, also
mtl'
COM 'C 66761-60135
MODEROW7-CASS CO7
CKT 1 OPENS A,B, also
mtl'
COM '** Defined as multi-
terminal'
COM 'E 60135-60137
CASS CO7-REDRIVR7
CKT 1 OPENS D,F'
COM 'F 60135-66761
CASS CO7-MODEROW7
CKT 1 OPENS D,E'
COM 'G 66761-60134
MODEROW7-SHEYNNE7
CKT 1 OPENS E,F,'
COM '----------
----------'
CONTINGENCY '535 1'
COM 'Tower contingency of
Sheyenne-Cass
Co.,Moderow-Sheyenne'
COM 'and Moderow-Cass
Co. 115kV lines. With
combination mtl'
COM 'portion.'
TRIP LINE FROM BUS
60134 TO BUS 60135 CKT
2
```

```
TRIP LINE FROM BUS
66761 TO BUS 60134 CKT
1
TRIP LINE FROM BUS
66761 TO BUS 60135 CKT
1
COM 'Also trips the
following MTL because of
C'
TRIP LINE FROM BUS
60135 TO BUS 60137 CKT
1
END
CONTINGENCY '535  2'
COM ' Multi-terminal only'
TRIP LINE FROM BUS
60135 TO BUS 60137 CKT
1
TRIP LINE FROM BUS
60135 TO BUS 66761 CKT
1
TRIP LINE FROM BUS
66761 TO BUS 60134 CKT
1
END

COM '99 CROSS TRIP
FOR TIOGA-LOGAN
230KV LINE OF THE
TIOGA'
COM ' 115/230
TRANSFORMER.  NOT
VALID UNTIL THE B10T
FLOW'
COM ' TOWARD THE
SOUTH IS OVER 100MW'
COM '-------------------------
-------------------------'
CONTINGENCY '99   '
TRIP LINE FROM BUS
67104 TO BUS 67108 CKT
1
TRIP LINE FROM BUS
67104 TO BUS 67385 CKT
1
END

COM '100 OTP WAPA
Defined as multi-terminal,
wapa/otp'
COM 'A 66431-63267
DEVILSL7-DEVIL J7 CKT 1
OPENS  B C D E F G H I J'
COM 'B 63267-63268
DEVIL J7-DEVIL S7 CKT 1
OPENS  A C D E F G H I J'
COM 'C 63267-63265
DEVIL J7-DEVILSE7 CKT
1  OPENS  A B D E F G H
I J'
COM 'D 63265-63266
DEVILSE7-RAMSEY 7
CKT 1  OPENS  A B C E F
G H I J'
COM 'E 63265-66720
DEVILSE7-SWEETWA7
CKT 1  OPENS  A B C D F
G H I J'
COM 'F 66720-63264
SWEETWA7-LOMA JT7
CKT 1  OPENS  A B C D E
G H I J'
COM 'G 63264-66709
LOMA JT7-LANGDON7
CKT 1  OPENS  A B C D E
F H I J'
COM 'H 66709-66784
LANGDON7-LANDGONT
CKT 1  OPENS  A B C D E
F G I J'
COM 'I 66784-63164
LANGDONT-LANGDON9
CKT 1  OPENS  A B C D E
F G H J'
COM 'J 66784-66800
LANDGONT-LANGDON8
CKT 1  OPENS  A B C D E
F G H I'
COM '-------------------------
-------------------------'
CONTINGENCY '100   '
TRIP LINE FROM BUS
66431 TO BUS 63267 CKT
1
TRIP LINE FROM BUS
63267 TO BUS 63268 CKT
1
TRIP LINE FROM BUS
63267 TO BUS 63265 CKT
1
TRIP LINE FROM BUS
63265 TO BUS 63266 CKT
1
TRIP LINE FROM BUS
63265 TO BUS 66720 CKT
1
TRIP LINE FROM BUS
66720 TO BUS 63264 CKT
1
TRIP LINE FROM BUS
63264 TO BUS 66709 CKT
1
TRIP LINE FROM BUS
66709 TO BUS 66784 CKT
1
TRIP LINE FROM BUS
66784 TO BUS 63164 CKT
1
TRIP LINE FROM BUS
66784 TO BUS 66800 CKT
1
END

COM '105  Defined as
multi-circuit, tower'
COM 'A 66426-66441
BISMARK4-GARRISN4
CKT 1  OPENS  B or C
tower'
COM 'B 66426-66456
BISMARK4-WASHBRN4
CKT 1  OPENS  A tower,
MTL 1 '
COM 'C 66441-67106
GARRISN4-LELANDO4
CKT 1  OPENS  A tower'
COM '**  Defined as multi-
terminal'
COM 'D 66426-66456
BISMARK4-WASHBRN4
CKT 1  OPENS  E MTL'
COM 'E 66456-67106
WASHBRN4-LELANDO4
CKT 1  OPENS  D MTL'
COM '-------------------------
-------------------------'
CONTINGENCY '105  1'
COM 'Tower with multi-
terminal'
TRIP LINE FROM BUS
66426 TO BUS 66441 CKT
1
TRIP LINE FROM BUS
66426 TO BUS 66456 CKT
1
COM 'Also trips the
following because of B'
TRIP LINE FROM BUS
66456 TO BUS 67106 CKT
1
END
CONTINGENCY '105  2'
COM 'Tower only'
TRIP LINE FROM BUS
66426 TO BUS 66441 CKT
1
TRIP LINE FROM BUS
66441 TO BUS 67106 CKT
1
END
CONTINGENCY '105  3'
COM 'Multi-terminal only'
TRIP LINE FROM BUS
66426 TO BUS 66456 CKT
1
TRIP LINE FROM BUS
66456 TO BUS 67106 CKT
1
END

COM '110  Defined as
multi-circuit, tower'
COM 'A 66503-66530
BLAIR  4-WATERTN4 CKT
1  OPENS  B  tower'
COM 'B 66530-66550
WATERTN4-GRANITF4
CKT 1  OPENS  A or C
tower'
COM 'C 66503-66550
BLAIR  4-GRANITF4 CKT
1  OPENS  B  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '110  1'
TRIP LINE FROM BUS
66503 TO BUS 66530 CKT
1
TRIP LINE FROM BUS
66530 TO BUS 66550 CKT
1
END
CONTINGENCY '110  2'
TRIP LINE FROM BUS
66530 TO BUS 66550 CKT
1
TRIP LINE FROM BUS
66503 TO BUS 66550 CKT
1
END

COM '111 WAPA Defined
as multi-terminal,
Interregional'
COM 'ASH STREET TAP'
COM 'A 66600-66601
ASHTAP 7-ASH ST 7 CKT
1  OPENS  B C'
COM 'B 66600-66520
ASHTAP 7-OAHE  7 CKT
1  OPENS  A B'
COM 'C 66600-66489
ASHTAP 7-PIERRE 7 CKT
1  OPENS  A C'
COM '-------------------------
-------------------------'
CONTINGENCY '111 '
TRIP LINE FROM BUS
66600 TO BUS 66601 CKT
1
TRIP LINE FROM BUS
66600 TO BUS 66520 CKT
1
TRIP LINE FROM BUS
66600 TO BUS 66489 CKT
1
END

COM '112 WAPA Defined
as multi-terminal,
Interregional'
COM 'EVANS STREET
TAP'
COM 'A 66602-66601
EVANSST7-ASH ST 7 CKT
1  OPENS  A B'
COM 'B 66602-66489
EVANSST7-PIERRE 7
CKT 1  OPENS  B C'
COM '-------------------------
-------------------------'
CONTINGENCY '112 '
TRIP LINE FROM BUS
66602 TO BUS 66601 CKT
1
TRIP LINE FROM BUS
66602 TO BUS 66489 CKT
1
END

COM '113 WAPA Defined
as multi-terminal,
Interregional'
COM 'NWPS huron-
westpark-redfield'
COM 'A 67411-66515
BTAP WP7-HURON  7
CKT 1  OPENS  B C'
COM 'B 67411-67403
BTAP WP7-REDFLD 7
CKT 1  OPENS  A C'
COM 'C 67411-67404
BTAP WP7-HURONWP7
CKT 1  OPENS  A B'
COM '-------------------------
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CONTINGENCY '113'
TRIP LINE FROM BUS
67411 TO BUS 66515 CKT
1
TRIP LINE FROM BUS
67411 TO BUS 67403 CKT
1
TRIP LINE FROM BUS
67411 TO BUS 67404 CKT
1
END

COM '114 WAPA Defined
as multi-terminal,
Interregional'
COM 'Little Missioui Tap'
COM 'A 67310-67265
BOWMAN 4-LTLMISS4
CKT 1  OPENS  B C'
COM 'B 67265-67304
LTLMISS4-BAKER  7 CKT
1  OPENS  A B'
COM 'C 67265-67263
LTLMISS4-LTLMISS7 CKT
1  OPENS  A C'
COM '--------------------------
--------------------------'
CONTINGENCY '114'
TRIP LINE FROM BUS
67310 TO BUS 67265 CKT
1
TRIP LINE FROM BUS
67265 TO BUS 67304 CKT
1
TRIP LINE FROM BUS
67265 TO BUS 67263 CKT
1
END

COM '120  Defined as
multi-circuit, tower'
COM 'A 66504-66531
BROOKNG7-WATERTN7
CKT 1  OPENS  B  tower'
COM 'B 66529-66537
WATERTN3-WHITE  3
CKT 1  OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '120  '
TRIP LINE FROM BUS
66504 TO BUS 66531 CKT
1
TRIP LINE FROM BUS
66529 TO BUS 66537 CKT
1
END

COM '108  Defined as
multi-circuit, tower'
COM 'A 66507-66509
FTTHOMP4-FTRANDL4
OPENS  B or C  tower'
COM 'B 66507-66516
FTTHOMP4-LAKPLAT4
OPENS  A  tower'
COM 'C 66509-66516
FTRANDL4-LAKPLAT4
OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '108  1'
TRIP LINE FROM BUS
66507 TO BUS 66509 CKT
1
TRIP LINE FROM BUS
66507 TO BUS 66516 CKT
1
TRIP LINE FROM BUS
66509 TO BUS 66516 CKT
1
END

COM '130  Defined as
multi-circuit, tower'
COM 'A 66507-66523
FTTHOMP4-SIOUXFL4
OPENS  BorCorD  tower'
COM 'B 66507-67122
FTTHOMP4-STORLA 4
OPENS  A  tower, MTL'
COM 'C 66513-67122
HANLON 4-STORLA 4
OPENS  A  tower, MTL'
COM 'D 66513-66523
HANLON 4-SIOUXFL4
OPENS  A  tower'
COM '**  Defined as multi-
terminal, MTL'
COM 'E 66507-67122
FTTHOMP4-STORLA 4
OPENS  F G'
COM 'F 66513-67122
HANLON 4-STORLA 4
OPENS  E G'
COM 'G 67122-67123
STORLA 4-STORLA 7
VLD SGL'
COM '--------------------------
--------------------------'
CONTINGENCY '130  1'
TRIP LINE FROM BUS
66507 TO BUS 66523 CKT
1
TRIP LINE FROM BUS
66507 TO BUS 67122 CKT
1
COM 'Also trips the
following because of B mtl'
TRIP LINE FROM BUS
66507 TO BUS 67122 CKT
1
TRIP LINE FROM BUS
66513 TO BUS 67122 CKT
1
TRIP LINE FROM BUS
67122 TO BUS 67123 CKT
1
END
CONTINGENCY '130  2'
TRIP LINE FROM BUS
66507 TO BUS 66523 CKT
1
TRIP LINE FROM BUS
66513 TO BUS 66523 CKT
1
END

COM '140  Defined as
multi-circuit, tower'
COM 'A 66507-66514
FTTHOMP4-HURON  4  1
OPENS  B  tower'
COM 'B 66507-66514
FTTHOMP4-HURON  4  2
OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '140  '
TRIP LINE FROM BUS
66507 TO BUS 66514 CKT
1
TRIP LINE FROM BUS
66507 TO BUS 66514 CKT
2
END

COM '150  Defined as
multi-circuit, tower'
COM 'A 66507-66519
FTTHOMP4-OAHE  4  1
OPENS  B  tower'
COM 'B 66507-66519
FTTHOMP4-OAHE  4  2
OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '150  '
TRIP LINE FROM BUS
66507 TO BUS 66519 CKT
1
TRIP LINE FROM BUS
66507 TO BUS 66519 CKT
2
END

COM '151  Defined as
multi-circuit'
COM 'A 66507-66519
FTTHOMP4-OAHE  4  3
OPENS  B  tower'
COM 'B 66507-66519
FTTHOMP4-OAHE  4  4
OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '151  '
TRIP LINE FROM BUS
66507 TO BUS 66519 CKT
3
TRIP LINE FROM BUS
66507 TO BUS 66519 CKT
4
END

COM '160  Defined as
multi-circuit, tower'
COM 'A 66509-66565
FTRANDL4-SIOUXCY4
OPENS  BorCorD  tower'
COM 'B 66509-66526
FTRANDL4-UTICAJC4
OPENS  A  tower, MTL'
COM 'C 66526-66536
UTICAJC4-RASMUSN4
OPENS  A  tower, MTL'
COM 'D 66536-66565
RASMUSN4-SIOUXCY4
OPENS  A  tower'
COM '**  Defined as multi-
terminal'
COM 'E 66509-66526
FTRANDL4-UTICAJC4
OPENS  F G'
COM 'F 66526-66398
UTICAJC4-VFODNES4
OPENS  E G'
COM 'G 66526-66536
UTICAJC4-RASMUSN4
OPENS  E F'
COM '--------------------------
--------------------------'
CONTINGENCY '160  1'
TRIP LINE FROM BUS
66509 TO BUS 66565 CKT
1
TRIP LINE FROM BUS
66509 TO BUS 66526 CKT
1
COM 'Also trips the
following because of B'
TRIP LINE FROM BUS
66526 TO BUS 66536 CKT
1
TRIP LINE FROM BUS
66398 TO BUS 66526 CKT
1
END
CONTINGENCY '160  2'
TRIP LINE FROM BUS
66509 TO BUS 66565 CKT
1
TRIP LINE FROM BUS
66536 TO BUS 66565 CKT
1
END
CONTINGENCY '160  3'
TRIP LINE FROM BUS
66509 TO BUS 66526 CKT
1
TRIP LINE FROM BUS
66398 TO BUS 66526 CKT
1
TRIP LINE FROM BUS
66526 TO BUS 66536 CKT
1
END

COM '170  Defined as
multi-circuit, tower'
COM 'A 66514-66530
HURON  4-WATERTN4  1
OPENS  B  tower'
COM 'B 66514-66530
HURON  4-WATERTN4  2
OPENS  A  tower'
COM '--------------------------
--------------------------'
CONTINGENCY '170  '
TRIP LINE FROM BUS
66514 TO BUS 66530 CKT
1
TRIP LINE FROM BUS
66514 TO BUS 66530 CKT
2
END
```

```
COM '180 GRE Defined as multi-terminal tower'
COM 'multi-terminal trips A B and C'
COM 'A 63041-63042 COAL CR4-COAL TP4 OPENS B, C'
COM 'B 63042-63049 COAL TP4-STANTON4 OPENS A, C'
COM 'C 63042-63044 COAL TP4-MCHENRY4 OPENS A, B'
COM 'A and B multi-circuit tower with portions of D and operating response'
COM 'D 63041-63049 COAL CR4-STANTON4'
COM '-------------------------------------------------------------'
CONTINGENCY '180 1'
COM 'mtl outage portion'
TRIP LINE FROM BUS 63041 TO BUS 63042 CKT 1
TRIP LINE FROM BUS 63042 TO BUS 63049 CKT 1
TRIP LINE FROM BUS 63042 TO BUS 63044 CKT 1
END
CONTINGENCY '180 2'
COM 'Common tower outage with mtl portion'
TRIP LINE FROM BUS 63041 TO BUS 63042 CKT 1
TRIP LINE FROM BUS 63042 TO BUS 63049 CKT 1
TRIP LINE FROM BUS 63042 TO BUS 63044 CKT 1
TRIP LINE FROM BUS 63041 TO BUS 63049 CKT 1
END


COM '190 Defined as multi-terminal'
COM 'A 66436-66707 FARGO 7-CLDONIA7 CKT 1 OPENS B C D E F'
COM 'B 66707-66430 CALEDON7-EGF IND7 CKT 1 OPENS C C D E F'
COM 'C 66430-66443 EGF IND7-GRNDFKS7 CKT 1 OPENS A B D E F'
COM 'D 66772-66707 CALEDONT-CALEDON7 CKT 1 OPENS A B C E F'
COM 'E 66772-66777 CALEDONT-CALEDON9 CKT 1 OPENS A B C D F'
COM 'F 66772-67053 CALEDONT-CALEDON8 CKT 1 OPENS A B C D E'
COM '-------------------------------------------------------------'
CONTINGENCY '190 '
TRIP LINE FROM BUS 66436 TO BUS 66707 CKT 1
TRIP LINE FROM BUS 66707 TO BUS 66430 CKT 1
TRIP LINE FROM BUS 66430 TO BUS 66443 CKT 1
TRIP LINE FROM BUS 66772 TO BUS 66707 CKT 1
TRIP LINE FROM BUS 66772 TO BUS 66777 CKT 1
TRIP LINE FROM BUS 66772 TO BUS 67053 CKT 1
END

COM '200 Defined as multi-terminal'
COM 'A 66437-66759 GRNDFKS4-PICKERT4 CKT 1 OPENS B C D E'
COM 'B 66444-66759 JAMESTN4-PICKERT4 CKT 1 OPENS A C D E'
COM 'C 66759-63188 PICKERT4-PICKERTY CKT 1 OPENS A B D E'
COM 'D 63188-66923 PICKERTY-PICKERT8 CKT 1 OPENS A B C E'
COM 'E 63188-63167 PICKERTY-PICKERT9 CKT 1 OPENS A B C D'
COM '-------------------------------------------------------------'
CONTINGENCY '200 '
TRIP LINE FROM BUS 66437 TO BUS 66759 CKT 1
TRIP LINE FROM BUS 66444 TO BUS 66759 CKT 1
TRIP LINE FROM BUS 66759 TO BUS 63188 CKT 1
TRIP LINE FROM BUS 63188 TO BUS 66923 CKT 1
TRIP LINE FROM BUS 63188 TO BUS 63167 CKT 1
END

COM '210 Defined as multi-terminal'
COM 'A 66484-66488 NUNDRWD4-PHILTAP4 CKT 1 OPENS B C'
COM 'B 66488-66519 PHILTAP4-OAHE 4 CKT 1 OPENS A C'
COM 'C 66486-66488 PHILIP 4-PHILTAP4 CKT 1 OPENS A B'
COM '-------------------------------------------------------------'
CONTINGENCY '210 '
TRIP LINE FROM BUS 66484 TO BUS 66488 CKT 1
TRIP LINE FROM BUS 66488 TO BUS 66519 CKT 1
TRIP LINE FROM BUS 66486 TO BUS 66488 CKT 1
END

COM '220 Defined as multi-terminal'
COM 'A 63358-63369 BUFFALO3-JAMESTN3 OPENS B C D E F G H I J K'
COM 'B 66792-63358 MAPLE R3-BUFFALO3 OPENS A C D E F G H I J K'
COM 'C 63358-63198 BUFFALO3-BUFFALOY OPENS A B D E F G H I J K'
COM 'D 63198-63258 BUFFALOY-BUFFALO7 OPENS A B C E F G H I J K'
COM 'E 63198-63158 BUFFALOY-BUFFALO9 OPENS A B C D F G H I J K'
COM 'F 66792-63189 MAPLE R3-MAPLER1Y OPENS A B C D E G H I J K'
COM 'G 63189-66754 MAPLER1Y-MAPLE R4 OPENS A B C D E F H I J K'
COM 'H 63189-63359 MAPLER1Y-MAPLER19 OPENS A B C D E F G I J K'
COM 'I 66792-63190 MAPLE R3-MAPLER2Y OPENS A B C D E F G H J K'
COM 'J 63190-66754 MAPLER2Y-MAPLE R4 OPENS A B C D E F G H I K'
COM 'K 63190-63360 MAPLER2Y-MAPLER29 OPENS A B C D E F G H I J'
COM '-------------------------------------------------------------'
CONTINGENCY '220 '
TRIP LINE FROM BUS 63358 TO BUS 63369 CKT 1
TRIP LINE FROM BUS 66792 TO BUS 63358 CKT 1
TRIP LINE FROM BUS 63358 TO BUS 63198 CKT 1
TRIP LINE FROM BUS 63198 TO BUS 63258 CKT 1
TRIP LINE FROM BUS 63198 TO BUS 63158 CKT 1
TRIP LINE FROM BUS 66792 TO BUS 63189 CKT 1
TRIP LINE FROM BUS 63189 TO BUS 66754 CKT 1
TRIP LINE FROM BUS 63189 TO BUS 63359 CKT 1
TRIP LINE FROM BUS 63190 TO BUS 66754 CKT 1
TRIP LINE FROM BUS 66792 TO BUS 63190 CKT 1
TRIP LINE FROM BUS 63190 TO BUS 63360 CKT 1
END

COM '230 OTP Defined as multi-terminal'
COM 'A 63363-63327 FORMAN 4-HANKSON4 OPENS B C D E F G H I J K L M'
COM 'B 63363-63362 FORMAN 4-OAKS 4 OPENS A C D E F G H I J K L M'
COM 'C 67326-63362 ELLENDL4-OAKS 4 OPENS A B D E F G H I J K L M'
COM 'D 63362-63162 OAKS 4-OAKS 9 OPENS A B C E F G H I J K L M'
COM 'E 63363-63193 FORMAN 4-FORMAN Y OPENS A B C D F G H I J K L M'
COM 'F 63193-63163 FORMAN Y-FORMAN 9 OPENS A B C D E G H I J K L M'
COM 'G 63193-63263 FORMAN Y-FORMAN 7 OPENS A B C D E F H I J K L M'
COM '-------------------------------------------------------------'
CONTINGENCY '230 '
COM 'Trip of the 230kV line sections and Forman'
```

```
TRIP LINE FROM BUS
63363 TO BUS 63327 CKT
1
TRIP LINE FROM BUS
63363 TO BUS 63362 CKT
1
TRIP LINE FROM BUS
67326 TO BUS 63362 CKT
1
TRIP LINE FROM BUS
63362 TO BUS 63162 CKT
1
TRIP LINE FROM BUS
63363 TO BUS 63193 CKT
1
TRIP LINE FROM BUS
63193 TO BUS 63163 CKT
1
TRIP LINE FROM BUS
63193 TO BUS 63263 CKT
1
END

COM '250  GRE Defined as
multi-terminal line, upa/otp'
COM 'A 66755-63047
PRAIRIE4-RAMSEY 4
VLD SGL'
COM 'B 63056-63047
BALTA  4-RAMSEY 4
VLD SGL'
COM 'C 63266-63047
RAMSEY 7-RAMSEY 4
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '250    '
COM 'Transformer fault at
Ramsey, mtl'
TRIP LINE FROM BUS
66755 TO BUS 63047 CKT
1
TRIP LINE FROM BUS
63056 TO BUS 63047 CKT
1
TRIP LINE FROM BUS
63266 TO BUS 63047 CKT
1
END

COM '260  GRE Defined as
multi-terminal line'
COM 'A 63044-63056
MCHENRY4-BALTA  4
OPENS B C'
COM 'B 63042-63044
COAL TP4-MCHENRY4
OPENS '
COM 'C 63044-60140
MCHENRY4-MCHENRY7
OPENS A B '
COM '-----------------------------
-----------------------------'
CONTINGENCY '260      '
TRIP LINE FROM BUS
63044 TO BUS 63056
CKT 1
TRIP LINE FROM BUS
63042 TO BUS 63044
CKT 1
TRIP LINE FROM BUS
63044 TO BUS 60140 CKT
1
END

COM ' '
COM ' '
COM ' '
COM '  END DAKOTA
AREA CONTINGENCIES'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
2
END

COM ' '
COM ' '
COM ' '
COM '  START
NEBRASKA AREA
CONTINGENCIES'
COM ' '
COM '380  Defined as
multi-terminal, Interregional'
COM 'A 64786-96039
COOPER 3-7FAIRPT
OPENS B'
COM 'B 96039-59393
7FAIRPT -ST JOE 3
OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '380      '
TRIP LINE FROM BUS
64786 TO BUS 96039 CKT
1
TRIP LINE FROM BUS
96039 TO BUS 59393 CKT
1
END

COM '300 Defined as multi-
terminal, or multi-circuit
tower RW'
COM 'A 65001-66573
VICTRYH4-STEGALL4
CKT 1   OPENS B C D'
COM 'B 65001-65045
VICTRYH4-VICTHL Y CKT
1   OPENS A C D'
COM 'C 65002-65045
VICTRYH7-VICTHL Y CKT
1   OPENS A B D'
COM 'D 65000-65045
VICTR10G-VICTHL Y CKT
1   OPENS A B C'
COM '-----------------------------
-----------------------------'
CONTINGENCY '300      '
TRIP LINE FROM BUS
65001 TO BUS 66573 CKT
1
TRIP LINE FROM BUS
65001 TO BUS 65045 CKT
1
TRIP LINE FROM BUS
65002 TO BUS 65045 CKT
1
TRIP LINE FROM BUS
65000 TO BUS 65045 CKT
1
END

COM '310  Defined as
multi-circuit,  tower RW'
COM 'A 64831-64943
GENTLMN3-REDWILO3
CKT 1   OPENS  B'
COM 'B 64831-64984
GENTLMN3-SWEET W3
CKT 2   OPENS  A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '310      '
TRIP LINE FROM BUS
64831 TO BUS 64943 CKT
1
TRIP LINE FROM BUS
64831 TO BUS 64984 CKT
2
END

COM '320  Defined as
multi-circuit, tower and RW'
COM 'A 64832-64909
GENTLMN4-N.PLATT4  2
OPENS   B      tower'
COM 'B 64832-64909
GENTLMN4-N.PLATT4  3
OPENS   A      tower'
COM 'Simultaneous outage
of A and B will OPENS   C'
COM 'C 64759-64909
C.CREEK4-N.PLATT4  1
OPENS   BorA      RW'
COM '-----------------------------
-----------------------------'
CONTINGENCY '320     1'
TRIP LINE FROM BUS
64832 TO BUS 64909 CKT
2
TRIP LINE FROM BUS
64832 TO BUS 64909 CKT
3
TRIP LINE FROM BUS
64759 TO BUS 64909 CKT
1
END

COM '330  Defined as
multi-circuit, RW'
COM 'A 64984-66571
SWEET W3-GR ISLD3
OPENS  B        RW'
COM 'B 66506-66571
FTTHOMP3-GR ISLD3
OPENS  A        RW'
COM '-----------------------------
-----------------------------'
CONTINGENCY '330      '
TRIP LINE FROM BUS
64984 TO BUS 66571 CKT
1
TRIP LINE FROM BUS
66506 TO BUS 66571 CKT
1
END

COM '340  Defined as
multi-circuit,  RW'
COM 'A 64839-64847  GR
ISLD4-HASTING4
OPENS  B C D  RW, MTL'

COM 'B 65271-64804
SUB-D  7-DONIPHN7
OPENS  A C D  RW, MTL'
COM 'C 64804-64805
DONIPHN7-DONIPHN9
OPENS  A B D'
COM 'D 64804-64941
DONIPHN7-PROSSER7
OPENS  A B C'
COM '-----------------------------
-----------------------------'
CONTINGENCY '340    '
TRIP LINE FROM BUS
64839 TO BUS 64847 CKT
1
TRIP LINE FROM BUS
65271 TO BUS 64804 CKT
1
TRIP LINE FROM BUS
64804 TO BUS 64805 CKT
1
TRIP LINE FROM BUS
64804 TO BUS 64941 CKT
1
END

COM '350  Defined as
multi-terminal'
COM 'A 64839-64847  GR
ISLD4-HASTING4
OPENS B C'
COM 'B 64847-65030
HASTING4-HASTNG Y
OPENS A C'
COM 'C 64848-65030
HASTING7-HASTNG Y
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '350    '
TRIP LINE FROM BUS
64839 TO BUS 64847 CKT
1
TRIP LINE FROM BUS
64847 TO BUS 65030 CKT
1
TRIP LINE FROM BUS
64848 TO BUS 65030 CKT
1
END

COM '360  Defined as
multi-terminal'
COM 'A 64765-64759
CANADAY4-C.CREEK4
OPENS B C'
COM 'B 64765-65022
CANADAY4-CANADAYY
OPENS A C'
COM 'C 64766-65022
CANADAY7-CANADAYY
OPENS A B'
COM '-----------------------------
-----------------------------'
```

```
CONTINGENCY '360   '
TRIP LINE FROM BUS
64765 TO BUS 64759 CKT
1
TRIP LINE FROM BUS
64765 TO BUS 65022 CKT
1
TRIP LINE FROM BUS
64766 TO BUS 65022 CKT
1
END

COM '370 OTP Defined as
multi-terminal'
COM 'A 64858-63875
HOSKINS3-RAUN  3
OPENS B C D'
COM 'B 64858-65032
HOSKINS3-HOSKNS Y
OPENS A C D'
COM 'C 64862-65032
HOSKNS19-HOSKNS Y
OPENS A B D'
COM 'D 64860-65032
HOSKINS7-HOSKNS Y
OPENS A B C'
COM '-------------------------
-------------------------'
CONTINGENCY '370   '
TRIP LINE FROM BUS
64858 TO BUS 63875 CKT
1
TRIP LINE FROM BUS
64858 TO BUS 65032 CKT
1
TRIP LINE FROM BUS
64862 TO BUS 65032 CKT
1
TRIP LINE FROM BUS
64860 TO BUS 65032 CKT
1
END

COM '380 OTP Defined as
multi-terminal'
COM 'A 64806-64783
E.COL. 4-COLMBUS4
OPENS B C D'
COM 'B 64806-65025
E.COL. 4-E.COL. Y
OPENS A C D'
COM 'C 64807-65025
E.COL. 9-E.COL. Y
OPENS A B D'
COM 'D 64778-65025
COLMB.E7-E.COL. Y
OPENS A B C'
COM '-------------------------
-------------------------'
<   Add this contingency
CONTINGENCY '380   '
TRIP LINE FROM BUS
64806 TO BUS 64783 CKT
1
TRIP LINE FROM BUS
64806 TO BUS 65025 CKT
1
TRIP LINE FROM BUS
64807 TO BUS 65025 CKT
1
TRIP LINE FROM BUS
64778 TO BUS 65025 CKT
1
END

COM '390  Defined as
multi-circuit, TOWER and
RW only'
COM 'A 64920-64889
NORFOLK7-MADISON7
CKT 1   OPENS B C D E F
G'
COM 'B 64889-64890
MADISON7-MADISON9
CKT 1   OPENS A C D E F
G'
COM 'C 64889-64796
MADISON7-CRESTON7
CKT 1   OPENS A B D E F
G'
COM 'D 64796-64797
CRESTON7-CRESTON9
CKT 1   OPENS A B C E F
G'
COM 'E 64796-64797
CRESTON7-CRESTON9
CKT 2   OPENS A B C D F
G'
COM 'F 64796-64784
CRESTON7-COLMBUS7
CKT 1   OPENS A B C D E
G'
COM 'G 64783-64859
COLMBUS4-HOSKINS4
CKT 1   OPENS A B C D E
F'
COM '-------------------------
-------------------------'
CONTINGENCY '390   '
TRIP LINE FROM BUS
64920 TO BUS 64889 CKT
1
TRIP LINE FROM BUS
64889 TO BUS 64890 CKT
1
TRIP LINE FROM BUS
64889 TO BUS 64796 CKT
1
TRIP LINE FROM BUS
64796 TO BUS 64797 CKT
1
TRIP LINE FROM BUS
64796 TO BUS 64797 CKT
2
TRIP LINE FROM BUS
64796 TO BUS 64784 CKT
1
TRIP LINE FROM BUS
64783 TO BUS 64859 CKT
1
END

COM '400 Defined as multi-
circuit   tower'
COM 'A 65401-65420
S1201  5-S1220  5  1
OPENS   B  tower'
COM 'B 65401-65486
S1201  5-S1286  5  1
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '400   '
TRIP LINE FROM BUS
65401 TO BUS 65420 CKT
1
TRIP LINE FROM BUS
65401 TO BUS 65486 CKT
1
END

COM '410  Defined as
multi-circuit   tower'
COM 'A 65450-65409
S1250  5-S1209  5  1
OPENS   B  tower'
COM 'B 65450-65409
S1250  5-S1209  5  2
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '410   '
TRIP LINE FROM BUS
65450 TO BUS 65409 CKT
1
TRIP LINE FROM BUS
65450 TO BUS 65409 CKT
2
END

COM '420 Defined as multi-
circuit   tower'
COM 'A 65450-65411
S1250  5-S1211  5  1
OPENS   B  tower'
COM 'B 65450-65411
S1250  5-S1211  5  2
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '420   '
TRIP LINE FROM BUS
65450 TO BUS 65411 CKT
1
TRIP LINE FROM BUS
65450 TO BUS 65411 CKT
2
END

COM '430 Defined as multi-
circuit   tower'
COM 'A 65411-65420
S1211  5-S1220  5  1
OPENS   B  tower'
COM 'B 65411-65499
S1211  5-S1299  5  1
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '430   '
OPEN BRANCH FROM
BUS 65411 TO BUS 65420
CKT 1
OPEN BRANCH FROM
BUS 65411 TO BUS 65499
CKT 1
END

COM '431 Defined as multi-
circuit   tower'
COM 'A 65411-65420
S1211  5-S1220  5  1
OPENS   B  tower'
COM 'B 65499-65486
S1299  5-S1286  5  1
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '431   '
OPEN BRANCH FROM
BUS 65411 TO BUS 65420
CKT 1
OPEN BRANCH FROM
BUS 65499 TO BUS 65486
CKT 1
END

COM '440 Defined as multi-
circuit   tower'
COM 'A 65409-65431
S1209  5-S1231  5  1
OPENS   B  tower'
COM 'B 65409-65431
S1209  5-S1231  5  2
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '440   '
TRIP LINE FROM BUS
65409 TO BUS 65431 CKT
1
TRIP LINE FROM BUS
65409 TO BUS 65431 CKT
2
END

COM '450  Defined as
multi-circuit   tower'
COM 'A 65431-65435
S1231  5-S1235  5  1
OPENS   B  tower'
COM 'B 65435-65434
S1235  5-S1234  5  1
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '450   '
TRIP LINE FROM BUS
65431 TO BUS 65435 CKT
1
TRIP LINE FROM BUS
65435 TO BUS 65434 CKT
1
END

COM '451 Defined as multi-
circuit   tower'
COM 'A 65421-65431
S1221  5-S1231  5  1
OPENS   B  tower'
COM 'B 65421-65455
S1221  5-S1255  5  1
OPENS   A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '451   '
OPEN BRANCH FROM
BUS 65421 TO BUS 65431
CKT 1
```

```
OPEN BRANCH FROM
BUS 65421 TO BUS 65455
CKT 1
END

COM '452 Defined as multi-
circuit  tower'
COM 'A 65426-65451
S1226  5-S1251  5  1
OPENS  B  tower'
COM 'B 65426-65498
S1226  5-S1298  5  1
OPENS  A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '452  '
OPEN BRANCH FROM
BUS 65426 TO BUS 65451
CKT 1
OPEN BRANCH FROM
BUS 65426 TO BUS 65498
CKT 1
END

COM '453 Defined as multi-
circuit  tower'
COM 'A 65437-65445
S1237  5-S1345  5  1
OPENS  B  tower'
COM 'B 65437-65453
S1237  5-S1253  5  1
OPENS  A  tower'
COM '-------------------------
-------------------------'
CONTINGENCY '453  '
OPEN BRANCH FROM
BUS 65437 TO BUS 65445
CKT 1
OPEN BRANCH FROM
BUS 65437 TO BUS 65453
CKT 1
END

COM '460 Defined as multi-
circuit  tower'
COM 'A 65351-65359
S3451  3-S3459  3  1
OPENS  B  tower'
COM 'B 65351-65354
S3451  3-S3454  3  1
OPENS  A  tower'
COM ' SUB3451 is referred
to as FT CALHOUN'
COM ' SUB3459 is referred
to as BLONDO'
COM '-------------------------
-------------------------'
CONTINGENCY '460  '
TRIP LINE FROM BUS
65351 TO BUS 65359 CKT
1
TRIP LINE FROM BUS
65351 TO BUS 65354 CKT
1
END

COM '461 Defined as multi-
terminal'
COM 'A 65384-65410
S1210T7T-S1210  5  1
OPENS  B C D'
COM 'B 65384-65510
S1210T7T-S910  8  1
OPENS  A C D'
COM 'C 65410-65417
S1210  5-S1217  5  1'
COM 'D 65410-65422
S1210  5-S1222  5  1'
COM 'Load at 65410
S1210  5 becomes
separated'
COM '-------------------------
-------------------------'
CONTINGENCY '461  '
OPEN BRANCH FROM
BUS 65384 TO BUS 65410
CKT 1
OPEN BRANCH FROM
BUS 65384 TO BUS 65510
CKT 1
MOVE 50 PERCENT
LOAD FROM BUS 65410
TO BUS 65417
MOVE 50 PERCENT
LOAD FROM BUS 65410
TO BUS 65422
OPEN BRANCH FROM
BUS 65410 TO BUS 65417
CKT 1
OPEN BRANCH FROM
BUS 65410 TO BUS 65422
CKT 1
END

COM '462 Defined as multi-
terminal'
COM 'A 65384-65410
S1210T7T-S1210  5  1
OPENS  B C D'
COM 'B 65384-65510
S1210T7T-S910  8  1
OPENS  A C D'
COM 'C 65410-65417
S1210  5-S1217  5  1'
COM 'D 65410-65422
S1210  5-S1222  5  1'
COM 'Note:  This
contingency is a repeat of
contingency 461 but
without'
COM '  the MOVE
records, for compatibility
with Activity ACCC'
COM '-------------------------
-------------------------'
CONTINGENCY '462  '
OPEN BRANCH FROM
BUS 65384 TO BUS 65410
CKT 1
OPEN BRANCH FROM
BUS 65384 TO BUS 65510
CKT 1
OPEN BRANCH FROM
BUS 65410 TO BUS 65417
CKT 1
OPEN BRANCH FROM
BUS 65410 TO BUS 65422
CKT 1
END

COM '463 Defined as multi-
terminal'
COM 'A 65387-65417
S1217T1T-S1217  5  1
OPENS  B C D'
COM 'B 65387-65517
S1217T1T-S917  8  1
OPENS  A C D'
COM 'C 65417-65410
S1217  5-S1210  5  1'
COM 'D 65417-65427
S1217  5-S1227  5  1'
COM 'Load at 65417
S1217  5 becomes
separated'
COM '-------------------------
-------------------------'
CONTINGENCY '463  '
OPEN BRANCH FROM
BUS 65387 TO BUS 65417
CKT 1
OPEN BRANCH FROM
BUS 65387 TO BUS 65517
CKT 1
MOVE 50 PERCENT
LOAD FROM BUS 65417
TO BUS 65410
MOVE 50 PERCENT
LOAD FROM BUS 65417
TO BUS 65427
OPEN BRANCH FROM
BUS 65417 TO BUS 65410
CKT 1
OPEN BRANCH FROM
BUS 65417 TO BUS 65427
CKT 1
END

COM '464 Defined as multi-
terminal'
COM 'A 65387-65417
S1217T1T-S1217  5  1
OPENS  B C D'
COM 'B 65387-65517
S1217T1T-S917  8  1
OPENS  A C D'
COM 'C 65417-65410
S1217  5-S1210  5  1'
COM 'D 65417-65427
S1217  5-S1227  5  1'
COM 'Note:  This
contingency is a repeat of
contingency 463 but
without'
COM '  the MOVE
records, for compatibility
with Activity ACCC'
COM '-------------------------
-------------------------'
CONTINGENCY '464  '
OPEN BRANCH FROM
BUS 65387 TO BUS 65417
CKT 1
OPEN BRANCH FROM
BUS 65387 TO BUS 65517
CKT 1
OPEN BRANCH FROM
BUS 65417 TO BUS 65410
CKT 1
OPEN BRANCH FROM
BUS 65417 TO BUS 65427
CKT 1
END

COM '465 Defined as multi-
terminal'
COM 'A 65388-65421
S1221T9T-S1221  5  1
OPENS  B C D'
COM 'B 65388-65521
S1221T9T-S921  8  1
OPENS  A C D'
COM 'C 65421-65431
S1221  5-S1231  5  1'
COM 'D 65421-65455
S1221  5-S1255  5  1'
COM 'Load at 65421
S1221  5 becomes
separated'
COM '-------------------------
-------------------------'
CONTINGENCY '465  '
OPEN BRANCH FROM
BUS 65388 TO BUS 65421
CKT 1
OPEN BRANCH FROM
BUS 65388 TO BUS 65521
CKT 1
MOVE 50 PERCENT
LOAD FROM BUS 65421
TO BUS 65431
MOVE 50 PERCENT
LOAD FROM BUS 65421
TO BUS 65455
OPEN BRANCH FROM
BUS 65421 TO BUS 65431
CKT 1
OPEN BRANCH FROM
BUS 65421 TO BUS 65455
CKT 1
END

COM '466 Defined as multi-
terminal'
COM 'A 65388-65421
S1221T9T-S1221  5  1
OPENS  B C D'
COM 'B 65388-65521
S1221T9T-S921  8  1
OPENS  A C D'
COM 'C 65421-65431
S1221  5-S1231  5  1'
COM 'D 65421-65455
S1221  5-S1255  5  1'
COM 'Note:  This
contingency is a repeat of
another contingency but
without'
COM '  the MOVE
records, for compatibility
with Activity ACCC'
COM '-------------------------
-------------------------'
CONTINGENCY '466  '
```

```
OPEN BRANCH FROM
BUS 65388 TO BUS 65421
CKT 1
OPEN BRANCH FROM
BUS 65388 TO BUS 65521
CKT 1
OPEN BRANCH FROM
BUS 65421 TO BUS 65431
CKT 1
OPEN BRANCH FROM
BUS 65421 TO BUS 65455
CKT 1
END

COM '467 Defined as multi-
terminal'
COM 'A 65481-65459
S1281  5-S1259  5   1
OPENS   B'
COM 'B 65481-65454
S1281  5-S1254  5   1'
COM '-----------------------------
-----------------------------'
CONTINGENCY '467     '
OPEN BRANCH FROM
BUS 65481 TO BUS 65459
CKT 1
OPEN BRANCH FROM
BUS 65481 TO BUS 65454
CKT 1
END

COM ' '
COM ' '
COM ' END NEBRASKA
AREA CONTINGENCIES'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
3
END

COM ' '
COM ' '
COM ' '
COM ' '
COM ' '
COM ' START
MINNESOTA AREA
CONTINGENCIES'
COM ' '
COM ' '
COM 'NSP  Defined as
multi-circuit, tower, multi-
terminal'
COM 'A 60256-60263
WSTGATE7-EDEN PR7
CKT1   OPENS B tower, C
mtl'
COM 'B 60256-60263
WSTGATE7-EDEN PR7
CKT2   OPENS A tower'
COM 'C 60256-60894
WSTGATE7-WSTGAT28
VLD SNG'
COM 'D 60256-60895
WSTGATE7-WSTGAT18
OPENS only for both A&B'
COM 'E 60256-60257
WSTGATE7-BLUFFCK7
OPENS only for both A&B'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    1'
TRIP LINE FROM BUS
60256 TO BUS 60263 CKT
1
TRIP LINE FROM BUS
60256 TO BUS 60263 CKT
2
TRIP LINE FROM BUS
60256 TO BUS 60894 CKT
1
TRIP LINE FROM BUS
60256 TO BUS 60895 CKT
1
TRIP LINE FROM BUS
60256 TO BUS 60257 CKT
1
END
CONTINGENCY 'NSP    2'
TRIP LINE FROM BUS
60256 TO BUS 60263 CKT
1
TRIP LINE FROM BUS
60256 TO BUS 60894 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60192-60108
BLUE LK3-WILMART3
OPENS B tower'
COM 'B 60215-60261
HYLNDLK7-DEANLAK7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60192 TO BUS 60108 CKT
1
TRIP LINE FROM BUS
60215 TO BUS 60261 CKT
1
TRIP LINE FROM BUS
60108 TO BUS 60103 CKT
1  / MEC
TRIP LINE FROM BUS
60110 TO BUS 60360 CKT
1  / MEC
CHANGE BUS 60056
GENERATION BY  200
MW
CHANGE BUS 60057
GENERATION BY  179
MW
END


COM 'NSP  Defined as
multi-circuit, tower, multi-
terminal'
COM 'A 60192-60108
BLUE LK3-WILMART3
OPENS B tower'
COM 'B 60244-60261
SCOTTCO7-DEANLAK7
OPENS A tower, C mtl'
COM 'C 60244-60890
SCOTTCO7-SCOTTCO8
VLD SNG
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    1'
TRIP LINE FROM BUS
60192 TO BUS 60108 CKT
1
TRIP LINE FROM BUS
60244 TO BUS 60261 CKT
1
TRIP LINE FROM BUS
60244 TO BUS 60890 CKT
1
TRIP LINE FROM BUS
60108 TO BUS 60103 CKT
1  / MEC
TRIP LINE FROM BUS
60110 TO BUS 60360 CKT
1  / MEC
CHANGE BUS 60056
GENERATION BY  200
MW
CHANGE BUS 60057
GENERATION BY  179
MW
END
CONTINGENCY 'NSP   2A'
TRIP LINE FROM BUS
60244 TO BUS 60261 CKT
1
TRIP LINE FROM BUS
60244 TO BUS 60890 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60215-60261
HYLNDLK7-DEANLAK7
OPENS B tower'
COM 'B 60215-60193
HYLNDLK7-BLUE LK7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60215 TO BUS 60261 CKT
1
TRIP LINE FROM BUS
60215 TO BUS 60193 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60249-60182
STLSPRK7-ALDRCH27
OPENS B tower'
COM 'B 60249-60346
STLSPRK7-CEDARLK7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60249 TO BUS 60182 CKT
1
TRIP LINE FROM BUS
60249 TO BUS 60346 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60208-60263
EDINA  7-EDEN PR7
OPENS B tower'
COM 'B 60208-60280
EDINA  7-NINE MI7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60208 TO BUS 60263 CKT
1
TRIP LINE FROM BUS
60208 TO BUS 60280 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60246-60195  SO
TOWN7-CDRVALE7
OPENS B tower'
COM 'B 60246-60245  SO
TOWN7-SHEPARD7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60246 TO BUS 60195 CKT
1
TRIP LINE FROM BUS
60246 TO BUS 60245 CKT
1
END


COM 'NSP  Defined as
multi-circuit, tower'
COM 'A 60153-60155
MNTCELO7-PULASKI7
OPENS B tower'
COM 'B 60153-62955
MNTCELO7-OAKWOOD7
OPENS A tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60153 TO BUS 60155 CKT
1
TRIP LINE FROM BUS
60153 TO BUS 62955 CKT
1
END
```

```
COM 'NSP  Defined as
multi-circuit, multi-terminal'
COM 'A 60221-60202
KOLMNLK3-COON CK3
OPENS  B TOWER, C
MTL'
COM 'B 60221-60251
KOLMNLK3-TERMINL3
OPENS  A tower, DEF mtl'
COM 'C 60221-60222
KOLMNLK3-KOLMNLK7
VLD SNG'
COM 'D 61491-60251
TERMID2Y-TERMINL3   D
E F VLD SNG'
COM 'E 61491-60252
TERMID2Y-TERMINL7   D
E F VLD SNG'
COM 'F 61491-61188
TERMID2Y-TERTER29   D
E F VLD SNG'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60221 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60251 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60222 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 60251 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 60252 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 61188 CKT
9
END


COM 'NSP  Defined as
multi-circuit, multi-terminal'
COM 'A 60221-60199
KOLMNLK3-CHIS CO3
OPENS  B TOWER, C
MTL'
COM 'B 60221-60186
KOLMNLK3-AS KING3
OPENS  A tower'
COM 'C 60221-60222
KOLMNLK3-KOLMNLK7
ckt 10   VLD SNG'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    1'
TRIP LINE FROM BUS
60221 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60186 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60222 CKT
10
END
CONTINGENCY 'NSP    2'
TRIP LINE FROM BUS
60221 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60222 CKT
10
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60186-60199  AS
KING3-CHIS CO3
OPENS  B TOWER'
COM 'B 60186-60221  AS
KING3-KOLMNLK3
OPENS  A tower'
COM 'C 60186-60304  AS
KING3-EAU CL 3   only for
both A&B, mtl DE'
COM 'D 60304-39244  EAU
CL 3-ARP 345    vld sgl'
COM 'E 60304-60305  EAU
CL 3-EAU CLA5 ckt9
OPENS C D'
COM ' These lines are west
of Council Creek'
COM ' They could trip for
loss of E.C.-Arpin 345 kV'
COM ' 39901 [COC DPC
] to 38342 [COC 69  69.0]'
COM ' 38333 [HLT 69
69.0] to 68821 [MAUSTON
69.0]'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    1'
TRIP LINE FROM BUS
60186 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
TRIP LINE FROM BUS
39901 TO BUS 38342 CKT
1
TRIP LINE FROM BUS
38333 TO BUS 68821 CKT
1
END
CONTINGENCY 'NSP    2'
TRIP LINE FROM BUS
60186 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60186-60199  AS
KING3-CHIS CO3   only for
both B&C'
COM 'B 60186-60236  AS
KING3-REDROCK3
OPENS  C tower'
COM 'C 60186-60304  AS
KING3-EAU CL 3   OPENS
B tower, mtl DE'
COM 'D 60304-39244  EAU
CL 3-ARP 345    vld sgl'
COM 'E 60304-60305  EAU
CL 3-EAU CLA5 ckt9
OPENS C D'
COM ' These lines are west
of Council Creek'
COM ' They could trip for
loss of E.C.-Arpin 345 kV'
COM ' 39901 [COC DPC
] to 38342 [COC 69  69.0]'
COM ' 38333 [HLT 69
69.0] to 68821 [MAUSTON
69.0]'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    1'
TRIP LINE FROM BUS
60186 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60236 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
TRIP LINE FROM BUS
39901 TO BUS 38342 CKT
1
TRIP LINE FROM BUS
38333 TO BUS 68821 CKT
1
END
CONTINGENCY 'NSP    2'
TRIP LINE FROM BUS
60186 TO BUS 60199 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60236 CKT
1
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
END


COM 'NSP  Defined as
multi-terminal'
COM 'A 60185-60225
ARDNHLS7-LXNGTON7
OPENS B mtl'
COM 'B 60185-60918
ARDNHLS7-ARDNHLS8
vld sgl'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60185 TO BUS 60225 CKT
1
TRIP LINE FROM BUS
60185 TO BUS 60918 CKT
1
END


COM 'NSP  Defined as
multi-terminal'
COM 'A 62091-60225
VADNSTP7-LXNGTON7
OPENS B C mtl'
COM 'B 62091-60212
VADNSTP7-GOOSELK7
OPENS A C mtl'
COM 'C 62091-62092
VADNSTP7-VADNAIS7
OPENS A B mtl'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
62091 TO BUS 60225 CKT
1
TRIP LINE FROM BUS
62091 TO BUS 60212 CKT
1
TRIP LINE FROM BUS
62091 TO BUS 62092 CKT
1
END


COM 'NSP  Defined as
multi-terminal'
COM 'A 60222-60212
KOLMNLK7-GOOSELK7
OPENS B mtl'
COM 'B 60212-60358
GOOSELK7-MNPIP 7   vld
slg'
COM '----------------------------
--------------------------'
CONTINGENCY 'NSP    '
```

```
TRIP LINE FROM BUS
60222 TO BUS 60212 CKT
1
TRIP LINE FROM BUS
60212 TO BUS 60358 CKT
1
END


COM 'NSP  Defined as
multi-terminal'
COM 'A 60212-60358
GOOSELK7-MNPIP  7
OPENS B mtl'
COM 'B 60358-60281
MNPIP  7-HUGO   7
OPENS A mtl'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60212 TO BUS 60358 CKT
1
TRIP LINE FROM BUS
60358 TO BUS 60281 CKT
1
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60238-60179
REDROCK7-AFTON  7
OPENS B tower'
COM 'B 60238-60344
REDROCK7-WOODBUR7
OPENS A tower'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60238 TO BUS 60179 CKT
1
TRIP LINE FROM BUS
60238 TO BUS 60344 CKT
1
END


COM 'NSP  Defined as
multi-terminal'
COM 'A 60336-60238
NSSJCT 7-REDROCK7
OPENS B C mtl'
COM 'B 60336-60267
NSSJCT 7-BATCRKT7
OPENS A C mtl'
COM 'C 60336-60337
NSSJCT 7-NSSTAP 7
OPENS A B mtl'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60336 TO BUS 60238 CKT
1
TRIP LINE FROM BUS
60336 TO BUS 60267 CKT
1
TRIP LINE FROM BUS
60336 TO BUS 60337 CKT
1
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60223-60341
KOCHREF7-ROSEMON7
OPENS B tower'
COM 'B 60223-62229
KOCHREF7-APPVLTE7
OPENS A tower'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60223 TO BUS 60341 CKT
1
TRIP LINE FROM BUS
60223 TO BUS 62229 CKT
1
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60238-60204
REDROCK7-COTTAGE7
OPENS B tower'
COM 'B 60236-60186
REDROCK3-AS KING7
OPENS A tower'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60238 TO BUS 60204 CKT
1
TRIP LINE FROM BUS
60236 TO BUS 60186 CKT
1
END


COM 'NSP  Defined as
multi-circuit'
COM 'A 60245-60214
SHEPARD7-HIBRDGE7
OPENS B tower'
COM 'B 60245-60246
SHEPARD7-SO TOWN7
OPENS A tower'
COM '-------------------------
-------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS
60245 TO BUS 60214 CKT
1
TRIP LINE FROM BUS
60245 TO BUS 60246 CKT
1
END

COM ' 501 Defined as
multi-terminal, Drayton
Transformer 1 TRIP'
COM 'A 66752-66787
DRAYTON4-DRAYTO1T
CKT 1    OPENS B C'
COM 'B 66705-66787
DRAYTON7-DRAYTO1T
CKT 1    OPENS A C'
COM 'C 66763-66787
DRAYTO19-DRAYTO1T
CKT 1    0PENS A B'
COM '-------------------------
-------------------------'
CONTINGENCY '501   1'
COM 'Trip Transformer 1'
TRIP LINE FROM BUS
66752 TO BUS 66787 CKT
1
TRIP LINE FROM BUS
66705 TO BUS 66787 CKT
1
TRIP LINE FROM BUS
66763 TO BUS 66787 CKT
1
END

COM ' 502 The Drayton
bus was updated with a
ring bus.  The 2'
COM ' transformer
trip/outage no longer open
ends the 230kV line.'
COM ' 502 Defined as
multi-terminal, Drayton
Transformer 2 TRIP'
COM 'A 66752-66788
DRAYTON4-DARYTO2T
CKT 1    OPENS B C'
COM 'B 66705-66788
DRAYTON7-DRAYTO2T
CKT 1    OPENS A C'
COM 'C 66762-66788
DRAYTO29-DRAYTO2T
CKT 1    OPENS A B'
COM '-------------------------
-------------------------'
CONTINGENCY '502   2'
COM 'Trip Transformer 2'
TRIP LINE FROM BUS
66752 TO BUS 66788 CKT
1
TRIP LINE FROM BUS
66705 TO BUS 66788 CKT
1
TRIP LINE FROM BUS
66762 TO BUS 66788 CKT
1
END

COM '500      GRE Defined
as multi-terminal line'
COM 'A 66550-63050
GRANITF4-WILLMAR4
OPENS B'
COM 'B 63050-62427
WILLMAR4-WILLMAR8
OPENS A'
COM '-------------------------
-------------------------'
CONTINGENCY '500'
TRIP LINE FROM BUS
66550 TO BUS 63050 CKT
1
TRIP LINE FROM BUS
63050 TO BUS 62427 CKT
1
END

COM '505  Defined as
multi-circuit, NSP'
COM 'A 66551-66508
GRANITF7-S3     7 CKT 1
OPENS B C'
COM 'B 66552-66508
MARS ER7-S3     7 CKT 1
OPENS A C'
COM 'B 60371-66508 ERIE
RD7-S3     7 CKT 1
OPENS A B'
COM '-------------------------
-------------------------'
CONTINGENCY '505    '
TRIP LINE FROM BUS
66551 TO BUS 66508 CKT
1
TRIP LINE FROM BUS
66552 TO BUS 66508 CKT
1
TRIP LINE FROM BUS
60371 TO BUS 66508 CKT
1
END

COM '510  Defined as
multi-terminal'
COM 'A 66550-66554
GRANITF4-MORRIS 4
CKT 1   OPENS  B C'
COM 'B 66554-66555
MORRIS 4-MORRIS 7 CKT
1   OPENS  A C'
COM 'C 66553-66554
MOORHED4-MORRIS 4
CKT 1   VLD SGL'
COM 'B 66554-66555
MORRIS 4-MORRIS 7 CKT
P1   OPENS  A C'
COM '-------------------------
-------------------------'
CONTINGENCY '510    '
TRIP LINE FROM BUS
66550 TO BUS 66554 CKT
1
TRIP LINE FROM BUS
66554 TO BUS 66555 CKT
1
TRIP LINE FROM BUS
66553 TO BUS 66554 CKT
1
TRIP LINE FROM BUS
66554 TO BUS 66555 CKT
P1
END

COM '515   Defined as
multi-terminal'
COM 'A 66717-63237
ULRICH 7-MAHNOMN7
CKT 1   OPENS  B C D E
F'
```

```
COM 'B 63236-66717
ADUBON 7-ULRICH 7 CKT
1  OPENS  A C D E F'
COM 'C 63237-63238
MAHNOMN7-WINGER 7
CKT 1  OPENS  A B D E
F'
COM 'D 66717-66781
ULRICH 7-ULRICH T CKT
1  OPENS  A B C E F'
COM 'E 66781-67039
ULRICH T-ULRICH 8 CKT
1  OPENS  A B C D F'
COM 'F 66781-66773
ULRICH T-ULRICH 9 CKT
1  OPENS  A B C D E'
COM '----------
----------'
CONTINGENCY '515   '
TRIP LINE FROM BUS
66717 TO BUS 63237 CKT
1
TRIP LINE FROM BUS
63236 TO BUS 66717 CKT
1
TRIP LINE FROM BUS
63237 TO BUS 63238 CKT
1
TRIP LINE FROM BUS
66717 TO BUS 66781 CKT
1
TRIP LINE FROM BUS
66781 TO BUS 67039 CKT
1
TRIP LINE FROM BUS
66781 TO BUS 66773 CKT
1
END

COM '520  Defined as
multi-terminal'
COM 'A 66710-63246
NARY   7-BEMIDJI7 CKT 1
OPENS  B C D E F G H I J'
COM 'B 66710-63247
NARY   7-CASS LK7 CKT
1  OPENS  A C D E F G H
I J'
COM 'C 63247-63248
CASS LK7-CASS N 7 CKT
1  OPENS  G H I J'
COM 'D 66710-66716
NARY   7-LAPORTE7 CKT
1  OPENS  A B C E F G H
I J'
COM 'E 66716-66715
LAPORTE7-LEECHLK7
CKT 1  OPENS  A B C D F
G H I J'
COM 'F 66716-61640
LAPORTE7-BADOURA7
CKT 1  OPENS  A B C D F
G H I J'
COM 'G 63247-63197
CASS LK7-CASS LKY CKT
1  OPENS  C H I J'
COM 'H 63197-63347
CASS LKY-CASS LK8 CKT
1  OPENS  C G I J'
COM 'I 63247-63349 CASS
LK7-CASSPIP9 CKT 1
OPENS  C G H J'
COM 'J 63248-63348
CASS N 7-NO PIPE9 CKT
1  OPENS  C G H I'
COM '----------
----------'
CONTINGENCY '520    1'
COM ' Trip of A or B, or D
or E, trips all, mtl'
TRIP LINE FROM BUS
66710 TO BUS 63246 CKT
1
TRIP LINE FROM BUS
66710 TO BUS 63247 CKT
1
TRIP LINE FROM BUS
63247 TO BUS 63248 CKT
1
TRIP LINE FROM BUS
66710 TO BUS 66716 CKT
1
TRIP LINE FROM BUS
66716 TO BUS 66715 CKT
1
TRIP LINE FROM BUS
66716 TO BUS 61640 CKT
1
TRIP LINE FROM BUS
63247 TO BUS 63197 CKT
1
TRIP LINE FROM BUS
63197 TO BUS 63347 CKT
1
TRIP LINE FROM BUS
63247 TO BUS 63349 CKT
1
TRIP LINE FROM BUS
63248 TO BUS 63348 CKT
1
END

CONTINGENCY '520    2'
COM ' Trip of C or I or J
OPENS each other'
COM ' Transformers
connected to bus via fault'
COM ' switch device'
TRIP LINE FROM BUS
63247 TO BUS 63248 CKT
1
TRIP LINE FROM BUS
63247 TO BUS 63349 CKT
1
TRIP LINE FROM BUS
63248 TO BUS 63348 CKT
1
END

CONTINGENCY '520    3'
COM ' Trip of F or G
OPENS each other'
COM ' Transformers
connected to bus via fault'
COM ' switch device'
TRIP LINE FROM BUS
63247 TO BUS 63197 CKT
1
TRIP LINE FROM BUS
63197 TO BUS 63347 CKT
1
END

COM '540  Defined as
multi-terminal'
COM 'CONTINGENCY
'HUBBARD MTL, GRE'
COM 'A 63336-63053
AUDUBON4-HUBBARD4
CKT 1  OPENS  B'
COM 'B 63053-61641
HUBBARD4-HUBBARD7
CKT 1  OPENS  A'
COM '----------
----------'
CONTINGENCY '540    '
TRIP LINE FROM BUS
63336 TO BUS 63053 CKT
1
TRIP LINE FROM BUS
63053 TO BUS 61641 CKT
1
END

COM '545  Defined as
multi-terminal'
COM 'A 63325-63327
BROWNSV4-HANKSON4
CKT 1  OPENS  B C'
COM 'B 63314-63325
BIGSTON4-BROWNSV4
CKT 1  OPENS  A C'
COM 'C 63325-63125
BROWNSV4-BROWNSV9
CKT 1  OPENS  A B'
COM '----------
----------'
CONTINGENCY '545   '
TRIP LINE FROM BUS
63325 TO BUS 63327 CKT
1
TRIP LINE FROM BUS
63314 TO BUS 63325 CKT
1
TRIP LINE FROM BUS
63325 TO BUS 63125 CKT
1
END

COM '550-A  Defined as
multi-terminal'
COM 'A 66555-63219
MORRIS 7-GRANTCO7
CKT 1  OPENS  B'
COM 'B 63219-63223
GRANTCO7-HOOT LK7
CKT 1  OPENS  A'
COM '----------
----------'
CONTINGENCY '550   '
TRIP LINE FROM BUS
66555 TO BUS 63219 CKT
1
TRIP LINE FROM BUS
63219 TO BUS 63223 CKT
1
END

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
4
END

COM '550-B  Defined as
multi-terminal, otp'
COM 'A 63219-63220
GRANTCO7-ELBOWLK7
CKT 1  OPENS  B C D'
COM 'B 63220-63221
ELBOWLK7-BRANDN 7
CKT 1  OPENS  A C D'
COM 'C 63221-67452
BRANDN 7-ALEXSS  CKT
1  OPENS  A B D'
COM 'D 63221-67455
BRANDN 7-BRANDN 9
CKT 1  OPENS  A B C'
COM '----------
----------'
CONTINGENCY '550-B   '
TRIP LINE FROM BUS
63219 TO BUS 63220 CKT
1
TRIP LINE FROM BUS
63220 TO BUS 63221 CKT
1
TRIP LINE FROM BUS
63221 TO BUS 67452 CKT
1
TRIP LINE FROM BUS
63221 TO BUS 67455 CKT
1
END

COM '551  Defined as
multi-terminal, otp'
COM 'A 67452-63222
ALEXSS  -ALEXAND7 CKT
1  OPENS  B'
COM 'B 63222-60144
ALEXAND7-DGLASCO7
CKT 1  OPENS  A'
COM '----------
----------'
CONTINGENCY '551   '
TRIP LINE FROM BUS
67452 TO BUS 63222 CKT
1
TRIP LINE FROM BUS
63222 TO BUS 60144 CKT
1
END

COM '552  Defined as
multi-terminal, otp'
COM 'A 67452-67453
ALEXSS  -ALEXSWM  CKT
1  OPENS  B'
COM 'B 67453-67454
ALEXSWM -ALEXPLDM
CKT 1  OPENS  A'
COM '----------
----------'
CONTINGENCY '552   '
TRIP LINE FROM BUS
67452 TO BUS 67453 CKT
1
```

```
TRIP LINE FROM BUS
67453 TO BUS 67454 CKT
1
END

COM '553  Defined as
multi-terminal, otp'  New
Miltona Tap
COM 'A 67454-62752
ALEXPLDM-MLTN TP7
CKT 1  OPENS  B C D E
F'
COM 'B 62527-62752
ELMO  7-MLTN TP7 CKT
1  OPENS  A C D E F'
COM 'C 62527-62531
ELMO  7-INMAN  7 CKT 1
OPENS  A B D E F'
COM 'D 62752-62753
MLTN TP7-MILTONA7
CKT 1  OPENS  A B C E
F'
COM 'E 62753-62773
MILTONA7-MILTONA9
CKT 1  OPENS  A B C D
F'
COM '-------------------------
-------------------------'
CONTINGENCY '553  '
TRIP LINE FROM BUS
67454 TO BUS 62752 CKT
1
TRIP LINE FROM BUS
62527 TO BUS 62752 CKT
1
TRIP LINE FROM BUS
62527 TO BUS 62531 CKT
1
TRIP LINE FROM BUS
62752 TO BUS 62753 CKT
1
TRIP LINE FROM BUS
62753 TO BUS 62773 CKT
1
END

COM '560  Defined as
multi-terminal'
COM 'A 63239-63238
BAGLEY 7-WINGER 7
CKT 1  OPENS  B C D E F
G H I J K L'
COM 'B 63239-63243
BAGLEY 7-SHEVLIN7 CKT
1  OPENS  A C D E F G H
I J K L'
COM 'C 63239-63241
BAGLEY 7-CLEARBR7
CKT 1  OPENS  A B D E F
G H I J K L'
COM 'D 63243-63285
SHEVLIN7-SOLWAY 7
CKT 1  OPENS  A B C E F
G H I J K L'
COM 'E 63243-66727
SHEVLIN7-RICELKT7 CKT
1  OPENS  A B C D F G H
I J K L'
COM 'F 63241-63240
CLEARBR7-MN PIPE7
CKT 1  OPENS  A B C D E
G H I J K L'
COM 'G 63241-63242
CLEARBR7-CLBKPIP7
CKT 1  OPENS  A B C D E
F H I J K L'
COM 'H 66727-66729
RICELKT7-RICELAK7 CKT
1  OPENS  A B C D E F G
I J K L'
COM 'I 66727-63244
RICELKT7-ITASKA 7 CKT
1  OPENS  A B C D E F G
H J K L'
COM 'J 63240-63340  MN
PIPE7-MN PIPE9 CKT 1
OPENS  F'
COM 'K 63242-63342
CLBKPIP7-CLBK LK9 CKT
1  OPENS  G'
COM 'L 63244-63344
ITASCA 7-ITASCA 9 CKT 1
OPENS  I'
COM '-------------------------
-------------------------'
CONTINGENCY '560  1'
COM 'Trip of A or B or C or
D or E or F or'
COM 'G or H or I trip each
other and J,K,L'
TRIP LINE FROM BUS
63239 TO BUS 63238 CKT
1
TRIP LINE FROM BUS
63239 TO BUS 63243 CKT
1
TRIP LINE FROM BUS
63239 TO BUS 63241 CKT
1
TRIP LINE FROM BUS
63243 TO BUS 63285 CKT
1
TRIP LINE FROM BUS
63243 TO BUS 66727 CKT
1
TRIP LINE FROM BUS
63241 TO BUS 63240 CKT
1
TRIP LINE FROM BUS
63241 TO BUS 63242 CKT
1
TRIP LINE FROM BUS
66727 TO BUS 66729 CKT
1
TRIP LINE FROM BUS
66727 TO BUS 63244 CKT
1
TRIP LINE FROM BUS
63240 TO BUS 63340 CKT
1
TRIP LINE FROM BUS
63242 TO BUS 63342 CKT
1
TRIP LINE FROM BUS
63244 TO BUS 63344 CKT
1
END
CONTINGENCY '560  2'
COM 'J trips E only'
TRIP LINE FROM BUS
63240 TO BUS 63340 CKT
1
TRIP LINE FROM BUS
63241 TO BUS 63240 CKT
1
END
CONTINGENCY '560  3'
TRIP LINE FROM BUS
63242 TO BUS 63342 CKT
1
TRIP LINE FROM BUS
63241 TO BUS 63242 CKT
1
END
CONTINGENCY '560  4'
COM 'L trips I only'
TRIP LINE FROM BUS
63244 TO BUS 63344 CKT
1
TRIP LINE FROM BUS
66727 TO BUS 63244 CKT
1
END

COM '562 DEFINED AS
MULTI-TERMINAL'
COM 'A 63285-63281
SOLWAY 7-LH PIPE7 CKT
1  OPENS B C'
COM 'B 63281-63280 LH
PIPE7-WLTN TP7 CKT 1
OPENS A C'
COM 'C 63281-63245 LH
PIPE7-WILTON 7 CKT 1
OPENS A B'
COM '-------------------------
---------------------------------'
CONTINGENCY '562  '
TRIP LINE FROM BUS
63285 TO BUS 63281 CKT
1
TRIP LINE FROM BUS
63281 TO BUS 63280 CKT
1
TRIP LINE FROM BUS
63281 TO BUS 63245 CKT
1
END

COM '565 Defined as multi-
terminal, mpl'
COM 'A 63246-63245
BEMIDJI7-WILTON 7  CKT
1  OPENS B C D E'
COM 'B 63245-63281
WILTON 7-LH PIPE7  CKT
1  OPENS A C D E'
COM 'C 63245-66776
WILTON 7-WILTON T
CKT 1  OPENS A B D E'
COM 'D 66776-66968
WILTON T-WILTON 8
CKT 1  OPENS A B C E'
COM 'E 66776-63145
WILTON T-WILTON 9
CKT 1  OPENS A B C D'
COM 'F 63245-63186
WILTON 7-WILTON Y
CKT 1  OPENS A B C D'
COM '-------------------------
---------------------------------'
CONTINGENCY '565  '
COM 'Multi-terminal with
fault on Wilton to'
COM 'Bemidji 115 kV line.
TRIP LINE FROM BUS
63246 TO BUS 63245 CKT
1
TRIP LINE FROM BUS
63245 TO BUS 63281 CKT
1
TRIP LINE FROM BUS
63245 TO BUS 66776 CKT
1
TRIP LINE FROM BUS
66776 TO BUS 66968 CKT
1
TRIP LINE FROM BUS
66776 TO BUS 63145 CKT
1
TRIP LINE FROM BUS
63245 TO BUS 63186 CKT
1
END

COM '570  Defined as a
multi-terminal'
COM 'A 66705-63255
DRAYTON7-DONALDS7
CKT 1  OPENS B C D E F
G H'
COM 'B 63255-63256
DONALDS7-DONDPIP7
CKT 1  OPENS A C D E F
G H'
COM 'C 63255-66718
DONALDS7-HALMA  7
CKT 1  see mtl 153'
COM 'D 63255-66714
DONALDS7-WARSAW 7
CKT 1  see mtl 156'
COM 'E 63255-63155
DONALDS7-DONALDS9
CKT 1  OPENS F'
COM 'F 63255-63155
DONALDS7-DONALDS9
CKT 2  OPENS E'
COM 'G 63256-63356
DONDPIP7-DON PIP9
CKT 1  OPENS B H'
COM 'H 63256-63356
DONDPIP7-DON PIP9
CKT 2  OPENS B G'
COM 'A and B will not
cause additional lines in
575 or 580 to open'
COM 'Simulating trip of G
or H is redundant to
simulating trip'
COM 'of A or B'
COM '-------------------------
---------------------------------'
CONTINGENCY '570  1'
COM 'Trip of A or B
OPENS all sections'
COM 'Trip of C and D are
shown in 153 and 156
below'
```

```
TRIP LINE FROM BUS
66705 TO BUS 63255 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 63256 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 66718 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 66714 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 63155 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 63155 CKT
2
TRIP LINE FROM BUS
63256 TO BUS 63356 CKT
1
TRIP LINE FROM BUS
63256 TO BUS 63356 CKT
2
END
CONTINGENCY '570     2'
COM 'Trip of E OPENS F
only, paralell bank'
TRIP LINE FROM BUS
63255 TO BUS 63155 CKT
1
TRIP LINE FROM BUS
63255 TO BUS 63155 CKT
2
END


COM '575  Defined as
multi-terminal'
COM 'A 63255-66718
DONALDS7-HALMA  7
CKT 1    OPENS  B C D E
F G H'
COM 'B 66718-66708
HALMA  7-KARLSTD7 CKT
1    OPENS  A C D E F G
H'
COM 'C 66708-63254
KARLSTD7-VIKING 7 CKT
1    OPENS  A B D E F G
H'
COM 'D 63254-66713
VIKING 7-TRFALLS7 CKT
1    OPENS  A B C E F G
H'
COM 'E 66708-66785
KARLSTD7-KARLSTDY
CKT 1    OPENS  F G'
COM 'F 66785-66838
KARLSTDY-KARLSTD8
CKT 1    OPENS  E G'
COM 'G 66785-63156
KARLSTDY-KARLSTD9
CKT 1    OPENS  E F'
COM 'H 63254-63354
VIKING 7-VIK PIP9 CKT 1
OPENS  A B C D E F G'
COM '----------
----------'
CONTINGENCY '575'
COM 'Trip of A or B or C or
D or H will open all other
sections.'
TRIP LINE FROM BUS
63255 TO BUS 66718 CKT
1
TRIP LINE FROM BUS
66718 TO BUS 66708 CKT
1
TRIP LINE FROM BUS
66708 TO BUS 63254 CKT
1
TRIP LINE FROM BUS
63254 TO BUS 66713 CKT
1
TRIP LINE FROM BUS
66708 TO BUS 66785 CKT
1
TRIP LINE FROM BUS
66785 TO BUS 66838 CKT
1
TRIP LINE FROM BUS
66785 TO BUS 63156 CKT
1
TRIP LINE FROM BUS
63254 TO BUS 63354 CKT
1
END

COM '576  Defined as
multi-terminal'
COM 'A 66713-63253
TRFALLS7-PLUMPIP7
CKT 1    OPENS  B C D E
F'
COM 'B 63253-63251
PLUMPIP7-PLUMTAP7
CKT 1    OPENS  A C D E
F'
COM 'C 63251-63252
PLUMTAP7-PLUMMER7
CKT 1    OPENS  A B D E
F'
COM 'D 63251-63238
PLUMTAP7-WINGER 7
CKT 1    OPENS  A B C E
F'
COM 'E 63253-63353
PLUMPIP7-PLUMPIP9
CKT 1    OPENS  F'
COM 'F 63253-63353
PLUMPIP7-PLUMPIP9
CKT 2    OPENS  E'
COM '----------
----------'
CONTINGENCY '576'
COM 'Trip of A or B or C or
D will open all other
sections.'
TRIP LINE FROM BUS
66713 TO BUS 63253 CKT
1
TRIP LINE FROM BUS
63253 TO BUS 63251 CKT
1
TRIP LINE FROM BUS
63251 TO BUS 63252 CKT
1
TRIP LINE FROM BUS
63251 TO BUS 63238 CKT
1
TRIP LINE FROM BUS
63253 TO BUS 63353 CKT
1
TRIP LINE FROM BUS
63253 TO BUS 63353 CKT
2
END

COM '580  Defined as
multi-terminal'
COM 'A 66706-66722
FALCONR7-OSLO   7 CKT
1  OPENS  B C D E F G H
I J'
COM 'B 66722-66714
OSLO   7-WARSAW 7 CKT
1  OPENS  A C D E F G H
I J'
COM 'C 66714-63255
WARSAW 7-DONALDS7
CKT 1  OPENS  A B D E F
G H I J'
COM 'D 66722-63284
OSLO   7-OSLO TN7 CKT
1  OPENS  A B C E F G H
I J'
COM 'E 63284-66724
OSLO TN7-ALVARAD7
CKT 1  OPENS  A B C D F
G H I J'
COM 'F 66724-66725
ALVARAD7-WARREN 7
CKT 1  OPENS  A B C D E
G H I J'
COM 'G 66725-66726
WARREN 7-ANDERNW7
CKT 1  OPENS  A B C D E
F H I J'
COM '******************'
COM 'LINES BELOW
REMOVED FOR THIS
MODEL SERIES
BECAUSE THE WARSAW'
COM 'TFMR IS NOT
MODELED IN DETAIL.'
COM 'H 66775-66714
WARSAW T-WARSAW 7
CKT 1  OPENS  F G'
COM 'I 66775-66834
WARSAW T-WARSAW 8
CKT 1  OPENS  E G'
COM 'J 66775-66774
WARSAW T-WARSAW 9
CKT 1  OPENS  E F'
COM ' See mtl FFF below'
COM '----------
----------'
CONTINGENCY '580   1'
COM 'Trip of A or B or C
OPENS all sections'
TRIP LINE FROM BUS
66706 TO BUS 66722 CKT
1
TRIP LINE FROM BUS
66722 TO BUS 66714 CKT
1
TRIP LINE FROM BUS
66714 TO BUS 63255 CKT
1
TRIP LINE FROM BUS
66722 TO BUS 63284 CKT
1
TRIP LINE FROM BUS
63284 TO BUS 66724 CKT
1
TRIP LINE FROM BUS
66724 TO BUS 66725 CKT
1
TRIP LINE FROM BUS
66725 TO BUS 66726 CKT
1
END

COM '585 MPC Defined as
multi-terminal'
COM 'A 66443-66706
GRNDFKS7-FALCONR7
CKT 1  OPENS  B C'
COM 'B 66706-66722
FALCONR7-OSLO   7 CKT
1  see mtl 580 above,
COM A'
COM 'C 66706-63249
FALCONR7-CRKSTON7
CKT 1  VLD SGL'
COM 'A OPENS B and C
but doesn't initiate mtl 580
above'
COM '----------
----------'
CONTINGENCY '585    '
TRIP LINE FROM BUS
66443 TO BUS 66706 CKT
1
TRIP LINE FROM BUS
66706 TO BUS 66722 CKT
1
TRIP LINE FROM BUS
66706 TO BUS 63249 CKT
1
END

COM '590  Defined as
multi-terminal'
COM 'A 63214-63213
BIGSTON7-MARIETT7
CKT 1  OPENS  B C D E'
COM 'B 63213-63212
MARIETT7-BURR   7 CKT
1  OPENS  A C D E'
COM 'C 63212-63211
BURR   7-CANBY  7 CKT 1
OPENS  A B D E'
COM 'D 63212-63210
BURR   7-TORONTO7
CKT 1  OPENS  A B C E'
COM 'E 63213-63113
MARIETT7-MARIETT9
CKT 1  OPENS  A B C D'
COM '----------
----------'
CONTINGENCY '590    '
TRIP LINE FROM BUS
63214 TO BUS 63213 CKT
1
```

```
TRIP LINE FROM BUS
63213 TO BUS 63212 CKT
1
TRIP LINE FROM BUS
63212 TO BUS 63211 CKT
1
TRIP LINE FROM BUS
63212 TO BUS 63210 CKT
1
TRIP LINE FROM BUS
63213 TO BUS 63113 CKT
1
END

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
5
END
COM '595  Defined as
multi-terminal'
COM 'A 63215-63216
HIWY12 7-ORTONVL7
CKT 1   OPENS  B'
COM 'B 63214-63215
BIGSTON7-HIWY12 7 CKT
1   OPENS  A'
COM '----------------------------
----------------------------'
CONTINGENCY '595    '
TRIP LINE FROM BUS
63215 TO BUS 63216 CKT
1
TRIP LINE FROM BUS
63214 TO BUS 63215 CKT
1
END

COM '600  Defined as
multi-terminal'
COM 'A 63249-63250
CRKSTON7-FERTILE7
CKT 1   OPENS  B C'
COM 'B 63250-63238
FERTILE7-WINGER 7 CKT
1   OPENS  A C'
COM 'C 63250-63150
FERTILE7-FERTILE9 CKT
1   OPENS  A B'
COM '----------------------------
----------------------------'
CONTINGENCY '600    '
TRIP LINE FROM BUS
63249 TO BUS 63250 CKT
1
TRIP LINE FROM BUS
63250 TO BUS 63238 CKT
1
TRIP LINE FROM BUS
63250 TO BUS 63150 CKT
1
END

COM '605  Defined as
multi-terminal'
COM 'A 63223-63233
HOOT LK7-EDGETAP7
CKT 1   OPENS  B C D E F
G H I J K'
COM 'B 63233-63234
EDGETAP7-PEL RPD7
CKT 1   OPENS  A C D E F
G H I J K'
COM 'C 63233-63232
EDGETAP7-EDGETWN7
CKT 1   OPENS  A B D E F
G H I J K'
COM 'D 63232-62532
EDGETWN7-FERGUS 7
CKT 1   OPENS  A B C E F
G H I J K'
COM 'E 63234-62528
PEL RPD7-TAMARAC7
CKT 1   OPENS  A B C D F
G H I J K'
COM 'F 62528-62533
TAMARAC7-CORMRNT7
CKT 1   OPENS  A B C D E
G H I J K'
COM 'G 62533-62529
CORMRNT7-CMRTJCT7
CKT 1   OPENS  A B C D E
F H I J K'
COM 'H 63236-62529
AUDUBON7-CMRTJCT7
CKT 1   OPENS  A B C D E
F G I J K'
COM 'I 62528-63310
TAMARAC7-TAMARAC9
CKT 1   OPENS  A B C D E
F G H J K'
COM 'J 62528-63310
TAMARAC7-TAMARAC9
CKT 2   OPENS  A B C D E
F G H I K'
COM 'K 62529-62530
FRAZEET7-FRAZEE 7
CKT 1   OPENS  A B C D E
F G H I J'
COM '----------------------------
----------------------------'
CONTINGENCY '605    '
TRIP LINE FROM BUS
63223 TO BUS 63233 CKT
1
TRIP LINE FROM BUS
63233 TO BUS 63234 CKT
1
TRIP LINE FROM BUS
63233 TO BUS 63232 CKT
1
TRIP LINE FROM BUS
63232 TO BUS 62532 CKT
1
TRIP LINE FROM BUS
63234 TO BUS 62528 CKT
1
TRIP LINE FROM BUS
62528 TO BUS 62533 CKT
1
TRIP LINE FROM BUS
62533 TO BUS 62529 CKT
1
TRIP LINE FROM BUS
63236 TO BUS 62529 CKT
1
TRIP LINE FROM BUS
62528 TO BUS 63310 CKT
1
TRIP LINE FROM BUS
62528 TO BUS 63310 CKT
2
TRIP LINE FROM BUS
62529 TO BUS 62530 CKT
1
END

COM 'CONTINGENCY 610
HAS NEW BREAKERS
BEING ADDED AT
WAHPETON'
COM '610  Defined as
multi-terminal'
COM 'A 63331-63329
FERGSFL4-WAHPETN4
CKT 1   VLD SGL'
COM 'B 63327-63329
HANKSON4-WAHPETN4
CKT 1   VLD SGL'
COM 'C 66754-63329
MAPLE R4-WAHPETN4
CKT 1   VLD SGL'
COM 'D 63329-63191
WAHPETN4-WAHPET1Y
CKT 1   OPENS  A B C E F
G H I'
COM 'E 63191-63229
WAHPET1Y-WAHPETN7
CKT 1   OPENS  A B C D F
G H I'
COM 'F 63191-63129
WAHPET1Y-WAHPETN9
CKT 1   OPENS  A B C D E
G H I'
COM 'G 63329-63201
WAHPETN4-WHAPET2Y
CKT 1   OPENS  A B C D E
F H I'
COM 'H 63201-63229
WAHPET2Y-WAHPETN7
CKT 1   OPENS  A B C D E
F G I'
COM 'I 63201-63129
WAHPET2Y-WAHPETN9
CKT 1   OPENS  A B C D E
F G H'
COM '----------------------------
----------------------------'
CONTINGENCY '610   1'
TRIP LINE FROM BUS
63331 TO BUS 63329 CKT
1
TRIP LINE FROM BUS
66754 TO BUS 63329 CKT
1
TRIP LINE FROM BUS
63329 TO BUS 63191 CKT
1
TRIP LINE FROM BUS
63191 TO BUS 63229 CKT
1
TRIP LINE FROM BUS
63191 TO BUS 63129 CKT
1
END
CONTINGENCY '610   2'
TRIP LINE FROM BUS
63327 TO BUS 63303 CKT
1
TRIP LINE FROM BUS
63327 TO BUS 63329 CKT
1
TRIP LINE FROM BUS
63329 TO BUS 63201 CKT
1
TRIP LINE FROM BUS
63201 TO BUS 63229 CKT
1
TRIP LINE FROM BUS
63201 TO BUS 63129 CKT
1
END

COM '615  Defined as
multi-terminal'
COM 'A 61610-63053
BADOURA4-HUBBARD4
CKT 1    OPENS  B C D E'
COM 'B 61610-61612
BADOURA4-RIVERTN2
CKT 1    OPENS  A C D E'
COM 'C 61610-61794
BADOURA4-BADOUJCT
CKT 1    OPENS  A B D E'
COM 'D 61794-61640
BADOUJCT-BADOURA7
CKT 1    OPENS  A B C E'
COM 'E 61794-61795
BADOUJCT-BADOUTRT
CKT 1    OPENS  A B C D'
COM '----------------------------
----------------------------'
CONTINGENCY '615    '
TRIP LINE FROM BUS
61610 TO BUS 63053 CKT
1
TRIP LINE FROM BUS
61610 TO BUS 61612 CKT
1
TRIP LINE FROM BUS
61610 TO BUS 61794 CKT
1
TRIP LINE FROM BUS
61794 TO BUS 61640 CKT
1
TRIP LINE FROM BUS
61794 TO BUS 61795 CKT
1
END

COM '616 From GRE, New
115 kV multi-terminal lines
for 2000 summer'
COM ' 616 Defined as
multi-terminal line'
COM 'A 61673-62447
ARROWHD7-BERGNTP7
CKT 1   OPENS OTHER
SEGMENTS'
COM 'B 61720-62447
COTTNTP7-BERGNTP7
CKT 1   OPENS OTHER
SEGMENTS'
COM 'C 62446-62447
BERGNLK7-BERGNTP7
CKT 1   OPENS OTHER
SEGMENTS'
COM 'D 61720-62452
COTTNTP7-COTTON 7
```

```
CKT 1  OPENS OTHER
SEGMENTS'
COM 'E 61720-61718
COTTNTP7-16L TAP7 CKT
1  OPENS OTHER
SEGMENTS'
COM 'F 61718-61721 16L
TAP7-ETCO  7 CKT 1
OPENS OTHER
SEGMENTS'
COM 'G 61718-62454 16L
TAP7-PEARY  7 CKT 1
OPENS OTHER
SEGMENTS'
COM 'H 61708-62454
VIRGNIA7-PEARY  7 CKT
1  OPENS OTHER
SEGMENTS'
COM '----------
----------'
CONTINGENCY '616    '
TRIP LINE FROM BUS
61673 TO BUS 62447 CKT
1
TRIP LINE FROM BUS
61720 TO BUS 62447 CKT
1
TRIP LINE FROM BUS
62446 TO BUS 62447 CKT
1
TRIP LINE FROM BUS
61720 TO BUS 62452 CKT
1
TRIP LINE FROM BUS
61720 TO BUS 61718 CKT
1
TRIP LINE FROM BUS
61718 TO BUS 61721 CKT
1
TRIP LINE FROM BUS
61718 TO BUS 62454 CKT
1
TRIP LINE FROM BUS
61708 TO BUS 62454 CKT
1
END

COM 'From GRE, New 115
kV multi-terminal lines for
2000 summer'
COM ' 617  Defined as
multi-terminal'
COM 'A 61642-62896
VERNDLE7-ALDRICH7
OPENS  B C D E F'
COM 'B 62896-61639
ALDRICH7-MNP-STP7
OPENS  A C D E F'
COM 'C 61639-62895
MNP-STP7-THMSTWN7
OPENS  A B D E F'
COM 'D 62895-61646
THMSTWN7-DOGLKTP7
OPENS  A B C E F'
COM 'E 61644-61646
DOGLAKE7-DOGLKTP7
OPENS  A B C D F'
COM 'F 61645-61646
BAXTER 7-DOGLKTP7
OPENS  A B C D E'
COM '----------
----------'
CONTINGENCY '617    '
TRIP LINE FROM BUS
61642 TO BUS 62896 CKT
1
TRIP LINE FROM BUS
62896 TO BUS 61639 CKT
1
TRIP LINE FROM BUS
61639 TO BUS 62895 CKT
1
TRIP LINE FROM BUS
62895 TO BUS 61646 CKT
1
TRIP LINE FROM BUS
61644 TO BUS 61646 CKT
1
TRIP LINE FROM BUS
61645 TO BUS 61646 CKT
1
END

COM ' 620 Defined as a
multi-terminal'
COM 'A 61615-61614
ARROWHD4-98LTAP 4
CKT 1  OPENS B C D E F'
COM 'B 61625-61614
BLCKBRY4-98LTAP 4
CKT 1  OPENS A C D E F'
COM 'C 61616-61614
HILLTOP4-98LTAP 4  CKT
1  OPENS A B D E F'
COM 'D 61616-61576
HILLTOP4-HILLPJCT  CKT
1  OPENS A B C E F'
COM 'E 61576-61672
HILLPJCT-HILLTOP7  CKT
1  OPENS A B C D F'
COM 'F 61576-61577
HILLPJCT-HILLPTR9  CKT
1  OPENS A B C D E'
COM '----------
----------'
CONTINGENCY '620    '
TRIP LINE FROM BUS
61615 TO BUS 61614 CKT
1
TRIP LINE FROM BUS
61625 TO BUS 61614 CKT
1
TRIP LINE FROM BUS
61616 TO BUS 61614 CKT
1
TRIP LINE FROM BUS
61616 TO BUS 61576 CKT
1
TRIP LINE FROM BUS
61576 TO BUS 61672 CKT
1
TRIP LINE FROM BUS
61576 TO BUS 61577 CKT
1
END

COM '625  Defined as
multi-terminal'
COM 'A 61623-61624
MINNTAC4-FORBES 4
CKT 1  OPENS  B C D'
COM 'B 61623-61558
MINNTAC4-MINT1JCT
CKT 1  OPENS  A C D'
COM 'C 61558-61710
MINT1JCT-MINNTAC7
CKT 1  OPENS  A B D'
COM 'D 61558-61559
MINT1JCT-MINT1TR9
CKT 1  OPENS  A B C'
COM '----------
----------'
CONTINGENCY '625    '
TRIP LINE FROM BUS
61623 TO BUS 61624 CKT
1
TRIP LINE FROM BUS
61623 TO BUS 61558 CKT
1
TRIP LINE FROM BUS
61558 TO BUS 61710 CKT
1
TRIP LINE FROM BUS
61558 TO BUS 61559 CKT
1
END

COM '630 Defined as multi-
terminal line, GRE'
COM 'A 61655-61656
CROMWLL7-MAHTOWA7
CKT 1  OPENS B C'
COM 'B 61656-61664
MAHTOWA7-WRENSHL7
CKT 1  OPENS A C'
COM 'C 61664-61665
WRENSHL7-THOMSON7
CKT 1  OPENS A B'
COM ' See multi-terminal
685 below'
COM '----------
----------'
CONTINGENCY '630    '
TRIP LINE FROM BUS
61655 TO BUS 61656 CKT
1
TRIP LINE FROM BUS
61656 TO BUS 61664 CKT
1
TRIP LINE FROM BUS
61664 TO BUS 61665 CKT
1
END

COM '635 GRE Defined as
multi-terminal line'
COM 'A 61655-62636
CROMWLL7-MCGREGR7
CKT 1  OPENS B C D E'
COM 'B 62636-62637
MCGREGR7-KIMBRLY7
CKT 1  OPENS A C D E'
COM 'C 62637-62638
KIMBRLY7-AITKIN 7 CKT
1  OPENS A B D E'
COM 'D 61654-62638
AITKNMN7-AITKIN 7 CKT
1  OPENS A B C E'
COM 'E 61653-61654
RIVERTN7-AITKNMN7
CKT 1  OPENS A B C D'
COM '----------
----------'
CONTINGENCY '635    '
TRIP LINE FROM BUS
61655 TO BUS 62636 CKT
1
TRIP LINE FROM BUS
62636 TO BUS 62637 CKT
1
TRIP LINE FROM BUS
62637 TO BUS 62638 CKT
1
TRIP LINE FROM BUS
61654 TO BUS 62638 CKT
1
TRIP LINE FROM BUS
61653 TO BUS 61654 CKT
1
END

COM '640  Defined as
multi-terminal line, GRE'
COM 'A 62425-62427
WILLMAR7-WILLMAR8
CKT 1  OPENS B'
COM 'B 62425-62005
WILLMAR7-KERKHOT7
CKT 1  OPENS A'
COM '----------
----------'
CONTINGENCY 640  '
COM 'Fault at Wilmarth,
between Wilmarth'
COM 'and Paynesville 115
kV'
TRIP LINE FROM BUS
62425 TO BUS 62427 CKT
1
TRIP LINE FROM BUS
62425 TO BUS 62005 CKT
1
END

COM '650  GRE Defined as
multi-terminal line'
COM 'A 62090-60205
PARKWD 7-CRKEDLK7
CKT 1  OPENS B'
COM 'B 62090-62132
PARKWD 7-PARKWD 8
CKT 1  OPENS A'
COM '----------
----------'
CONTINGENCY '650  '
TRIP LINE FROM BUS
62090 TO BUS 60205 CKT
1
TRIP LINE FROM BUS
62090 TO BUS 62132 CKT
1
END

COM '651 GRE Defined as
multi-terminal line'
COM 'A 62090-60203
PARKWD 7-COON CK7
CKT 1  OPENS B'
```

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COM 'B 62090-62132
PARKWD 7-PARKWD 8
CKT 2   OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY 651'
TRIP LINE FROM BUS
62090 TO BUS 60203 CKT
1
TRIP LINE FROM BUS
62090 TO BUS 62132 CKT
2
END

COM ' 652 Defined as
common tower'
COM 'A 63045-61617
BENTON 4-MUDLAKE4
CKT 1   OPENS B'
COM 'B 63045-61910
BENTON 4-MILACA 4 CKT
1   OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY 652'
TRIP LINE FROM BUS
63045 TO BUS 61617 CKT
1
TRIP LINE FROM BUS
63045 TO BUS 61910 CKT
1
END

COM '653 Defined as multi-
terminal'
COM 'A 60162-62616
WAKEFLD7-BIGSWAN7
OPENS B C'
COM 'B 62616-62617
BIGSWAN7-BIGSWAN8
OPENS A C'
COM 'C 62616-60206
BIGSWAN7-CROWRVR7
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '653'
TRIP LINE FROM BUS
60162 TO BUS 62616 CKT
1
TRIP LINE FROM BUS
62616 TO BUS 62617 CKT
1
TRIP LINE FROM BUS
62616 TO BUS 60206 CKT
1
END

COM '655  GRE Defined as
multi-terminal line'
COM 'A 62924-60206
MEDINA 7-CROWRVR7
CKT 1   OPENS B'
COM 'B 62924-62951
MEDINA 7-MEDINA 8 CKT
1   OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '655  '
TRIP LINE FROM BUS
62924 TO BUS 60206 CKT
1
TRIP LINE FROM BUS
62924 TO BUS 62951 CKT
1
END

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
6
END

COM '660  GRE Defined as
multi-terminal line'
COM 'A 63043-63046 ELK
RIV4-BUNKER 4 CKT 1
OPENS B'
COM 'B 63043-62134 ELK
RIV4-ELKR14S8 CKT 1
OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '660   '
TRIP LINE FROM BUS
63043 TO BUS 63046 CKT
1
TRIP LINE FROM BUS
63043 TO BUS 62134 CKT
2
END

COM '665  GRE Defined as
multi-terminal line'
COM 'A 63043-60152 ELK
RIV4-MNTCELO4 CKT 1
OPENS B'
COM 'B 63043-62134 ELK
RIV4-ELKRI4S8 CKT 1
OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '665   '
TRIP LINE FROM BUS
63043 TO BUS 60152 CKT
1
TRIP LINE FROM BUS
63043 TO BUS 62134 CKT
1
END

COM '670 GRE Defined as
multi-circuit, tower'
COM 'A 60160-60202
SHERCO 3-COON CK3
CKT 1   OPENS B, C,
tower'
COM 'B 63031-60160
BUNKER 3-SHERCO 3
CKT 1   OPENS A, C mtl,
tower'
COM 'C 63031-60202
BUNKER 3-COON CK3
CKT 1   OPENS A, B mtl,
tower'
COM '**GRE Defined as
multi-terminal'
COM 'D 60160-60202
SHERCO 3-COON CK3
CKT 1   OPENS E,F,G'
COM 'E 61487-60655
CNCMID2Y-CNCTER29
CKT 10   OPENS D,E,G'
COM 'F 61487-60203
CNCMID2Y-COON CK7
CKT 10   OPENS D,E,F'
COM 'G 61487-60202
CNCMID2Y-COON CK3
CKT 10   OPENS D,E,F'
COM '**GRE Defined as
multi-terminal '
COM 'F 63031-60160
BUNKER 3-SHERCO 3
CKT 1   OPENS G, H'
COM 'G 63031-60202
BUNKER 3-COON CK3
CKT 1   OPENS F, H'
COM 'H 63046-63031
BUNKER 4-BUNKER 3
CKT 1   OPENS F, G'
COM '-----------------------------
-----------------------------'
CONTINGENCY '670    1'
COM 'Tower outage with
resulting multi-terminal'
TRIP LINE FROM BUS
60160 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
63031 TO BUS 60160 CKT
1
TRIP LINE FROM BUS
63031 TO BUS 60202 CKT
1
COM 'also trips the
following because of A,
tower'
TRIP LINE FROM BUS
60202 TO BUS 61487 CKT
10
TRIP LINE FROM BUS
61487 TO BUS 60203 CKT
10
TRIP LINE FROM BUS
61487 TO BUS 60655 CKT
10
COM 'also trips the
following because of B,
tower'
TRIP LINE FROM BUS
63046 TO BUS 63031 CKT
1
END
CONTINGENCY '670    2'
COM 'Valid multi-terminal
only'
TRIP LINE FROM BUS
63031 TO BUS 60160 CKT
1
TRIP LINE FROM BUS
63031 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
63046 TO BUS 63031 CKT
1
END
CONTINGENCY '670    3'
COM 'Valid multi-terminal
only'
TRIP LINE FROM BUS
60160 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
60202 TO BUS 61487 CKT
10
TRIP LINE FROM BUS
61487 TO BUS 60203 CKT
10
TRIP LINE FROM BUS
61487 TO BUS 60655 CKT
10
END

COM ' 675 Defined as
multi-terminal'
COM 'A 63045-60142
BENTON 4-BENTON 3
CKT 1   OPENS B C '
COM 'B 63045-60142
BENTON 4-BENTON 3
CKT 2   OPENS A C '
COM 'C 60142-60160
BENTON 3-SHERCO 3
CKT 1   OPENS A B '
COM '-----------------------------
-----------------------------'
COM ' 675 Defined as
multi-terminal'
COM 'A 63045-60142
BENTON 4-BENTON 3
CKT 1   OPENS B C '
COM 'B 63045-60142
BENTON 4-BENTON 3
CKT 2   OPENS A C '
COM 'C 60142-60160
BENTON 3-SHERCO 3
CKT 1   OPENS A B '
COM '-----------------------------
-----------------------------'
CONTINGENCY '675    '
TRIP LINE FROM BUS
63045 TO BUS 60142 CKT
1
TRIP LINE FROM BUS
63045 TO BUS 60142 CKT
2
TRIP LINE FROM BUS
60142 TO BUS 60160 CKT
1
END

COM '685  Defined as
multi-terminal line, GRE'
COM 'A 61655-62470
CROMWLL7-CROMWLL8
CKT 1   OPENS B C'
COM 'B 61655-61656
CROMWLL7-MAHTOWA7
CKT 1   OPENS A C'
COM 'C 61655-62636
CROMWLL7-MCGREGR7
CKT 1   OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '685    '
COM 'Simulates a fault on
the transformer'
```

```
TRIP LINE FROM BUS
61655 TO BUS 62470 CKT
1
TRIP LINE FROM BUS
61655 TO BUS 61656 CKT
1
TRIP LINE FROM BUS
61655 TO BUS 62636 CKT
1
END

COM '  690 Defined as
multi-terminal, GRE'
COM 'A 62425-62005
WILLMAR7-KERKHOT7
OPENS B C D'
COM 'B 60357-62005
MAYNARD7-KERKHOT7
OPENS A C D'
COM 'C 62005-62006
KERKHOT7-KERKHO 7
OPENS A B D'
COM 'D 62006-62001
KERKHO 7-BENSON 7
OPENS A B C'
COM '--------------------------
--------------------------'
CONTINGENCY '690      '
TRIP LINE FROM BUS
62425 TO BUS 62005 CKT
1
TRIP LINE FROM BUS
60357 TO BUS 62005 CKT
1
TRIP LINE FROM BUS
62005 TO BUS 62006 CKT
1
TRIP LINE FROM BUS
62006 TO BUS 62001 CKT
1
END

COM ' 695 Defined as
multi-terminal'
COM 'A 62925-62926
DICKNSN7-DCKSNSS7
OPENS B C'
COM 'B 62926-60155
DCKSNSS7-PULASKI7
OPENS A C'
COM 'C 60153-60155
MNTCELO7-PULASKI7
OPENS A B'
COM '--------------------------
--------------------------'
CONTINGENCY '695      '
TRIP LINE FROM BUS
62925 TO BUS 62926 CKT
1
TRIP LINE FROM BUS
62926 TO BUS 60155 CKT
1
TRIP LINE FROM BUS
60153 TO BUS 60155 CKT
1
END

COM '700  Defined as
multi-circuit'
COM 'A 60105-60192  PR
ISLD3-BLUE LK3   OPENS
B   tower'
COM 'B 60192-60217
BLUE LK3-INVRHLS3
OPENS  A   tower'
COM 'C 60217-60236
INVRHLS3-REDROCK3
OPENS  B   mtl
COM '--------------------------
--------------------------'
CONTINGENCY '700    1'
TRIP LINE FROM BUS
60105 TO BUS 60192 CKT
1
TRIP LINE FROM BUS
60192 TO BUS 60217 CKT
1
TRIP LINE FROM BUS
60217 TO BUS 60236 CKT
1
END
CONTINGENCY '700    2'
COM ' Multi-terminal
portion only'
TRIP LINE FROM BUS
60192 TO BUS 60217 CKT
1
TRIP LINE FROM BUS
60217 TO BUS 60236 CKT
1
END

COM '705  Defined as
multi-circuit, tower, mtl'
COM 'A 60192-60233
BLUE LK3-PARKERS3
OPENS  B or C tower'
COM 'B 60192-60262
BLUE LK3-EDEN PR3
OPENS  A      tower MTL'
COM 'C 60233-60262
PARKERS3-EDEN PR3
OPENS  A      tower MTL'
COM '**    Defined as multi-
terminal'
COM 'B 60192-60262
BLUE LK3-EDEN PR3
OPENS  B'
COM 'D 60262-60263
EDEN PR3-EDEN PR7
OPENS  B'
COM '**    Defined as multi-
terminal'
COM 'C 60233-60262
PARKERS3-EDEN PR3
OPENS  E'
COM 'E 60262-60263
EDEN PR3-EDEN PR7
OPENS  C'
COM '--------------------------
--------------------------'
CONTINGENCY '705      1'
COM 'Tower with resulting
multi-terminal'
TRIP LINE FROM BUS
60192 TO BUS 60233 CKT
1
TRIP LINE FROM BUS
60192 TO BUS 60262 CKT
1
COM 'Also trips the
following because of B'
TRIP LINE FROM BUS
60262 TO BUS 60263 CKT
9
END
CONTINGENCY '705      2'
COM 'Tower with resulting
multi-terminal'
TRIP LINE FROM BUS
60192 TO BUS 60233 CKT
1
TRIP LINE FROM BUS
60233 TO BUS 60262 CKT
1
COM 'Also trips the
following because of C'
TRIP LINE FROM BUS
60262 TO BUS 60263 CKT
10
END
CONTINGENCY '705      3'
COM 'Valid Multi-terminal
only'
TRIP LINE FROM BUS
60192 TO BUS 60262 CKT
1
TRIP LINE FROM BUS
60262 TO BUS 60263 CKT
9
END
CONTINGENCY '705      4'
COM 'Valid Multi-terminal
only'
TRIP LINE FROM BUS
60233 TO BUS 60262 CKT
1
TRIP LINE FROM BUS
60262 TO BUS 60263 CKT
10
END

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
7
END

COM '710 Defined as multi-
terminal, tower'
COM ' Multi-terminal trips A
and B'
COM 'A 62925-62667
DICKNSN7-ST BONI7
OPENS B C'
COM 'B 62667-60277  ST
BONI7-WWACNIA7
OPENS A C'
COM 'D 62667-63021 ST
BONI7-ST BONI   OPENS
A B'
COM ' A and B multi-curcuit
tower with portions of C'
COM 'C 62925-60206
DICKNSN7-CROWRVR7'
COM '--------------------------
--------------------------'
COM 'mtl outage portion'
CONTINGENCY '710   1'
TRIP LINE FROM BUS
62925 TO BUS 62667 CKT
1
TRIP LINE FROM BUS
62667 TO BUS 60277 CKT
1
TRIP LINE FROM BUS
62667 TO BUS 63021 CKT
1
END
COM 'mtl, tower outage
portion'
CONTINGENCY '710   2'
TRIP LINE FROM BUS
62925 TO BUS 60206 CKT
1
TRIP LINE FROM BUS
62925 TO BUS 62667 CKT
1
TRIP LINE FROM BUS
62667 TO BUS 60277 CKT
1
TRIP LINE FROM BUS
62667 TO BUS 63021 CKT
1
END

COM '715 NSP Defined as
multi-terminal'
COM 'A 62666-60243
GLNDALE7-SCOTTAP7
OPENS  B C D E'
COM 'B 62666-62672
GLNDALE7-GLENDALE69
CKT 1  VLD SNG'
COM 'C 60243-60244
SCOTTAP7-SCOTTCO7
OPENS  A B D E'
COM 'D 60243-60194
SCOTTAP7-CARVRCO7
OPENS  A B C E'
COM 'E 60194-60931
CARVRCO7-CARVRCO8
VLD SNG'
COM '--------------------------
--------------------------'
CONTINGENCY '715      '
TRIP LINE FROM BUS
62666 TO BUS 60243 CKT
1
TRIP LINE FROM BUS
62666 TO BUS 62672 CKT
1
TRIP LINE FROM BUS
60243 TO BUS 60244 CKT
1
TRIP LINE FROM BUS
60243 TO BUS 60194 CKT
1
TRIP LINE FROM BUS
60194 TO BUS 60931 CKT
1
END

COM '720  Defined as
multi-circuit, tower'
```

```
COM 'A 60211-60234
GLESNLK7-PARKERS7  1
OPENS  B  tower'
COM 'B 60211-60234
GLESNLK7-PARKERS7  2
OPENS  A  tower'
COM '----------------------------
--------------------------'
CONTINGENCY '720      1'
TRIP LINE FROM BUS
60211 TO BUS 60234 CKT
1
TRIP LINE FROM BUS
60211 TO BUS 60234 CKT
2
END

COM '725 GRE Defined as
multi-terminal line'
COM 'A 63040-63048
BLAINE 4-RUSH CY4 CKT
1   OPENS B C'
COM 'B 63040-62128
BLAINE 4-BLAINE 8 CKT 1
OPENS A C'
COM 'C 63040-63046
BLAINE 4-BUNKER 4 CKT
1   OPEND A B'
COM '----------------------------
-----------------------------'
CONTINGENCY '725      '
TRIP LINE FROM BUS
63040 TO BUS 63048 CKT
1
TRIP LINE FROM BUS
63040 TO BUS 62128 CKT
1
TRIP LINE FROM BUS
63040 TO BUS 63046 CKT
1
END


CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
8
END

COM '740  Defined as
multi-circuit, tower'
COM 'A 60103-63071
CANNFLS5-SPRNGCK5
OPENS  B  tower MTL'
COM 'B 60106-63071  PR
ISLD5-SPRNGCK5
OPENS  A  tower'
COM '**    Defined as multi-
terminal'
COM 'C 60103-60104
CANNFLS5-CANNFLS7
OPENS  D'
COM 'D 60103-63071
CANNFLS5-SPRNGCK5
OPENS  C'
COM '----------------------------
-----------------------------'
CONTINGENCY '740    1'
TRIP LINE FROM BUS
60103 TO BUS 63071 CKT
1
TRIP LINE FROM BUS
60106 TO BUS 63071 CKT
1
COM 'Also trips the
following because of A'
TRIP LINE FROM BUS
60103 TO BUS 60104 CKT
5
END
CONTINGENCY '740    2'
TRIP LINE FROM BUS
60103 TO BUS 60104 CKT
5
TRIP LINE FROM BUS
60103 TO BUS 63071 CKT
1
END

COM '745  Defined as
multi-terminal'
COM 'A 60156-60162
PYNSVIL7-WAKEFLD7
OPENS  B C'
COM 'B 60162-62616
WAKEFLD7-BIGSWAN7
VLD SGL'
COM 'C 60162-60706
WAKEFLD7-WAKEFLD9
OPENS A B'
COM '----------------------------
-----------------------------'
CONTINGENCY '745      '
TRIP LINE FROM BUS
60156 TO BUS 60162 CKT
1
TRIP LINE FROM BUS
60162 TO BUS 62616 CKT
1
TRIP LINE FROM BUS
60162 TO BUS 60706 CKT
2
END

COM '750 Defined as multi-
terminal'
COM 'A 61647-62817
LONG PR7-LSAUKTP7
CKT 1
COM 'A 62817-60144
LSAUKTP7-DGLASCO7
CKT 1
COM 'A 62817-62818
LSAUKTP7-LTLSAUK7
CKT 1
COM 'B 60144-60749
DGLASCO7-DGLAS C8
CKT 1
COM '----------------------------
-----------------------------'
CONTINGENCY '750      '
TRIP LINE FROM BUS
61647 TO BUS 62817 CKT
1
TRIP LINE FROM BUS
62817 TO BUS 60144 CKT
1
TRIP LINE FROM BUS
62817 TO BUS 62818 CKT
1
TRIP LINE FROM BUS
60144 TO BUS 60749 CKT
1
END

COM ' FROM GRE, New
bus STCDTP 7 was not in
listing. Assuming bus is
60158'
COM ' 755 Defined as
multi-terminal'
COM 'A 60166-60158
SALIDA 7-STCLTP 7 CKT
1   OPENS B C '
COM 'B 60157-60158
STCLOUD7-STCLTP 7
CKT 1   OPENS A C '
COM 'C 62815-60158
I94PARK7-STCLTP 7 CKT
1   OPENS A B '
COM '----------------------------
-----------------------------'
CONTINGENCY '755      '
TRIP LINE FROM BUS
60166 TO BUS 60158 CKT
1
TRIP LINE FROM BUS
60157 TO BUS 60158 CKT
1
TRIP LINE FROM BUS
62815 TO BUS 60158 CKT
1
END

COM '756 Defined as multi-
terminal'
COM 'A 62815-62816
I94PARK7-STAUGST7
CKT 1   OPENS B C D'
COM 'B 60162-60159
WAKEFLD7-STCLTPW7
CKT 1   OPENS A C D'
COM 'C 60157-60159
STCLOUD7-STCLTPW7
CKT 1   OPENS A B D'
COM 'D 62816-60159
STAUGST7-STCLTPW7
CKT 1   OPENS A B C'
COM 'E 60162-60717
WAKEFLD7-WAKEFLD8
CKT 1'
COM 'F 60707-60717
BLUEHRN8-WAKEFLD8
CKT 1'
COM '----------------------------
-----------------------------'
CONTINGENCY '756      '
TRIP LINE FROM BUS
62815 TO BUS 62816 CKT
1
TRIP LINE FROM BUS
60162 TO BUS 60159 CKT
1
TRIP LINE FROM BUS
60157 TO BUS 60159 CKT
1
TRIP LINE FROM BUS
62816 TO BUS 60159 CKT
1
TRIP LINE FROM BUS
60162 TO BUS 60717 CKT
1
TRIP LINE FROM BUS
60707 TO BUS 60717 CKT
1
END

COM '760  Defined as
multi-circuit, tower'
COM 'A 60105-60236  PR
ISLD3-REDROCK3  1
OPENS  B'
COM 'B 60105-60236  PR
ISLD3-REDROCK3  2
OPENS  A'
COM '----------------------------
-----------------------------'
CONTINGENCY '760      '
TRIP LINE FROM BUS
60105 TO BUS 60236 CKT
1
TRIP LINE FROM BUS
60105 TO BUS 60236 CKT
2
END

COM '765  Defined as
multi-terminal'
COM 'A 63048-60237
RUSH CY4-REDROCK4
OPENS  B C'
COM 'B 60236-60237
REDROCK3-REDROCK4
OPENS  A C'
COM 'C 60361-63048
ROCKCR 4-RUSH CY4
OPENS  A B'
COM '----------------------------
-----------------------------'
CONTINGENCY '765      '
TRIP LINE FROM BUS
63048 TO BUS  60237
CKT 1
TRIP LINE FROM BUS
60236 TO BUS  60237
CKT 5
TRIP LINE FROM BUS
60361 TO BUS  63048
CKT 1
END

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
9
END

COM '770  Defined as
multi-terminal'
COM 'A 60109-60110
WILMART5-WILMART7
OPENS  B C'
COM 'B 60109-60120
WILMART5-BLUEART5
OPENS  A C'
```

```
COM 'C 60120-34009
BLUEETA5-WINBAGO5
OPENS  A B'
COM '----------------------------
----------------------------'
CONTINGENCY '770    '
TRIP LINE FROM BUS
60109 TO BUS 60110 CKT
5
TRIP LINE FROM BUS
60109 TO BUS 60120 CKT
1
TRIP LINE FROM BUS
60120 TO BUS 34009 CKT
1
END

COM '775  Defined as
multi-terminal'
COM 'A 62819-60163
FSCHRHL7-WST CLD7
VLD SGL'
COM 'B 60146-60164
GRANCTY7-XRDS  7     A
C D E F'
COM 'C 60154-60163
SAUK RV7-WST CLD7
A B D E F'
COM 'D 60165-60164 MEI
INT7-XRDS  7     A B C E
F'
COM 'E 60165-60163 MEI
INT7-WST CLD7     A B C
D F'
COM 'E 60165-62814 MEI
INT7-WESTWD 7     A B C
D F'
COM 'F 62814-60163
WESTWD 7-WST CLD7
A B C D E'
COM '----------------------------
----------------------------'
CONTINGENCY '775    '
TRIP LINE FROM BUS
62819 TO BUS 60163 CKT
1
TRIP LINE FROM BUS
60146 TO BUS 60164 CKT
1
TRIP LINE FROM BUS
60154 TO BUS 60163 CKT
1
TRIP LINE FROM BUS
60165 TO BUS 60164 CKT
1
TRIP LINE FROM BUS
60165 TO BUS 62814 CKT
1
TRIP LINE FROM BUS
62814 TO BUS 60163 CKT
1
TRIP LINE FROM BUS
60165 TO BUS 62814 CKT
1
TRIP LINE FROM BUS
62814 TO BUS 60163 CKT
1
END

COM '180 GRE Defined as
multi-terminal tower'
COM 'multi-terminal trips A
B and C'
COM 'A 63041-63042
COAL CR4-COAL TP4
OPENS B, C'
COM 'B 63042-63049
COAL TP4-STANTON4
OPENS A, C'
COM 'C 63042-63044
COAL TP4-MCHENRY4
OPENS A, B'
COM 'A and B multi-circuit
tower with portions of D
and operating response'
COM 'D 63041-63049
COAL CR4-STANTON4'
COM '----------------------------
----------------------------'
CONTINGENCY '180     1'
COM 'mtl outage portion'
TRIP LINE FROM BUS
63041 TO BUS 63042 CKT
1
TRIP LINE FROM BUS
63042 TO BUS 63049 CKT
1
TRIP LINE FROM BUS
63042 TO BUS 63044 CKT
1
END
CONTINGENCY '180     2'
COM 'Common tower
outage with mtl portion'
TRIP LINE FROM BUS
63041 TO BUS 63042 CKT
1
TRIP LINE FROM BUS
63042 TO BUS 63049 CKT
1
TRIP LINE FROM BUS
63042 TO BUS 63044 CKT
1
TRIP LINE FROM BUS
63041 TO BUS 63049 CKT
1
END

COM '785 GRE Defined as
multi-terminal'
COM 'A 60129-60128
SPLIT R7-SPLIT R5
OPENS  B C D E F'
COM 'B 60128-34003
SPLIT R5-MAGNLIA5
OPENS  A C D E F'
COM 'C 34003-34004
MAGNLIA5-ELK    5
OPENS  A B D E F'
COM 'D 34004-62709  ELK
-BREWSTR5   OPENS  A
B C E F'
COM 'E 62709-34005
BREWSTR5-HRN LK 5
OPENS  A B C D F'
COM 'F 34005-34225  HRN
LK 5-HERONLK8 CKT 1'
COM '----------------------------
----------------------------'
CONTINGENCY '785    '
TRIP LINE FROM BUS
60129 TO BUS 60128 CKT
6
TRIP LINE FROM BUS
60128 TO BUS 34003 CKT
1
TRIP LINE FROM BUS
34003 TO BUS 34004 CKT
1
TRIP LINE FROM BUS
34004 TO BUS 62709 CKT
1
TRIP LINE FROM BUS
62709 TO BUS 34005 CKT
1
TRIP LINE FROM BUS
34005 TO BUS 34225 CKT
1
END

COM '790  Defined as
multi-terminal'
COM 'A 66550-60147
GRANITF4-MINVALY4
OPENS  B'
COM 'B 60147-60148
MINVALY4-MINVALY7  5
OPENS  A'
COM '----------------------------
----------------------------'
CONTINGENCY '790    '
TRIP LINE FROM BUS
66550 TO BUS 60147 CKT
1
TRIP LINE FROM BUS
60147 TO BUS 60148 CKT
5
END

COM '795  Defined as
multi-terminal'
COM 'A 66550-60150
GRANITF4-MNVLTAP4
OPENS  B C D E'
COM 'B 60148-60149
MINVALY7-MINVALT4
OPENS  A C D E'
COM 'C 60150-63054
MNVLTAP4-PANTHER4
OPENS  A B D E'
COM 'D 60149-60150
MINVALT4-MNVLTAP4
OPENS  A B C E'
COM 'E 63054-60742
PANTHER4-PANTHER8
OPENS  A B C D'
COM '----------------------------
----------------------------'
CONTINGENCY '795    '
TRIP LINE FROM BUS
66550 TO BUS 60150 CKT
1
TRIP LINE FROM BUS
60148 TO BUS 60149 CKT
6
TRIP LINE FROM BUS
60150 TO BUS 63054 CKT
1
TRIP LINE FROM BUS
60149 TO BUS 60150 CKT
1
TRIP LINE FROM BUS
63054 TO BUS 60742 CKT
1
END

COM '800  Defined as
multi-terminal'
COM  Wilton 230/115 kV
COM 'A 63345-63186
WILTON 4-WILTON Y
OPENS B C D '
COM 'B 63186-63245
WILTON Y-WILTON 7
OPENS A C D'
COM 'C 63186-63343
WILTON Y-WILTON19
OPENS A B D
COM 'D 66758-63345
WINGER 4-WILTON 4
OPENS A B C
COM '----------------------------
----------------------------'
CONTINGENCY '800     1'
TRIP LINE FROM BUS
63345 TO BUS 63186 CKT
1
TRIP LINE FROM BUS
63186 TO BUS 63245 CKT
1
TRIP LINE FROM BUS
63186 TO BUS 63343 CKT
1
TRIP LINE FROM BUS
66758 TO BUS 63345 CKT
1
END

COM '805  Defined as
multi-terminal'
COM 'A 60187-60176  AS
KING7-BAYTOWN7
OPENS  B C'
COM 'B 60224-60176
LONG LK7-BAYTOWN7
OPENS  A C'
COM 'C 60222-60224
KOLMNLK7-LONG LK7
VLD SGL'
COM '----------------------------
----------------------------'
CONTINGENCY '805    '
TRIP LINE FROM BUS
60187 TO BUS 60176 CKT
1
TRIP LINE FROM BUS
60222 TO BUS 60224 CKT
1
TRIP LINE FROM BUS
60224 TO BUS 60176 CKT
1
END

COM '810  Defined as
multi-terminal'
COM 'A 60189-62980 BLK
DOG4-MCLEOD 4
OPENS  B'
```

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COM 'B 60189-60190 BLK
DOG4-BLK DOG7
OPENS  A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '810    '
TRIP LINE FROM BUS
60189 TO BUS 62980 CKT
1
TRIP LINE FROM BUS
60189 TO BUS 60190 CKT
5
END

COM '811  Defined as
multi-terminal'
COM 'A 60107-62865 W
FARIB7-AIRTECH7
OPENS B C'
COM 'B 62865-62234
AIRTECH7-LKMARN 7
OPENS A C'
COM 'C 60276-62234
AIRLAKE7-LKMARN 7
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '811     '
TRIP LINE FROM BUS
60107 TO BUS 62865 CKT
1
TRIP LINE FROM BUS
62865 TO BUS 62234 CKT
1
TRIP LINE FROM BUS
60276 TO BUS 62234 CKT
1
END

COM '815  Defined as
multi-terminal'
COM 'A 62225-62226
BURNVIL7-FISCHER7
OPENS  B C D'
COM 'B 62226-60343
FISCHER7-WILLPIP7
OPENS  A C D'
COM 'C 60343-62228
WILLPIP7-APPVLTW7
OPENS  A B D'
COM 'D 62228-62227
APPVLTW7-JOHNCAK7
OPENS  A B C'
COM '-----------------------------
-----------------------------'
CONTINGENCY '815     '
TRIP LINE FROM BUS
62225 TO BUS 62226 CKT
1
TRIP LINE FROM BUS
62226 TO BUS 60343 CKT
1
TRIP LINE FROM BUS
60343 TO BUS 62228 CKT
1
TRIP LINE FROM BUS
62228 TO BUS 62227 CKT
1
END

COM '820  Defined as
multi-terminal'
COM 'A 60218 TO  60271
INVRHLS7-RICHVLY7
OPENS  B C'
COM 'B 60271 TO  60247
RICHVLY7-LINDE  7
OPENS  A C'
COM 'C 60247 TO  60201
LINDE  7-CHEMOLT7
OPENS  A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '820    '
TRIP LINE FROM BUS
60218 TO BUS 60271 CKT
1
TRIP LINE FROM BUS
60271 TO BUS 60247 CKT
1
TRIP LINE FROM BUS
60247 TO BUS 60201 CKT
1
END

COM '825  Defined as
multi-terminal'
COM 'A 63032-60102  PL
VLLY3-ADAMS  3  OPENS
B C'
COM 'B 60102-34014
ADAMS  3-ADAMS  5
OPENS  A C'
COM 'C 60102-34018
ADAMS  3-HAZLTON3
VLD SGL'
COM '-----------------------------
-----------------------------'
CONTINGENCY '825    '
TRIP LINE FROM BUS
63032 TO BUS 60102 CKT
1
TRIP LINE FROM BUS
60102 TO BUS 34014 CKT
9
TRIP LINE FROM BUS
60102 TO BUS 34018 CKT
1
END

COM '855  Defined as
multi-terminal'
COM 'A 63216-62003
ORTONVL7-GRACEVT7
OPENS  B C'
COM 'B 66555-62003
MORRIS 7-GRACEVT7
OPENS  A C'
COM 'C 62003-62004
GRACEVT7-GRACEV 7
OPENS  A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '855    '
COM 'Trip of A or B or C'
TRIP LINE FROM BUS
63216 TO BUS 62003 CKT
1
TRIP LINE FROM BUS
66555 TO BUS 62003 CKT
1
TRIP LINE FROM BUS
62003 TO BUS 62004 CKT
1
END

COM '860  Defined as
multi-terminal'
COM 'A 66555-63218
MORRIS 7-MOROTP 7
CKT 1   OPENS B C D E'
COM 'B 63218-62002
MOROTP 7-WALDON 7
CKT 1   OPENS A C D E'
COM 'C 62002-62001
WALDON 7-BENSON 7
CKT 1   OPENS A B C D'
COM 'D 62001-62013
BENSON 7-BENSON 9
CKT 1   OPENS A B C E'
com 'E 62001-62006
BENSON 7-KERKHO 7
CKT 1   OPENS A B C D'
COM '-----------------------------
-----------------------------'
CONTINGENCY '860    '
TRIP LINE FROM BUS
66555 TO BUS 63218 CKT
1
TRIP LINE FROM BUS
63218 TO BUS 62002 CKT
1
TRIP LINE FROM BUS
62002 TO BUS 62001 CKT
1
TRIP LINE FROM BUS
62001 TO BUS 62013 CKT
1
TRIP LINE FROM BUS
62001 TO BUS 62006 CKT
1
END

COM '865   Defined as
multi-terminal, otp'
COM 'A 63331-63051
FERGSFL4-HENNING4
CKT 1   OPENS  B C'
COM 'B 63051-63052
HENNING4-INMAN  4 CKT
1   OPENS  A C'
COM 'C 63051-63309
HENNING4-HENNING9
CKT 1   OPENS  A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '865    '
TRIP LINE FROM BUS
63331 TO BUS 63051 CKT
1
TRIP LINE FROM BUS
63051 TO BUS 63052 CKT
1
TRIP LINE FROM BUS
63051 TO BUS 63309 CKT
1
END

COM '866   Defined as
multi-terminal, otp'
COM 'A 63052-61611
INMAN  4-WINGRIV4 CKT
1   OPENS  B'
COM 'B 63052-63051
INMAN  4-HENNING4 CKT
1   OPENS  A'
COM 'C 63052-62531
INMAN  4-INMAN  7 CKT 1
OPENS  A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '866    '
TRIP LINE FROM BUS
63052 TO BUS 61611 CKT
1
TRIP LINE FROM BUS
63052 TO BUS 63051 CKT
1
TRIP LINE FROM BUS
63052 TO BUS 62531 CKT
1
END

COM '900  Defined as
multi-circuit, tower'
COM 'A 60105-60192  PR
ISLD3-BLUE LK3   OPENS
B  tower'
COM 'B 60105-60236  PR
ISLD3-REDROCK3
OPENS  A  tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY '900    '
TRIP LINE FROM BUS
60105 TO BUS 60192 CKT
1
TRIP LINE FROM BUS
60105 TO BUS 60236 CKT
1
END

COM '905  Defined as
multi-circuit, tower'
COM 'A 60105-61950  PR
ISLD3-BYRON  3   OPENS
B  tower'
COM 'B 60105-60236  PR
ISLD3-REDROCK3
OPENS  A  tower'
COM '-----------------------------
-----------------------------'
CONTINGENCY '905    '
TRIP LINE FROM BUS
60105 TO BUS 61950 CKT
1
TRIP LINE FROM BUS
60105 TO BUS 60236 CKT
2
END

COM '910  Defined as
multi-terminal'
COM 'A 60107-60265  W
FARIB7-LOONLKTP
OPENS  B C D E F G'
```

```
COM 'B 60107-60792  W
FARIB7-WFARBLT8
OPENS  A C D E F G'
COM 'C 60107-61952  W
FARIB7-S FARIB5
OPENS  VLD SNG'
COM 'D 60265-60264
LOONLKTP-LOON LK7
OPENS  A B C E F G'
COM 'E 60264-61976
LOON LK7-LOON LK8
OPENS  A B C D F G'
COM 'F 60265-60113
LOONLKTP-DOME   7
OPENS  A B C D E G'
COM 'G 60113-60110
DOME   7-WILMART7
OPENS  A B C D E F'
COM '-------------------------
-------------------------'
CONTINGENCY '910    '
TRIP LINE FROM BUS
60107 TO BUS 60265 CKT
1
TRIP LINE FROM BUS
60107 TO BUS 60792 CKT
1
TRIP LINE FROM BUS
60107 TO BUS 61952 CKT
1
TRIP LINE FROM BUS
60265 TO BUS 60264 CKT
1
TRIP LINE FROM BUS
60264 TO BUS 61976 CKT
1
TRIP LINE FROM BUS
60265 TO BUS 60113 CKT
1
TRIP LINE FROM BUS
60113 TO BUS 60110 CKT
1
END

COM '915  Defined as
multi-terminal'
COM 'A 60104-62235
CANNFLS7-EMPIRE 7
OPENS  B '
COM 'B 60104-60801
CANNFLS7-CNFLSTR8
OPENS  VLD SNG'
COM '-------------------------
-------------------------'
CONTINGENCY '915    '
TRIP LINE FROM BUS
60104 TO BUS 62235 CKT
1
TRIP LINE FROM BUS
60104 TO BUS 60801 CKT
1
END

COM '920  Defined as
multi-terminal'
COM 'A 60110-60111
WILMART7-SWAN LK7
OPENS  B '
COM 'B 60111-60112
SWAN LK7-FTRIDLY7
OPENS  VLD SNG'
COM '-------------------------
-------------------------'
CONTINGENCY '920    '
TRIP LINE FROM BUS
60110 TO BUS 60111 CKT
1
TRIP LINE FROM BUS
60111 TO BUS 60112 CKT
1
END

COM '924 OTP Defined as
multi-terminal'
COM 'A 63236-63207
AUDUBON7-DL OTP7
OPENS  B'
COM 'B 63207-67464  DL
OTP7-DLWEST7
OPENS  A'
COM '-------------------------
-------------------------'
CONTINGENCY '924    '
TRIP LINE FROM BUS
63236 TO BUS 63207 CKT
1
TRIP LINE FROM BUS
63207 TO BUS 67464 CKT
1
END

COM '925 OTP Defined as
multi-terminal'
COM 'A 62530-63235
FRAZEE 7-PERHAM 7
OPENS  B C D E'
COM 'B 63235-63286
PERHAM 7-QUADRNT7
OPENS  A C D E'
COM 'C 63286-62526
QUADRNT7-RUSH LK7
OPENS  A B D E'
COM 'D 62526-62562
RUSH LK7-RUSH LK9
OPENS  A B C E'
COM 'E 62526-62531
RUSH LK7-INMAN  7
OPENS  A B C D'
COM '-------------------------
-------------------------'
CONTINGENCY '925    '
TRIP LINE FROM BUS
62530 TO BUS 63235 CKT
1
TRIP LINE FROM BUS
63235 TO BUS 63286 CKT
1
TRIP LINE FROM BUS
63286 TO BUS 62526 CKT
1
TRIP LINE FROM BUS
62526 TO BUS 62562 CKT
1
TRIP LINE FROM BUS
62526 TO BUS 62531 CKT
1
END

COM '930  Defined as
multi-circuit, multi-terminal'
COM 'A 60233-60114
PARKERS3-ELM CRK3
OPENS  B TOWER'
COM 'B 60233-60270
PARKERS3-MPLEGV13
OPENS  A TOWER, C
MTL'
COM 'C 60270-63030
MPLEGV13-DICKNSN3
OPENS  B MTL'
COM 'D 61490-60233
PKLMID1Y-PARKERS3
OPENS ONLY FOR A&B,
D E F MTL'
COM 'E 61490-60234
PKLMID1Y-PARKERS7
OPENS ONLY FOR A&B,
D E F MTL'
COM 'F 61490-60660
PKLMID1Y-PKLTER19
OPENS ONLY FOR A&B,
D E F MTL'
COM '-------------------------
-------------------------'
CONTINGENCY '930   1'
TRIP LINE FROM BUS
60233 TO BUS 60114 CKT
1
TRIP LINE FROM BUS
60233 TO BUS 60270 CKT
1
TRIP LINE FROM BUS
60270 TO BUS 63030 CKT
1
TRIP LINE FROM BUS
61490 TO BUS 60233 CKT
9
TRIP LINE FROM BUS
61490 TO BUS 60234 CKT
9
TRIP LINE FROM BUS
61490 TO BUS 60660 CKT
9
END
CONTINGENCY '930   2'
TRIP LINE FROM BUS
60233 TO BUS 60270 CKT
1
TRIP LINE FROM BUS
60270 TO BUS 63030 CKT
1
END
CONTINGENCY '930   3'
TRIP LINE FROM BUS
61490 TO BUS 60233 CKT
9
TRIP LINE FROM BUS
61490 TO BUS 60234 CKT
9
TRIP LINE FROM BUS
61490 TO BUS 60660 CKT
9
END


COM '935  Defined as
multi-circuit, multi-terminal'
COM 'A 60114-60233  ELM
CRK3-PARKERS3
OPENS  B TOWER'
COM 'B 60160-60272
SHERCO 3-MPLEGV23
OPENS  A TOWER, C D E
F MTL'
COM 'C 60272-60202
MPLEGV23-COON CK3
OPENS  B D E F MTL'
COM 'D 61488-60202
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'E 61488-60203
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'F 61488-60656
CNCMID1Y-CNCTER19
OPENS  D E F MTL'
COM '-------------------------
-------------------------'
CONTINGENCY '935   1'
TRIP LINE FROM BUS
60114 TO BUS 60233 CKT
1
TRIP LINE FROM BUS
60160 TO BUS 60272 CKT
1
TRIP LINE FROM BUS
60272 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END
CONTINGENCY '935   2'
TRIP LINE FROM BUS
60160 TO BUS 60272 CKT
1
TRIP LINE FROM BUS
60272 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END
CONTINGENCY '935   3'
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END
```

```
COM '940  Defined as
multi-circuit, multi-terminal'
COM 'A 60114-60151  ELM
CRK3-MNTCELO3
OPENS  B TOWER'
COM 'B 60160-60272
SHERCO 3-MPLEGV23
OPENS  A TOWER, C D E
F MTL'
COM 'C 60272-60202
MPLEGV23-COON CK3
OPENS  B D E F MTL'
COM 'D 61488-60202
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'E 61488-60203
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'F 61488-60656
CNCMID1Y-CNCTER19
OPENS  D E F MTL'
COM '----------------------------
--------------------------'
CONTINGENCY '940    '
TRIP LINE FROM BUS
60114 TO BUS 60151 CKT
1
TRIP LINE FROM BUS
60160 TO BUS 60272 CKT
1
TRIP LINE FROM BUS
60272 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END


COM '945  Defined as
multi-circuit, multi-terminal'
COM 'A 60160-60151
SHERCO 3-MNTCELO3
OPENS  B TOWER'
COM 'B 60160-60272
SHERCO 3-MPLEGV23
OPENS  A TOWER, C D E
F MTL'
COM 'C 60272-60202
MPLEGV23-COON CK3
OPENS  B D E F MTL'
COM 'D 61488-60202
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'E 61488-60203
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'F 61488-60656
CNCMID1Y-CNCTER19
OPENS  D E F MTL'
COM '----------------------------
--------------------------'
CONTINGENCY '945    '
TRIP LINE FROM BUS
60160 TO BUS 60151 CKT
1
TRIP LINE FROM BUS
60160 TO BUS 60272 CKT
1
TRIP LINE FROM BUS
60272 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END


COM '950  Defined as
multi-circuit, multi-terminal'
COM 'A 60202-63030
COON CK3-DICKNSN3
OPENS  B TOWER'
COM 'B 60160-60272
SHERCO 3-MPLEGV23
OPENS  A TOWER, C D E
F MTL'
COM 'C 60272-60202
MPLEGV23-COON CK3
OPENS  B D E F MTL'
COM 'D 61488-60202
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'E 61488-60203
CNCMID1Y-COON CK3
OPENS  D E F MTL'
COM 'F 61488-60656
CNCMID1Y-CNCTER19
OPENS  D E F MTL'
COM '----------------------------
--------------------------'
CONTINGENCY '950    '
TRIP LINE FROM BUS
60202 TO BUS 63030 CKT
1
TRIP LINE FROM BUS
60160 TO BUS 60272 CKT
1
TRIP LINE FROM BUS
60272 TO BUS 60202 CKT
1
TRIP LINE FROM BUS
61488 TO BUS 60202 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60203 CKT
9
TRIP LINE FROM BUS
61488 TO BUS 60656 CKT
9
END


COM '955  Defined as
multi-circuit, multi-terminal'
COM 'A 60115-60269
ELMCRK 7-HASSAN 7
OPENS  B TOWER'
COM 'B 60115-60177
ELMCRK 7-CHAMPLN7
OPENS  A TOWER, C D E
MTL'
COM 'C 60177-60178
CHAMPLN7-CHAMP T7
OPENS  B D E MTL'
COM 'D 60178-60205
CHAMP T7-CRKEDLK7
OPENS  B C E MTL'
COM 'E 60178-60254
CHAMP T7-WCNRAPD7
OPENS  B C D MTL'
COM '----------------------------
--------------------------'
CONTINGENCY '955    1'
TRIP LINE FROM BUS
60115 TO BUS 60269 CKT
1
TRIP LINE FROM BUS
60115 TO BUS 60177 CKT
1
TRIP LINE FROM BUS
60177 TO BUS 60178 CKT
1
TRIP LINE FROM BUS
60178 TO BUS 60205 CKT
1
TRIP LINE FROM BUS
60178 TO BUS 60254 CKT
1
END
CONTINGENCY '955    2'
TRIP LINE FROM BUS
60115 TO BUS 60177 CKT
1
TRIP LINE FROM BUS
60177 TO BUS 60178 CKT
1
TRIP LINE FROM BUS
60178 TO BUS 60205 CKT
1
TRIP LINE FROM BUS
60178 TO BUS 60254 CKT
1
END


COM '960  Defined as
multi-circuit'
COM 'A 60234-60346
PARKERS7-CEDARLK7
OPENS  B TOWER'
COM 'B 60234-60259
PARKERS7-BASCRK 7
OPENS  A TOWER'
COM '----------------------------
--------------------------'
CONTINGENCY '960    '
TRIP LINE FROM BUS
60234 TO BUS 60346 CKT
1
TRIP LINE FROM BUS
60234 TO BUS 60259 CKT
1
END


COM '965  Defined as
multi-circuit'
COM 'A 60234-60346
PARKERS7-CEDARLK7
OPENS  B TOWER'
COM 'B 60259-60227
BASCRK 7-MEDLAKE7
OPENS  A TOWER'
COM '----------------------------
--------------------------'
CONTINGENCY '965    '
TRIP LINE FROM BUS
60234 TO BUS 60346 CKT
1
TRIP LINE FROM BUS
60259 TO BUS 60227 CKT
1
END

COM ' 970 Defined as
multi-circuit'
COM 'A 60234-60346
PARKERS7-CEDARLK7
OPENS  B TOWER'
COM 'B 60227-60182
MEDLAKE7-ALDRCH27
OPENS  A TOWER'
COM '----------------------------
--------------------------'
CONTINGENCY '970    '
TRIP LINE FROM BUS
60234 TO BUS 60346 CKT
1
TRIP LINE FROM BUS
60227 TO BUS 60182 CKT
1
END


COM '975  Defined as
multi-circuit'
COM 'A 60182-60227
ALDRCH27-MEDLAKE7
OPENS  B TOWER'
COM 'B 60181-60216
ALDRICH7-INDIANA7
OPENS  A TOWER'
COM '----------------------------
--------------------------'
CONTINGENCY '975    '
TRIP LINE FROM BUS
60182 TO BUS 60227 CKT
1
TRIP LINE FROM BUS
60181 TO BUS 60216 CKT
1
END


COM '980  Defined as
multi-circuit'
COM 'A 60355-60240
WRIV RD7-RIVRSID7
OPENS  B TOWER'
COM 'B 60355-60240
WRIV RD7-RIVRSID7
OPENS  A TOWER'
COM '----------------------------
--------------------------'
```

```
CONTINGENCY '980    '
TRIP LINE FROM BUS
60355 TO BUS 60240 CKT
1
TRIP LINE FROM BUS
60355 TO BUS 60240 CKT
2
END


COM '985  Defined as
multi-circuit'
COM 'A 60240-60253
RIVRSID7-TWIN LK7
OPENS  B TOWER'
COM 'B 60240-60268
RIVRSID7-BRKLNPK7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '985    '
TRIP LINE FROM BUS
60240 TO BUS 60253 CKT
1
TRIP LINE FROM BUS
60240 TO BUS 60268 CKT
1
END


COM '990  Defined as
multi-circuit'
COM 'A 60240-60209
RIVRSID7-ELLOTPK7
OPENS  B C TOWER'
COM 'B 60240-60210
RIVRSID7-FIFTHST7
OPENS  A C TOWER'
COM 'C 60240-60226
RIVRSID7-MAIN ST7
OPENS  A B TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '990    '
TRIP LINE FROM BUS
60240 TO BUS 60209 CKT
1
TRIP LINE FROM BUS
60240 TO BUS 60210 CKT
1
TRIP LINE FROM BUS
60240 TO BUS 60226 CKT
1
END


COM '995  Defined as
multi-circuit'
COM 'A 60253-60203
TWIN LK7-COON CK7
OPENS  B TOWER'
COM 'B 60253-60240
TWIN LK7-RIVRSID7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '995    '
TRIP LINE FROM BUS
60253 TO BUS 60203 CKT
1
TRIP LINE FROM BUS
60253 TO BUS 60240 CKT
1
END


COM '996  Defined as
multi-circuit'
COM 'A 60203-60253
COON CK7-TWIN LK7
OPENS  B TOWER'
COM 'B 60203-60268
COON CK7-BRKLNPK7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '996    '
TRIP LINE FROM BUS
60203 TO BUS 60253 CKT
1
TRIP LINE FROM BUS
60203 TO BUS 60268 CKT
1
END


COM '997  Defined as
multi-circuit'
COM 'A 60203-60253
COON CK7-TWIN LK7
OPENS  B TOWER'
COM 'B 60240-60268
RIVRSID7-BRKLNPK7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '997    '
TRIP LINE FROM BUS
60203 TO BUS 60253 CKT
1
TRIP LINE FROM BUS
60240 TO BUS 60268 CKT
1
END


COM '998  Defined as
multi-circuit'
COM 'A 60229-60203
MOORELK7-COON CK7
OPENS  B TOWER'
COM 'B 60229-60240
MOORELK7-RIVRSID7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '998    '
TRIP LINE FROM BUS
60229 TO BUS 60203 CKT
1
TRIP LINE FROM BUS
60229 TO BUS 60240 CKT
1
END


COM '999  Defined as
multi-circuit'
COM 'A 60229-60203
MOORELK7-COON CK7
OPENS  B TOWER'
COM 'B 60229-60240
MOORELK7-RIVRSID7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '999    '
TRIP LINE FROM BUS
60229 TO BUS 60203 CKT
1
TRIP LINE FROM BUS
60229 TO BUS 60240 CKT
1
END


COM '903  Defined as
multi-circuit'
COM 'A 60229-60203
MOORELK7-COON CK7
OPENS  B TOWER'
COM 'B 60229-60240
MOORELK7-RIVRSID7
OPENS  A TOWER'
COM '-----------------------------
-----------------------------'
CONTINGENCY '903    '
TRIP LINE FROM BUS
60229 TO BUS 60203 CKT
1
TRIP LINE FROM BUS
60229 TO BUS 60240 CKT
1
END


COM '907  Defined as
multi-circuit, multi-terminal'
COM 'A 60202-60221
COON CK3-KOLMNLK3
OPENS  B TOWER, C
MTL'
COM 'B 60202-60251
COON CK3-TERMINL3
OPENS  A TOWER, D E F
MTL'
COM 'C 60221-60222
KOLMNLK3-KOLMNLK7
VLD SNG'
COM 'D 61492-60251
TERMID1Y-TERMINL3   D
E F VLD SNG'
COM 'E 61492-60252
TERMID1Y-TERMINL7   D
E F VLD SNG'
COM 'F 61492-61187
TERMID1Y-TERTER19   D
E F VLD SNG'
COM '-----------------------------
-----------------------------'
CONTINGENCY '907    1'
TRIP LINE FROM BUS
60202 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
60202 TO BUS 60251 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60222 CKT
9
TRIP LINE FROM BUS
61492 TO BUS 60251 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 60252 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 61187 CKT
10
END
CONTINGENCY '907    2'
TRIP LINE FROM BUS
60202 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
60221 TO BUS 60222 CKT
9
END
CONTINGENCY '907    3'
TRIP LINE FROM BUS
60202 TO BUS 60251 CKT
1
TRIP LINE FROM BUS
61492 TO BUS 60251 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 60252 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 61187 CKT
10
END
CONTINGENCY '907    4'
TRIP LINE FROM BUS
61492 TO BUS 60251 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 60252 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 61187 CKT
10
END


COM '913  Defined as
mulit-circuitmulti-terminal'
COM 'A 60252-60241
TERMINL7-ROSE PL7
OPENS  B tower'
COM 'B 60252-60184
TERMINL7-APACHET7
OPENS  A tower, C D E
mtl'
COM 'C 60184-60183
APACHET7-APACHE 7
OPENS  B D E'
COM 'D 60184-60185
APACHET7-ARDNHLS7
OPENS  B C E'
COM 'E 60185-60909
ARDNHLS7-ARDNHL28
VLD SNG'
COM '-----------------------------
-----------------------------'
CONTINGENCY '013    1'
```

```
TRIP LINE FROM BUS
60252 TO BUS 60241 CKT
1
TRIP LINE FROM BUS
60252 TO BUS 60184 CKT
1
TRIP LINE FROM BUS
60184 TO BUS 60183 CKT
1
TRIP LINE FROM BUS
60184 TO BUS 60185 CKT
1
TRIP LINE FROM BUS
60185 TO BUS 60909 CKT
1
END
CONTINGENCY '913    2'
TRIP LINE FROM BUS
60252 TO BUS 60184 CKT
1
TRIP LINE FROM BUS
60184 TO BUS 60183 CKT
1
TRIP LINE FROM BUS
60184 TO BUS 60185 CKT
1
TRIP LINE FROM BUS
60185 TO BUS 60909 CKT
1
END


COM '917  Defined as
multi-circuit, multi-terminal'
COM 'A 60251-60221
TERMINL3-KOLMNLK3
OPENS  B TOWER, F G H
MTL'
COM 'B 60202-60251
COON CK3-TERMINL3
OPENS  A TOWER, C D E
MTL'
COM 'C 61492-60251
TERMID1Y-TERMINL3   C
D E VLD SNG'
COM 'D 61492-60252
TERMID1Y-TERMINL7   C
D E VLD SNG'
COM 'E 61492-61187
TERMID1Y-TERTER19   C
D E VLD SNG'
COM 'F 61491-60251
TERMID2Y-TERMINL3   F
G H VLD SNG'
COM 'G 61491-60252
TERMID2Y-TERMINL7   F
G H VLD SNG'
COM 'H 61491-61188
TERMID2Y-TERTER29   F
G H VLD SNG'
COM '-------------------------
-------------------------'
CONTINGENCY '917    1'
TRIP LINE FROM BUS
60251 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
60202 TO BUS 60251 CKT
1
TRIP LINE FROM BUS
61492 TO BUS 60251 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 60252 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 61187 CKT
10
TRIP LINE FROM BUS
61491 TO BUS 60251 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 60252 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 61188 CKT
9
END
CONTINGENCY '917    2'
TRIP LINE FROM BUS
60251 TO BUS 60221 CKT
1
TRIP LINE FROM BUS
61491 TO BUS 60251 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 60252 CKT
9
TRIP LINE FROM BUS
61491 TO BUS 61188 CKT
9
END
CONTINGENCY '917    3'
TRIP LINE FROM BUS
61492 TO BUS 60251 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 60252 CKT
10
TRIP LINE FROM BUS
61492 TO BUS 61187 CKT
10
END


COM '923  Defined as
multi-terminal'
COM 'A 60200-62666  BLK
DG27-GLNDALE7
OPENS  B'
COM 'B 62666-62672
GLNDALE7-GLNDALE8
CKT 2   OPENS  A'
COM '-------------------------
-------------------------'
CONTINGENCY '923    '
TRIP LINE FROM BUS
60200 TO BUS 62666 CKT
1
TRIP LINE FROM BUS
62666 TO BUS 62672 CKT
2
END

COM '923  Defined as
multi-terminal'
COM 'A 60242-62668
SAVAGE 7-EGLCKTP7
OPENS  B C D'
COM 'B 62668-62975
EGLCKTP7-SHAKOPE7
OPENS  A C D'
COM 'C 62668-62669
EGLCKTP7-EAGLECK7
OPENS  A B D'
COM 'D 62975-60244
SHAKOPE7-SCOTTCO7
OPENS  A B C'
COM '-------------------------
-------------------------'
CONTINGENCY '923    '
TRIP LINE FROM BUS
60242 TO BUS 62668 CKT
1
TRIP LINE FROM BUS
62668 TO BUS 62975 CKT
1
TRIP LINE FROM BUS
62668 TO BUS 62669 CKT
1
TRIP LINE FROM BUS
62975 TO BUS 60244 CKT
1
END

COM '923  Defined as
multi-terminal'
COM 'A 60258-60190
WILSON 7-BLK DOG7
OPENS  B'
COM 'B 60258-60280
WILSON 7-NINE MI7
OPENS  A'
COM '-------------------------
-------------------------'
CONTINGENCY '923    '
TRIP LINE FROM BUS
60258 TO BUS 60190 CKT
3
TRIP LINE FROM BUS
60258 TO BUS 60280 CKT
1
END

COM ' '
COM ' '
COM '  END MINNESOTA
AREA CONTINGENCIES'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
10
END

COM ' '
COM ' '
COM ' '
COM ' '
COM '  START
WISCONSIN AREA
CONTINGENCIES'
COM ' '
COM ' '
COM '050  Defined as
multi-circuit,  Interregional'
COM 'A 60186-60304  AS
KING3-EAU CL 3   OPENS
B C'
COM 'B 60304-39244  EAU
CL 3-ARP 345    vld sgl'
COM 'C 60304-60305  EAU
CL 3-EAU CLA5 ckt9
OPENS A B'
COM ' These lines are west
of Council Creek'
COM ' They could trip for
loss of E.C.-Arpin 345 kV'
COM ' 39901 [COC DPC
] to 38342 [COC 69  69.0]'
COM ' 38333 [HLT 69
69.0] to 68821 [MAUSTON
69.0]'
COM '-------------------------
-------------------------'
CONTINGENCY '050    1'
COM 'king-eau claire-arpin
with 69 tripping'
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
TRIP LINE FROM BUS
39901 TO BUS 38342 CKT
1
TRIP LINE FROM BUS
38333 TO BUS 68821 CKT
1
END
CONTINGENCY '050    2'
COM 'king-eau claire-arpin
w/o 69 tripping'
TRIP LINE FROM BUS
60186 TO BUS 60304 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
60304 TO BUS 60305 CKT
9
END
CONTINGENCY '050    3'
COM 'eau claire-arpin with
69 tripping'
TRIP LINE FROM BUS
60304 TO BUS 39244 CKT
1
TRIP LINE FROM BUS
39901 TO BUS 38342 CKT
1
TRIP LINE FROM BUS
38333 TO BUS 68821 CKT
1
END

COM 'NSP  Defined as
multi-circuit'
COM 'A 60325-60187
WILOWRV7-AS KING7
OPENS  B'
COM 'B 60325-60313
WILOWRV7-PINE LK7
OPENS  A'
```

```
COM '-------------------------------------------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS 60325 TO BUS 60187 CKT 1
TRIP LINE FROM BUS 60325 TO BUS 60313 CKT 1
END

COM 'NSP Defined as multi-terminal'
COM 'A 60313-60285 PINE LK7-EAGLEPT7 OPENS B tower'
COM 'B 60313-60312 PINE LK7-PINE LK5 OPENS CDEF'
COM 'C 60329-60314 CRYSTAL5-PINELKT5 OPENS BDEF'
COM 'D 69565-60314  APL RVR5-PINELKT5 OPENS BCEF'
COM 'E 60312-60314 PINE LK5-PINELKT5 OPENS BCDF'
COM 'F 69565-69007  APL RVR5-APLRVR 8 OPENS BCDE'
COM '-------------------------------------------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS 60313 TO BUS 60285 CKT 1
TRIP LINE FROM BUS 60313 TO BUS 60312 CKT 3
TRIP LINE FROM BUS 60329 TO BUS 60314 CKT 1
TRIP LINE FROM BUS 69565 TO BUS 60314 CKT 1
TRIP LINE FROM BUS 60312 TO BUS 60314 CKT 1
TRIP LINE FROM BUS 69565 TO BUS 69007 CKT 1
END

COM 'NSP Defined as multi-terminal'
COM 'A 60321-60285 HYDROLN7-EAGLEPT7 OPENS B tower'
COM 'B 60321-60326 HYDROLN7-JIMFLS 7 OPENS A tower'
COM '-------------------------------------------------------------'
CONTINGENCY 'NSP    '
TRIP LINE FROM BUS 60321 TO BUS 60285 CKT 1
TRIP LINE FROM BUS 60321 TO BUS 60326 CKT 1
END

COM '835  Defined as multi-circuit'
COM 'A 60282-60329 REDCDR 5-CRYSTAL5 CKT 1  OPENS  B tower'
COM 'B 60282-60319 REDCDR 5-WHEATTP5 CKT 1  OPENS  C D mtl'
COM 'C 60319-60318 WHEATTP5-WHT 56 5 CKT 1  OPENS  B D mtl'
COM 'D 60319-60320 WHEATTP5-HYDROLN5 CKT 1  OPENS  B C mtl'
COM '-------------------------------------------------------------'
CONTINGENCY '835    '
TRIP LINE FROM BUS 60282 TO BUS 60329 CKT 1
TRIP LINE FROM BUS 60282 TO BUS 60319 CKT 1
TRIP LINE FROM BUS 60319 TO BUS 60318 CKT 1
TRIP LINE FROM BUS 60319 TO BUS 60320 CKT 1
END

COM '735  Defined as multi-circuit'
COM 'A 60297-60298 OSPREY 7-PARKFLS7 OPENS  B'
COM 'B 60298-69120 PARKFLS7-CRANDPC OPENS  A'
COM '**  Defined as multi-terminal'
COM 'B 60298-69120 PARKFLS7-CRANDPC OPENS  F G H'
COM 'F 69120-60340 CRANDPC -PHILIPS7 OPENS  B G H'
COM 'G 60340-69108 PHILIPS7-PHILDPC OPENS  B F H'
COM 'H 69108-60301 PHILDPC -PRENTCE7 OPENS  B F G'
COM '-------------------------------------------------------------'
CONTINGENCY '735   1'
TRIP LINE FROM BUS 60297 TO BUS 60298 CKT 1
TRIP LINE FROM BUS 60298 TO BUS 69120 CKT 1
TRIP LINE FROM BUS 69120 TO BUS 60340 CKT 1
TRIP LINE FROM BUS 60340 TO BUS 69108 CKT 1
TRIP LINE FROM BUS 69108 TO BUS 60301 CKT 1
END
CONTINGENCY '735   2'
TRIP LINE FROM BUS 60298 TO BUS 69120 CKT 1
TRIP LINE FROM BUS 69120 TO BUS 60340 CKT 1
TRIP LINE FROM BUS 60340 TO BUS 69108 CKT 1
TRIP LINE FROM BUS 69108 TO BUS 60301 CKT 1
END

COM '830  Defined as multi-terminal'
COM 'A 60238-68966 REDROCK7-GLENMONT CKT 1  OPENS  B C D E'
COM 'B 60327-61244 T RIVFL7-RIVFLSN7 CKT 1 OPENS  A C D E'
COM 'C 60327-60328 T RIVFL7-RIV FLS7 CKT 1 OPENS  A B D E'
COM 'D 60327-68966 T RIVFL7-GLENMONT CKT 1  OPENS  A B C E'
COM 'E 61244-60330 T RIVFLSN7-CRYSTAL7 CKT 1 OPENS  A B C D'
COM '-------------------------------------------------------------'
CONTINGENCY '830    '
TRIP LINE FROM BUS 60238 TO BUS 68966 CKT 1
TRIP LINE FROM BUS 60327 TO BUS 61244 CKT 1
TRIP LINE FROM BUS 60327 TO BUS 60328 CKT 1
TRIP LINE FROM BUS 60327 TO BUS 68966 CKT 1
TRIP LINE FROM BUS 61244 TO BUS 60330 CKT 1
END

CONTINGENCY '835    '
COM 'Fault between Wheaton Tap and Red Cedar/Hydro Lane'
TRIP LINE FROM BUS 60282 TO BUS 60319 CKT 1
TRIP LINE FROM BUS 60319 TO BUS 60318 CKT 1
TRIP LINE FROM BUS 60319 TO BUS 60320 CKT 1
END

COM '840  Defined as multi-terminal'
COM 'A 60318-60368 WHEATON5-JEFRSRD5 CKT 1  OPENS  B'
COM 'B 60319-60318 WHEATTP5-WHEATON5 CKT 1  OPENS  A'
COM '-------------------------------------------------------------'
CONTINGENCY '840    '
COM ' Fault on line from Wheaton looking towards Jef and
COM ' then to Eau Claire 161 kV'
TRIP LINE FROM BUS 60318 TO BUS 60368 CKT 1
TRIP LINE FROM BUS 60319 TO BUS 60318 CKT 1
END

COM '845  Defined as multi-terminal'
COM 'A 60306-60322 HOLCOMB7-CORNELL7 OPENS  B C'
COM 'B 69157-60322 ANDERSN7-CORNELL7 OPENS  A C'
COM 'C 60326-69157 JIMFLS 7-ANDERSN7 OPENS  A B'
COM '-------------------------------------------------------------'
CONTINGENCY '845    '
TRIP LINE FROM BUS 60306 TO BUS 60322 CKT 1
TRIP LINE FROM BUS 69157 TO BUS 60322 CKT 1
TRIP LINE FROM BUS 60326 TO BUS 69157 CKT 1
END

COM '850 Defined as multi-terminal'
COM 'A 60313-60312 PINE LK7-PINE LK5 OPENS B C D E'
COM 'B 60329-60314 CRYSTAL5-PINELKT5 OPENS A C D E'
COM 'C 69565-60314  APL RVR5-PINELKT5 OPENS A B D E'
COM 'D 60312-60314 PINE LK5-PINELKT5 OPENS A B C E'
```

```
COM 'E 69565-69007  APL
RVR5-APLRVR 8
OPENS A B C D
COM '----------------------------
----------------------------'
CONTINGENCY '850     '
TRIP LINE FROM BUS
60313 TO BUS 60312 CKT
3
TRIP LINE FROM BUS
60329 TO BUS 60314 CKT
1
TRIP LINE FROM BUS
69565 TO BUS 60314 CKT
1
TRIP LINE FROM BUS
60312 TO BUS 60314 CKT
1
TRIP LINE FROM BUS
69565 TO BUS 69007 CKT
1
END


COM '875  Defined as
multi-circuit, RW'
COM 'A 60302-60308
COULEE 5-LACROSS5
CKT 1  OPENS  B      RW'
COM 'B 69523-69535
GENOA  5-LAC TAP5 CKT
1  OPENS  A      RW'
COM '**  Defined as multi-
terminal'
COM 'C 60308-69535
LACROSS5-LAC TAP5
CKT 1  OPENS D E'
COM 'D 60309-69535
MRSHLND5-LAC TAP5
CKT 1  OPENS C E'
COM 'E 69523-69535
GENOA  5-LAC TAP5 CKT
1  OPENS C D'
COM '----------------------------
----------------------------'
CONTINGENCY '875      1'
TRIP LINE FROM BUS
60302 TO BUS 60308 CKT
1
TRIP LINE FROM BUS
69523 TO BUS 69535 CKT
1
COM 'Also trips the
following because of B'
TRIP LINE FROM BUS
60308 TO BUS 69535 CKT
1
TRIP LINE FROM BUS
60309 TO BUS 69535 CKT
1
END
CONTINGENCY '875      2'
COM 'Multi-terminal portion'
TRIP LINE FROM BUS
60308 TO BUS 69535 CKT
1
TRIP LINE FROM BUS
60309 TO BUS 69535 CKT
1
TRIP LINE FROM BUS
69523 TO BUS 69535 CKT
1
END

COM '880  Defined as
tower'
COM 'A 69523-69527
GENOA  5-HARMONY5
CKT 1  OPENS  B  tower'
COM 'B 69523-34021
GENOA  5-LANSING5 CKT
1  OPENS  A  tower'
COM '----------------------------
----------------------------'
CONTINGENCY '880     '
TRIP LINE FROM BUS
69523 TO BUS 69527 CKT
1
TRIP LINE FROM BUS
69523 TO BUS 34021 CKT
1
END

COM ' '
COM ' '
COM ' '
COM ' '
COM ' '
COM '  END WISCONSIN
AREA CONTINGENCIES'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
11
END

COM ' '
COM ' '
COM ' '
COM ' '
COM ' START IOWA AREA
CONTINGENCIES'
COM ' '
COM ' '
COM 'MPW 1 Defined as
multi-terminal with
autotransfr for converging'
COM 'A  63664-63665
SO.SUB 5-9 SUB  5
OPENS  B C D'
COM 'B  63664-63673
SO.SUB 5-KPECKTP5
OPENS  A C D'
COM 'C  63673-64413
KPECKTP5-SB 112 5
OPENS  A B D'
COM 'D  64413-64415  SB
112 5-SB 18  5  OPENS  A
B C'
COM 'E  63664-63693
SO.SUB 5-SO.SUB Y
OPENS  F'
COM 'F  63666-63693
SO.SUB 8-SO.SUB Y
OPENS  E'
COM '----------------------------
----------------------------'
CONTINGENCY 'MPW 1    '
TRIP LINE FROM BUS
63664 TO BUS  63665
CKT 1
TRIP LINE FROM BUS
63664 TO BUS  63673
CKT 1
TRIP LINE FROM BUS
63673 TO BUS  64413
CKT 1
TRIP LINE FROM BUS
64413 TO BUS  64415
CKT 1
TRIP LINE FROM BUS
63664 TO BUS  63693
CKT 1
TRIP LINE FROM BUS
63666 TO BUS  63693
CKT 1
END

COM 'MPW 5 Defined as
multi-terminal with
autotransfr for converging'
COM 'A  63665-63667  9
SUB  5-HWY61  5  OPENS
B C'
COM 'B  63667-63668
HWY61  5-WEST   5
OPENS  A C'
COM 'C  34186-63667
NEWPORT5-HWY61  5
OPENS  A B'
COM 'D  63668-63692
WEST   5-WEST   Y
OPENS  E'
COM 'E  63669-63692
WEST   8-WEST   Y
OPENS  D'
COM '----------------------------
----------------------------'
CONTINGENCY 'MPW 5
'
TRIP LINE FROM BUS
63665 TO BUS  63667
CKT 1
TRIP LINE FROM BUS
63667 TO BUS  63668
CKT 1
TRIP LINE FROM BUS
34186 TO BUS  63667
CKT 1
TRIP LINE FROM BUS
63668 TO BUS  63692
CKT 1
TRIP LINE FROM BUS
63669 TO BUS  63692
CKT 1
END

COM '901 Defined as multi-
terminal, Interregional'
COM 'A 64411-32415
GALESBRG-GALESBRG
CKT 1  OPENS B C'
COM 'B 64411-32415
GALESBRG-GALESBRG
CKT 2  OPENS A C'
COM 'C 64411-64415
GALESBRG-SUB 18 5
CKT 1  OPENS A B'
COM '----------------------------
----------------------------'
CONTINGENCY '999     '
TRIP BRANCH FROM BUS
32415 TO BUS 64411 CKT
1
TRIP BRANCH FROM BUS
32415 TO BUS 64411 CKT
2
TRIP BRANCH FROM BUS
64411 TO BUS 64415 CKT
1
END

COM '902  Defined as
multi-terminal, Interregional'
COM 'A 64405-36382 SUB
91 3-QUAD CTY CKT 1
OPENS  B C'
COM 'B 64405-64438 SUB
91 3-SUB 91 5 CKT 1
OPENS  A C'
COM 'C 64405-64404 SUB
91 3-DAVNPRT3 CKT 1
VLD SGL'
COM '----------------------------
----------------------------'
CONTINGENCY '902     '
COM ' Leaves the end to
Davenport open ended'
TRIP LINE FROM BUS
64405 TO BUS 36382 CKT
1
TRIP LINE FROM BUS
64405 TO BUS 64438 CKT
1
TRIP LINE FROM BUS
64405 TO BUS 64404 CKT
1
END

COM '904  Defined as
multi-terminal, Interregional'
COM 'A 64403-64400 E
MOLIN3-MECCORD3 CKT
1  OPENS  B C'
COM 'B 64403-64680-
64418 E MOLIN3-E
MOLINE CKT 1  OPENS
A C'
COM 'C 64403-64402 E
MOLIN3-LOUISA 3 CKT 1
VLD SGL'
COM '----------------------------
----------------------------'
CONTINGENCY '904     '
TRIP LINE FROM BUS
64403 TO BUS 64400 CKT
1
DISCONNECT BUS 64680
TRIP LINE FROM BUS
64403 TO BUS 64402 CKT
1
END

COM '906  Defined as
multi-terminal, Interregional'
COM 'A 64402-64408
LOUISA 3-SUB T  3 CKT 1
OPENS  B C'
```

```
COM 'B 64408-64350 SUB
T  3-HILLS  3 CKT 1
OPENS  A C'
COM 'C 64408-31435 SUB
T  3-PALM TAP CKT 1
See next cont.'
COM '----------------------------
--------------------------'
CONTINGENCY '906      '
TRIP LINE FROM BUS
64402 TO BUS 64408 CKT
1
TRIP LINE FROM BUS
64408 TO BUS 64350 CKT
1
TRIP LINE FROM BUS
64408 TO BUS 31435 CKT
1
END

COM '908  Defined as
multi-terminal, Interregional'
COM 'A 64408-31435 SUB
T  3-PALM TAP CKT 1
OPENS  B C D'
COM 'B 31435-31992
PALM TAP-SPENCER
CKT 1   OPENS  A C D'
COM 'C 31992-31230
SPENCER-MONTGMTY
CKT 1   OPENS  A B D'
COM '----------------------------
--------------------------'
CONTINGENCY '908      1'
TRIP LINE FROM BUS
64408 TO BUS 31435 CKT
1
TRIP LINE FROM BUS
31435 TO BUS 31992 CKT
1
TRIP LINE FROM BUS
31992 TO BUS 31230 CKT
1
END

COM '910  Defined as
multi-terminal, Interregional'
COM 'A 64350-64352
HILLS  3-TIFFIN 3
OPENS B,C'
COM 'B  64352-64353
TIFFIN 3-TIFFIN 5
OPENS VLD SGL'
COM 'C  64352-34093
TIFFIN 3-ARNOLD 3
OPENS A B'
COM 'The Hills-Tiffin 345
kV line 'A' is breakered
individually'
COM 'and could be
onsidered a valid single
outage.  However, I '
COM 'believe we show this
multi-terminal outage due
to the '
COM 'reverse power relay
on the Tiffin transformer
that we '
COM 'discussed previously.
Therefore, I would say that
this'
COM 'multi-terminal outage
is valid.'
COM 'Let me know if you
have questions.'
COM 'Ken'
COM ' '
COM 'Note:'
COM 'If the base case flow
is from Tiffin to Hills 345 kV'
COM 'the Hills-Tiffin 345 kV
outage is valid.'
COM ' '
COM 'If the base case flow
if from Hills to Tiffin 345 kV"
COM 'the Hills-Tiffin 345 kV
is NOT a valid outage.
COM '----------------------------
--------------------------'
CONTINGENCY '910      '
TRIP LINE FROM BUS
64350 TO BUS 64352 CKT
1
TRIP LINE FROM BUS
64352 TO BUS 64353 CKT
1
TRIP LINE FROM BUS
64352 TO BUS 34093 CKT
1
END

COM '911 WAPA Defined
as multi-terminal,
Interregional'
COM 'A 66560-34047
CRESTON5-ANTA TP5
CKT 1   OPENS  B C'
COM 'B 66603-34047
EXIRA  5-ANTA TP5 CKT 1
OPENS  A C'
COM 'C 34048-34047
ANITA  5-ANTA TP5 CKT 1
OPENS  A B'
COM '----------------------------
--------------------------'
CONTINGENCY '911      '
TRIP LINE FROM BUS
66560 TO BUS 34047 CKT
1
TRIP LINE FROM BUS
66603 TO BUS 34047 CKT
1
TRIP LINE FROM BUS
34048 TO BUS 34047 CKT
1
END

COM '916 Defined as multi-
terminal'
COM 'A 63774-63730
SHEFFLD5-HAMPTON5
CKT 1   OPENS B'
COM 'B 63730-64239
HAMPTON5-FRANKLN5
CKT 1   OPENS A'
COM '----------------------------
--------------------------'
CONTINGENCY '916      '
TRIP LINE FROM BUS
63774 TO BUS 63730 CKT
1
TRIP LINE FROM BUS
63730 TO BUS 64239 CKT
1
END

COM '917  Defined as
multi-terminal, Interregional'
COM 'A 34019-61930
HAZLETON-WINDSOR5
CKT 1   OPENS B'
COM 'B 61930-69531
WINDSOR5-POSTVIL5
CKT 1   OPENS A'
COM '----------------------------
--------------------------'
CONTINGENCY '917      '
TRIP LINE FROM BUS
34019 TO BUS 61930 CKT
1
TRIP LINE FROM BUS
61930 TO BUS 69531 CKT
1
END

COM '921  Defined as
multi-circuit, RW'
COM 'A 64429-64437  SB
74  5-SB  90 5   OPENS
BorCDE   RW'
COM 'B 64429-64430  SB
74  5-SB 76  5   OPENS
AorCDE   RW'
COM 'C 64429-64410  SB
74  5-SB 58T 5   OPENS
AorBorDE RW'
COM 'D 64432-64410  SB
78  5-SB 58T 5   see muti-
terminal'
COM 'E 64426-64410  SB
58  5-SB 58T 5'
COM '----------------------------
----------------------------'
CONTINGENCY '921      1'
TRIP LINE FROM BUS
64429 TO BUS 64437 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64430 CKT
1
END
CONTINGENCY '921      2'
TRIP LINE FROM BUS
64429 TO BUS 64437 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64432 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64426 TO BUS 64410 CKT
1
END
CONTINGENCY '921      3'
TRIP LINE FROM BUS
64429 TO BUS 64430 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64432 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64426 TO BUS 64410 CKT
1
END
CONTINGENCY '921      4'
TRIP LINE FROM BUS
64429 TO BUS 64437 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64410 CKT
1
END
CONTINGENCY '921      5'
TRIP LINE FROM BUS
64429 TO BUS 64430 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64410 CKT
1
END

COM '922  Defined as a
multi-circuit, tower'
COM 'A 64428-64435  SB
71  5-SB 88  5   OPENS B
C   RW  MTL'
COM 'B 64435-64427  SB
88  5-SB 70  5   OPENS A
RW  MTL'
COM 'C 64427-64412  SB
70  5-RIVSIDE5   OPENS
A B   RW  MTL'
COM '**   Defined as multi-
terminal'
COM 'D 64428-64435  SB
71  5-SB 88  5   OPENS E
F G'
COM 'E 64429-64433  SB
74  5-SB 79  5   OPENS D
F G'
COM 'F 64433-64428  SB
79  5-SB 71  5   OPENS D
E G'
COM 'G 64438-64433  SB
91  5-SB 79  5   OPENS D
E F'
COM '----------------------------
----------------------------'
CONTINGENCY '922      1'
TRIP LINE FROM BUS
64428 TO BUS 64435 CKT
1
TRIP LINE FROM BUS
64435 TO BUS 64427 CKT
1
COM 'Also trips the
following because of A'
TRIP LINE FROM BUS
64429 TO BUS 64433 CKT
1
```

```
TRIP LINE FROM BUS
64433 TO BUS 64428 CKT
1
TRIP LINE FROM BUS
64438 TO BUS 64433 CKT
1
END
CONTINGENCY '922      2'
TRIP LINE FROM BUS
64428 TO BUS 64435 CKT
1
TRIP LINE FROM BUS
64429 TO BUS 64433 CKT
1
TRIP LINE FROM BUS
64433 TO BUS 64428 CKT
1
TRIP LINE FROM BUS
64438 TO BUS 64433 CKT
1
END

COM '923  Defined as
multi-terminal'
COM 'A 64205-64203
FT.DODG5-NW FTDG5
OPENS  B C'
COM 'B 64230-64203
POMEROY5-NW FTDG5
OPENS  A C'
COM 'C 64203-64201  NW
FTDG5-WEBSTER5
OPENS  A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '923    '
TRIP LINE FROM BUS
64205 TO BUS 64203 CKT
1
TRIP LINE FROM BUS
64230 TO BUS 64203 CKT
1
TRIP LINE FROM BUS
64203 TO BUS 64201 CKT
1
END

COM '924 Defined as Multi-
Circuit'
COM 'A 64250-64256
BLKHAWK5-UNIONTP5
OPENS B'
COM 'B 64256-64285
UNIONTP5-BUTLER 5
OPENS A'
COM ' ----------------------------
-------------------'
CONTINGENCY '924    '
TRIP LINE FROM BUS
64250 TO BUS 64256 CKT
1
TRIP LINE FROM BUS
64256 TO BUS 64285 CKT
1
END

COM '917 Defined as Multi-
Circuit, Multi-terminal'
COM 'A 64250-64255
BLKHAWK5-MIDPORT5
OPENS C'
COM 'B 64255-64258
MIDPORT5-LUNDQST5
OPENS C'
COM 'C 64250-64257
BLKHAWK5-DRFNDRY5
OPENS A AND B'
COM ' THE 161 KV LINES
ARE ON THE SAME
TOWER'
COM ' ----------------------------
-------------------'
CONTINGENCY '917    '
TRIP LINE FROM BUS
64250 TO BUS 64255 CKT
1
TRIP LINE FROM BUS
64255 TO BUS 64258 CKT
1
DISCONNECT BUS 64255
TRIP LINE FROM BUS
64250 TO BUS 64257 CKT
1
END

COM '927  Defined as
multi-terminal'
COM 'A 64192-64064
GDMEC-BONDRNT3
OPENS  B C'
COM 'B 64064-64080
BONDRNT3-SYCAMOR3
OPENS  A C'
COM 'C 64064-64095
BONDRNT3-MNTZUMA3
VLD SGL'
COM '-----------------------------
-----------------------------'
CONTINGENCY '927    '
TRIP LINE FROM BUS
64192 TO BUS 64064 CKT
1
TRIP LINE FROM BUS
64064 TO BUS 64080 CKT
1
TRIP LINE FROM BUS
64064 TO BUS 64095 CKT
1
END

COM '928  Defined as
multi-terminal'
COM 'A 64050-64056 SE
POLK3-MADISON3
OPENS B,C'
COM 'B 64056-64060
MADISON3-BOONVIL3
OPENS A,C'
COM 'C 64056-63800
MADISON3-CBLUFFS3
VLD SGL'
COM '-----------------------------
-----------------------------'
CONTINGENCY '928    '
TRIP LINE FROM BUS
64050 TO BUS 64056 CKT
1
TRIP LINE FROM BUS
64056 TO BUS 64060 CKT
1
TRIP LINE FROM BUS
64056 TO BUS 63800 CKT
1
END

COM '930  Defined as
multi-circuit, Tower,
Interregional'
COM 'A 64050-64056 SE
POLK3-MADISON3
OPENS B or C'
COM 'B 64051-64068 SE
POLK5-GRENFLD5
OPENS A'
COM 'C 64068-34060
GRENFLD5-WNTRST 5
OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '930   1'
TRIP LINE FROM BUS
64050 TO BUS 64056
TRIP LINE FROM BUS
64051 TO BUS 64068
END
CONTINGENCY '930   2'
TRIP LINE FROM BUS
64050 TO BUS 64056
TRIP LINE FROM BUS
64068 TO BUS 34060
END

COM '931  Defined as
multi-circuit, tower'
COM 'A 64050-64192  SE
POLK3-GDMEC   OPENS
B'
COM 'B 64062-64069
DMOINES5-ALTONA 5
OPENS  A or D'
COM 'C 64067-64069
BONDRNT5-ALTONA 5
OPENS  D'
COM 'D 64192-64064
GDMEC-BONDRNT3
OPENS  B or C'
COM ' The 161 kV lines
area physically under the
345 kV lines'
COM '-----------------------------
-----------------------------'
CONTINGENCY '931   1'
TRIP LINE FROM BUS
64050 TO BUS 64192
TRIP LINE FROM BUS
64062 TO BUS 64069
END
CONTINGENCY '931   2'
TRIP LINE FROM BUS
64050 TO BUS 64192
TRIP LINE FROM BUS
64067 TO BUS 64069
END
CONTINGENCY '931   3'
TRIP LINE FROM BUS
64192 TO BUS 64064
TRIP LINE FROM BUS
64062 TO BUS 64069
END
CONTINGENCY '931   4'
TRIP LINE FROM BUS
64192 TO BUS 64064
TRIP LINE FROM BUS
64067 TO BUS 64069
END

COM '932  Defined as
multi-circuit, tower,
Interregional'
COM 'A 64202-64080
LEHIGH 3-SYCAMOR3
OPENS  B or C  tower'
COM 'B 64060-64080
BOONVIL3-SYCAMOR3
OPENS  A      tower'
COM 'C 34073-34059  GR
JCT 7-BOONE  7    OPENS
A      RW'
COM 'D 34058-64189
PERRY  5-NEANKNY5
RW,MTL, see MTL section'
COM 'E 34058-34166
PERRY  5-PERRY  9
RW,MTL, see MTL section'
COM 'F 34058-34166
PERRY  5-PERRY  9
RW,MTL, see MTL section'
COM 'G 34054-34058  GR
JCT 5-PERRY  5
RW,MTL, see MTL section'
COM '-----------------------------
-----------------------------'
CONTINGENCY '932      1'
TRIP LINE FROM BUS
64202 TO BUS 64080 CKT
1
TRIP LINE FROM BUS
64060 TO BUS 64080 CKT
1
END
CONTINGENCY '932      2'
TRIP LINE FROM BUS
64202 TO BUS 64080 CKT
1
TRIP LINE FROM BUS
34073 TO BUS 34059 CKT
1
END
CONTINGENCY '932      3'
TRIP LINE FROM BUS
64202 TO BUS 64080 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 64189 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
2
TRIP LINE FROM BUS
34054 TO BUS 34058 CKT
1
END
```

```
COM '946  Defined as
multi-terminal'
COM 'A 64404-64409
DAVNPRT3-WALCOTT3
CKT 1   OPENS B C'
COM 'B 64404-64425
DAVNPRT3-DAVNPRT5
CKT 1   OPENS A C'
COM 'C 64404-64405
DAVNPRT3-SUB 91 3 CKT
1   VLD SGL'
COM '-----------------------------
-----------------------------'
CONTINGENCY '946    '
TRIP LINE FROM BUS
64404 TO BUS 64409 CKT
1
DISCONNECT BUS 64681
TRIP LINE FROM BUS
64404 TO BUS 64405 CKT
1
END

COM '947 Defined as multi-
terminal'
COM 'A 64409-64406
WALCOTT3-SUB 92 3 CKT
1   OPENS B C'
COM 'B 64406-64350  SUB
92 3-HILLS  3 CKT 1
OPENS A C'
COM 'C 64402-64406
LOUISA 3-SUB 92 3 CKT 1
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '947       '
TRIP LINE FROM BUS
64409 TO BUS 64406 CKT
1
TRIP LINE FROM BUS
64406 TO BUS 64350 CKT
1
TRIP LINE FROM BUS
64402 TO BUS 64406 CKT
1
END

COM '948  Defined as
multi-circuit, RW and MTL,
Interregional'
COM 'A 34038-64422  BVR
CH 5-SUB 49 5   OPENS
B  RW'
COM 'B 34038-34044  BVR
CH 5-ALBANY 5   OPENS
A  RW, MTL F G'
COM '**    Defined as multi-
terminal'
COM 'D 34038-34044  BVR
CH 5-ALBANY 5   OPENS
E F G H'
COM 'E 34044-34045
ALBANY 5-ALBANY 6
OPENS  D F G H'
COM 'F 34044-34046
ALBANY 5-YORK   5
OPENS  D E G H '
COM 'G 34043-34046
SAVANNA5-YORK   5
OPENS  D E F H'
COM 'H 34046-34351
YORK   5-YORK   9   SGL'
COM '-----------------------------
-----------------------------'
CONTINGENCY '948      1'
COM 'Combination RW and
MTL'
TRIP LINE FROM BUS
34038 TO BUS 64422 CKT
1
TRIP LINE FROM BUS
34038 TO BUS 34044 CKT
1
COM 'Also trips the
following because of C
MTL'
TRIP LINE FROM BUS
34044 TO BUS 34045 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34046 TO BUS 34351 CKT
1
END
CONTINGENCY '948      2'
COM 'multi-terminal portion
only, D,E,F,G,H'
TRIP LINE FROM BUS
34038 TO BUS 34044 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34045 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34046 TO BUS 34351 CKT
1
END

COM '950  Defined as
multi-terminal'
COM 'A 64425-64434
DAVNPRT5-SB 85 5 CKT 1
OPENS  B C D'
COM 'B 64415-64434
ROCK IS5-SB 85 5 CKT 1
OPENS  A C D'
COM 'C 64434-64423 SB
85 5 -SB 52 5 CKT 1
OPENS  B C D'
COM 'D 64434-64424 SB
85 5 -SB 53 5 CKT 1
OPENS  A B C'
COM '-----------------------------
-----------------------------'
CONTINGENCY '950    '
TRIP LINE FROM BUS
64425 TO BUS 64434 CKT
1
TRIP LINE FROM BUS
64415 TO BUS 64434 CKT
1
TRIP LINE FROM BUS
64434 TO BUS 64423 CKT
1
TRIP LINE FROM BUS
64434 TO BUS 64424 CKT
1
END

COM '951  Defined as
multi-terminal'
COM 'A 64429-64410 SB
74  5-58TAP  5 CKT 1
OPENS  B C'
COM 'B 64432-64410 SB
78  5-58TAP  5 CKT 1
OPENS  A C'
COM 'C 64426-64410 SB
58  5-58TAP  5 CKT 1
OPENS  A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '951    '
TRIP LINE FROM BUS
64429 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64432 TO BUS 64410 CKT
1
TRIP LINE FROM BUS
64426 TO BUS 64410 CKT
1
END

COM '952  Defined as
multi-terminal'
COM 'A 64418-64419  E
MOLIN5-SB 43  5 CKT 1
OPENS B'
COM 'B 64419-64415  SB
43  5-SB 18  5 CKT 1
OPENS A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '952    '
TRIP LINE FROM BUS
64418 TO BUS 64419 CKT
1
TRIP LINE FROM BUS
64419 TO BUS 64415 CKT
1
END

COM '953  Defined as
multi-terminal'
COM 'A 64414-64416 SUB
17 5-SUB 28 5 CKT 1
OPENS  B,C,D'
COM 'B 64418-64407 E
MOLIN5-SB 31T 8 CKT 1
OPENS  A,C,D'
COM 'C 64416-64407 SUB
28 5-SB 31T 8 CKT 1
OPENS  A,B,D'
COM 'D 64407-64417 SB
31T 8-SB 31  5 CKT 1
OPENS  A,B,C
COM '-----------------------------
-----------------------------'
CONTINGENCY '953    '
TRIP LINE FROM BUS
64414 TO BUS 64416 CKT
1
TRIP LINE FROM BUS
64418 TO BUS 64407 CKT
1
TRIP LINE FROM BUS
64416 TO BUS 64407 CKT
1
TRIP LINE FROM BUS
64407 TO BUS 64417 CKT
1
END

COM '954  Defined as
multi-terminal'
COM 'A 64418-64420 E
MOLIN5-SB 47  5 CKT 1
OPENS  B'
COM 'B 64421-64420 SB
48  5-SB 47  5 CKT 1
OPENS  A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '954    '
TRIP LINE FROM BUS
64418 TO BUS 64420 CKT
1
TRIP LINE FROM BUS
64421 TO BUS 64420 CKT
1
END

COM '956  Defined as
multi-terminal'
COM 'A 64360-64357 SB
PIC 5-SB GIC 5 CKT 1
OPENS  B,C'
COM 'B 64357-64362 SB
GIC 5-SB YIC 5 CKT 1
OPENS  A,C'
COM 'C 64362-64356 SB
YIC 5-SB EIC 5 CKT 1
OPENS  A,B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '956    '
TRIP LINE FROM BUS
64360 TO BUS 64357 CKT
1
TRIP LINE FROM BUS
64357 TO BUS 64362 CKT
1
TRIP LINE FROM BUS
64362 TO BUS 64356 CKT
1
END

COM '957  Defined as
multi-terminal'
COM 'A 64359-64361 SB
JIC 5-SB UIC 5 CKT 1
OPENS  B'
```

```
COM 'B 64361-64360 SB
UIC 5-SB PIC 5 CKT 1
OPENS  A'
COM '-----------------------------
-----------------------------'
CONTINGENCY '957    '
TRIP LINE FROM BUS
64359 TO BUS 64361 CKT
1
TRIP LINE FROM BUS
64361 TO BUS 64360 CKT
1
END

COM '960  Defined as
multi-terminal, Interregional'
COM 'A 34028-34033
LORE   5-TRK RIV5 CKT 1
OPENS B C'
COM 'B 34033-69503 TRK
RIV5-CASVILL5 CKT 1
OPENS A C'
COM 'C 34033-34465 TRK
RIV5-TURK RV8 CKT 1
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '960        '
TRIP LINE FROM BUS
34028 TO BUS 34033 CKT
1
TRIP LINE FROM BUS
34033 TO BUS 69503 CKT
1
TRIP LINE FROM BUS
34033 TO BUS 34465 CKT
1
END

COM '961  Defined as
multi-terminal, Interregional'
COM 'A 34008-61932 FOX
LK 5-RUTLAND5 CKT 1
OPENS B C'
COM 'B 61932-34009
RUTLAND5-WINBAGO5
CKT 1   OPENS A C'
COM 'C 61932-61934
RUTLAND5-RUTLAND
CKT 1   OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '961        '
TRIP LINE FROM BUS
34008 TO BUS 61932 CKT
1
TRIP LINE FROM BUS
61932 TO BUS 34009 CKT
1
TRIP LINE FROM BUS
61932 TO BUS 61934 CKT
1
END

COM '962  Defined as
multi-terminal, Interregional'
COM 'A 34014-69526
ADAMS  5-BVR CRK5 CKT
1   OPENS B C'
COM 'B 69526-69527 BVR
CRK5-HARMONY5 CKT 1
OPENS A C'
COM 'C 61980-69526
RICE   5-BVR CRK5 CKT 1
OPENS A B'
COM '-----------------------------
-----------------------------'
CONTINGENCY '962        '
TRIP LINE FROM BUS
34014 TO BUS 69526 CKT
1
TRIP LINE FROM BUS
69526 TO BUS 69527 CKT
1
TRIP LINE FROM BUS
61980 TO BUS 69526 CKT
1
END

COM '963 MEC Defined as
multi-terminal'
COM 'A 64050-64634 SE
POLK3 - SE MID 5 CKT 1
OPENS  B C'
COM 'B 64050-64192 SE
POLK3 - GDMEC CKT 1  '
COM 'C 64050-64056 SE
POLK3 - MADISON3 CKT
1 '
COM '-----------------------------
-----------------------------'
CONTINGENCY '963        '
DISCONNECT BUS 64050
DISCONNECT BUS 64634
END

COM '964 MEC Defined as
multi-terminal'
COM 'A 64414-64674 SB
17  5 - SB17MID8 CKT 1
OPENS  B C'
COM 'B 64414-64416 SB
17  5 - SB 28  5 CKT 1  '
COM 'C 64414-64422 SB
17  5 - SB 49  5 CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '964        '
DISCONNECT BUS 64414
DISCONNECT BUS 64674
END

COM '966 MEC Defined as
multi-terminal'
COM 'A 63894-64618
MONONA 5 - MON MID8
CKT 1   OPENS  B C'
COM 'B 63894-63878
MONONA 5 - NEAL 4 5
CKT 1  '
COM 'C 63894-63900
MONONA 5 - CARROLL5
CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '966        '
DISCONNECT BUS 63894
DISCONNECT BUS 64618
END

COM '967 MEC Defined as
multi-terminal'
COM 'A 63892-64617 LIT
SX 5 - LIT MID8 CKT 1
OPENS  B C'
COM 'B 63892-63908 LIT
SX 5 - SAC    5 CKT 1  '
COM 'C 63892-64000 LIT
SX 5 - LEMARST5 CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '967        '
DISCONNECT BUS 63892
DISCONNECT BUS 64617
END

COM '968 MEC Defined as
multi-terminal'
COM 'A 64001-64002
LEMARS 5 - LEMARS 8
CKT 1   OPENS  B '
COM 'B 64001-64000
LEMARS 5 - LEMARST5
CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '968        '
DISCONNECT BUS 64001
DISCONNECT BUS 64002
END

COM '969 MEC Defined as
multi-terminal'
COM 'A 64230-64620
POMEROY5 - POM MID8
CKT 1   OPENS  B C '
COM 'B 64230-64203
POMEROY5 - NW FTDG5
CKT 1  '
COM 'C 64230-63908
POMEROY5 - SAC    5
CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '969        '
DISCONNECT BUS 64230
DISCONNECT BUS 64620
END

COM '971 MEC Defined as
multi-terminal'
COM 'A 64267-64653 EL
FARM  5 - ELF MID8 CKT
1   OPENS  B '
COM 'B 64267-64269 EL
FARM  5 - WASHBRN5
CKT 1  '
COM '-----------------------------
-----------------------------'
CONTINGENCY '971        '
DISCONNECT BUS 64653
TRIP LINE FROM BUS
64267 TO BUS 64269 CKT
1
END

COM '972 MEC Defined as
multi-terminal'
COM 'A 63820-64610
HASTING5 - HASTMID5
CKT 1   OPENS  B C'
COM 'B 63820-63817
HASTING5 - BUNGE 5
CKT 1 '
COM 'C 63820-63826
HASTING5 - CLRNDA 5
CKT 1 '
COM '-----------------------------
-----------------------------'
CONTINGENCY '972    '
DISCONNECT BUS 63820
DISCONNECT BUS 64610
END

COM '973 MEC Defined as
multi-terminal, Interregional'
COM 'A 64252-64654
FLOYD  5 - FLYDMID8
CKT 1   OPENS  B C '
COM 'B 64252-34016
FLOYD  5 - EMERYN
CKT 1 '
COM 'C 64252-64250
FLOYD  5 - BLKHAWK5
CKT 1 '
COM '-----------------------------
-----------------------------'
CONTINGENCY '973    '
DISCONNECT BUS 64252
DISCONNECT BUS 64654
END

COM '974 MEC Defined as
multi-terminal, Interregional'
COM 'A 63810-64611
SUB701 5 - SB701MD8
CKT  1   OPENS  B C'
COM 'B 63810-63812
SUB701 5 - SUB 702 5
CKT  1 '
COM 'C 63810-65411
SUB701 5 - S1211   5 CKT
1 '
COM '-----------------------------
-----------------------------'
CONTINGENCY '974        '
DISCONNECT BUS 63810
DISCONNECT BUS 64611
END

COM ' '
COM ' '
COM ' '
COM ' END MAPP IOWA
AREA CONTINGENCIES'
COM ' '
COM ' '
COM ' '
COM          END MAPP
Contingencies'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
12
END

COM ' '
```

```
COM ' '
COM ' '
COM ' '
COM  BEGIN ALTW
Contingencies
COM
COM  Updated 4-24-03,
Dale Cathedral'
COM ' '
COM ' '
COM ' '
COM '  ******* ALTW
CONTINGENCIES ONLY
********'
COM ' '
COM ' '
COM ' ALTW-1 Defined as
multi-terminal, Interregional'
COM 'A 34081-30290
VIELE  5-CARBID T CKT 1
OPENS B C'
COM 'B 30290-31437
CARBID T-PALMYRA  CKT
1   OPENS A C'
COM 'C 34056-30290
CARBIDE5-CARBID T CKT
1   OPENS A B'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-1'
TRIP LINE FROM BUS
34081 TO BUS 30290 CKT
1
TRIP LINE FROM BUS
30290 TO BUS 31437 CKT
1
TRIP LINE FROM BUS
34056 TO BUS 30290 CKT
1
END

COM 'ALTW-2  Defined as
multi-terminal'
COM 'A 34054-34058  GR
JCT 5-PERRY  5 CKT 1
OPENS  B'
COM 'B 34058-64189
PERRY   5-NEANKNY5
CKT 1   OPENS  A'
COM 'C 34058-34166
PERRY   5-PERRY  9 CKT
1   SGL'
COM 'D 34058-34166
PERRY   5-PERRY  9 CKT
2   SGL'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-2'
TRIP LINE FROM BUS
34054 TO BUS 34058 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 64189 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
2
END

COM 'ALTW-3 Defined as
multi-terminal'
COM 'A 34066-34169 M-
TOWN 7-WELSBGT7 CKT
1   OPENS  B C D E F'
COM 'B 34169-34074
WELSBGT7-WELSBRG7
CKT 1   OPENS  A C D E
F'
COM 'C 34169-34075
WELSBGT7-ELDORA 7
CKT 1   OPENS  A B D E
F'
COM 'D 34075-34077
ELDORA 7-IA FALS7 CKT
1   OPENS  A B C E F'
COM 'E 34074-63734
WELSBRG7-WELSBRG8
CKT 1   OPENS  A B C D
F'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-3'
TRIP LINE FROM BUS
34066 TO BUS 34169 CKT
1
TRIP LINE FROM BUS
34169 TO BUS 34074 CKT
1
TRIP LINE FROM BUS
34169 TO BUS 34075 CKT
1
TRIP LINE FROM BUS
34075 TO BUS 34077 CKT
1
TRIP LINE FROM BUS
34074 TO BUS 63734 CKT
1
END

COM 'ALTW-4  Defined as
multi-terminal'
COM 'A 34066-34085  M-
TOWN 7-BLARSTW7 CKT
1   OPENS  B C'
COM 'B 34085-34086
BLARSTW7-WILSBRG7
CKT 1   OPENS  A C'
COM 'C 34085-34099
BLARSTW7-PRAR CK7
CKT 1   OPENS  A B'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-4'
TRIP LINE FROM BUS
34066 TO BUS 34085 CKT
1
TRIP LINE FROM BUS
34085 TO BUS 34086 CKT
1
TRIP LINE FROM BUS
34085 TO BUS 34099 CKT
1
END

COM 'ALTW-5  Defined as
multi-terminal'
COM 'A 34087-34089
DYSART 5-VINTON 5 CKT
1   OPENS  B'
COM 'C 34089-34091
VINTON 5-ARNOLD 5 CKT
1   OPENS  A'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-5'
TRIP LINE FROM BUS
34087 TO BUS 34089 CKT
1
TRIP LINE FROM BUS
34089 TO BUS 34091 CKT
1
END

COM 'ALTW-6  Defined as
multi-terminal'
COM 'A 34099-34117
PRAR CK7-SUTLIFF7 CKT
1   OPENS  B C D E'
COM 'B 34117-34116
SUTLIFF7-W.BRCH 7 CKT
1   OPENS  A C D E'
COM 'C 34117-34120
SUTLIFF7-CALAMUS7
CKT 1   OPENS  A B D E'
COM 'D 34120-34121
CALAMUS7-E CALMS7
CKT 1   OPENS  A B C E'
COM 'E 34120-34142
CALAMUS7-CALAMUS9
CKT 1   OPENS  A B C D'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-6'
TRIP LINE FROM BUS
34099 TO BUS 34117 CKT
1
TRIP LINE FROM BUS
34117 TO BUS 34116 CKT
1
TRIP LINE FROM BUS
34117 TO BUS 34120 CKT
1
TRIP LINE FROM BUS
34120 TO BUS 34121 CKT
1
TRIP LINE FROM BUS
34120 TO BUS 34142 CKT
1
END

COM 'ALTW-7  Defined as
multi-terminal'
COM 'A 34131-34133
COGGON 7-DUNDEE 7
CKT 1   OPENS  B'
COM 'B 34103-34131
MARION 7-COGGON 7
CKT 1   OPENS  A'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-7'
TRIP LINE FROM BUS
34131 TO BUS 34133 CKT
1
TRIP LINE FROM BUS
34103 TO BUS 34131 CKT
1
END

COM 'ALTW-8  Defined as
multi-terminal'
COM 'A 34189-34190
OTTUMWA5-BRDGPRT5
CKT 1   OPENS B'
COM 'B 34190-34558
BRDGPRT5-BRDGPR1Y
CKT 1   VLD SGL'
COM 'C 34558-34205
BRDGPR1Y- BRDGPRT8
CKT 1  VLD SGL'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-8'
TRIP LINE FROM BUS
34189 TO BUS 34190 CKT
1
TRIP LINE FROM BUS
34190 TO BUS 34558 CKT
1
TRIP LINE FROM BUS
34558 TO BUS 34205 CKT
1
END

COM 'ALTW-9  Defined as
multi-circuit, RW and MTL,
Interregional'
COM 'A 34038-64422 BVR
CH 5-SUB 49 5 CKT 1
OPENS  B  RW'
COM '**   Defined as multi-
terminal'
COM 'B 34038-34044 BVR
CH 5-ALBANY 5 CKT 1
OPENS  A  RW, MTL'
COM 'C 34044-34045
ALBANY 5-ALBANY 6 CKT
1   SGL'
COM 'D 34044-34046
ALBANY 5-YORK   5 CKT
1   MTL'
COM 'E 34043-34046
SAVANNA5-YORK   5 CKT
1   MTL'
COM 'F 34046-34351
YORK   5-YORK   9 CKT 1
SGL'
COM 'G 34043-34346
SAVANNA5-SAVNA S9
CKT 1   SGL'
COM '-----------------------------
-------------------------------'
CONTINGENCY 'ALTW-9'
COM 'Combination RW and
MTL'
TRIP LINE FROM BUS
34038 TO BUS 64422 CKT
1
TRIP LINE FROM BUS
34038 TO BUS 34044 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34045 CKT
1
```

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TRIP LINE FROM BUS
34044 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34046 TO BUS 34351 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34346 CKT
1
END

COM 'ALTW-10  Defined
as multi-terminal'
COM 'A 34038-34044 BVR
CH 5-ALBANY 5 CKT 1
MTL'
COM 'B 34044-34045
ALBANY 5-ALBANY 6 CKT
1  SGL'
COM 'C 34044-34046
ALBANY 5-YORK  5 CKT
1  MTL'
COM 'D 34043-34046
SAVANNA5-YORK  5 CKT
1  MTL'
COM 'E 34046-34351
YORK  5-YORK  9 CKT 1
SGL'
COM 'F 34043-34346
SAVANNA5-SAVNA S9
CKT 1  SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-10'
TRIP LINE FROM BUS
34038 TO BUS 34044 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34045 CKT
1
TRIP LINE FROM BUS
34044 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34046 CKT
1
TRIP LINE FROM BUS
34046 TO BUS 34351 CKT
1
TRIP LINE FROM BUS
34043 TO BUS 34346 CKT
1
END

COM 'ALTW-11  Defined
as multi-terminal'
COM 'A 34028-34129
LORE  5-LIBERTY5 CKT 1
OPENS B'
COM 'B 34129-34135
LIBERTY5-DUNDEE 5
CKT 1  OPENS A'
COM 'C 34129-34541
LIBERTY5-LIBERTYY CKT
1  SGL'
COM 'D 34541-34128
LIBERTYY-LIBERTY8 CKT
1  SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-11'
TRIP LINE FROM BUS
34028 TO BUS 34129 CKT
1
TRIP LINE FROM BUS
34129 TO BUS 34135 CKT
1
TRIP LINE FROM BUS
34129 TO BUS 34541 CKT
1
TRIP LINE FROM BUS
34541 TO BUS 34128 CKT
1
END

COM ' ALTW-12 Defined
as multi-terminal'
COM 'A 34052-34076
AMES  7-BNE JCT7 CKT
1
COM 'B 34076-34059 BNE
JCT7-BOONE  7 CKT 1
COM 'C 34061-34076 BNE
JCT5-BNE JCT7 CKT 2
COM 'D 34061-34076 BNE
JCT5-BNE JCT7 CKT 3
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-12'
TRIP LINE FROM BUS
34052 TO BUS 34076 CKT
1
TRIP LINE FROM BUS
34076 TO BUS 34059 CKT
1
TRIP LINE FROM BUS
34061 TO BUS 34076 CKT
2
TRIP LINE FROM BUS
34061 TO BUS 34076 CKT
3
END

COM ' ALTW-13 Defined
as multi-terminal'
COM 'A 34138-34543
DUNDEE 8-DUNDEE2Y
CKT 1  OPENS C D E'
COM 'B 34543-34135
DUNDEE2Y-DUNDEE 5
CKT 1  OPENS C D E'
COM 'C 34135-34020
DUNDEE 5-HAZL S 5 CKT
1  VLD SGL'
COM 'D 34135-34129
DUNDEE 5-LIBERTY5
CKT 1  SEE
CONTINGENCY ALTW-11'
COM 'E 34135-34133
DUNDEE 5-DUNDEE 7
CKT 1  OPENS A B C D'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-13'
TRIP LINE FROM BUS
34138 TO BUS 34543 CKT
1
TRIP LINE FROM BUS
34543 TO BUS 34135 CKT
1
TRIP LINE FROM BUS
34135 TO BUS 34020 CKT
1
TRIP LINE FROM BUS
34135 TO BUS 34129 CKT
1
TRIP LINE FROM BUS
34135 TO BUS 34133 CKT
1
END

COM ' ALTW-14 Defined
as multi-terminal'
COM 'A 34133-34119
DUNDEE 7-DUNDEE 9
CKT 1  OPENS B C'
COM 'B 34133-34119
DUNDEE 7-DUNDEE 9
CKT 2  OPENS A C'
COM 'C 34133-34131
DUNDEE 7-COGGON 7
CKT 1  SEE
CONTINGENCY ALTW-7'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-14'
TRIP LINE FROM BUS
34133 TO BUS 34119 CKT
1
TRIP LINE FROM BUS
34133 TO BUS 34119 CKT
2
TRIP LINE FROM BUS
34133 TO BUS 34131 CKT
1
END

COM ' ALTW-15 Defined
as multi-terminal'
COM 'A 34127-34141
WYOMING5-WYOMING9
CKT 1  OPENS B C'
COM 'B 34127-34053
WYOMING5-MT VERN5
CKT 1  SEE
CONTINGENCY ALTW-16'
COM 'C 34127-34126
WYOMING5-MQOKETA5
CKT 1  VLD SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-15'
TRIP LINE FROM BUS
34127 TO BUS 34141 CKT
1
TRIP LINE FROM BUS
34127 TO BUS 34053 CKT
1
TRIP LINE FROM BUS
34127 TO BUS 34126 CKT
1
END

COM ' ALTW-16 Defined
as multi-terminal'
COM 'A 34053-34109 MT
VERN5-BERTRAM5 CKT 1
OPENS B'
COM 'B 34053-34127 MT
VERN5-WYOMING5 CKT 1
OPENS A'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-16
'
TRIP LINE FROM BUS
34053 TO BUS 34109 CKT
1
TRIP LINE FROM BUS
34053 TO BUS 34127 CKT
1
END

COM ' ALTW-17 Defined
as multi-terminal'
COM 'A 34050-34167 GU
CTR 5-GU CTR 9 CKT 1
OPENS B C D'
COM 'B 34050-34049 GU
CTR 5-SCRANTN5 CKT 1
OPENS A C D'
COM 'C 34050-34048 GU
CTR 5-ANITA  5 CKT 1
See Cont ALTW-18'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-17'
TRIP LINE FROM BUS
34050 TO BUS 34167 CKT
1
TRIP LINE FROM BUS
34050 TO BUS 34049 CKT
1
TRIP LINE FROM BUS
34050 TO BUS 34048 CKT
1
END

COM ' ALTW-18 Defined
as multi-terminal'
COM 'A 34048-34524
ANITA  5-ANITA  Y CKT 1
OPENS B C'
COM 'B 34524-34064
ANITA  Y-ANITA  8 CKT 1
OPENS A C'
COM 'C 34048-34050
ANITA  5-GU CTR 5 CKT 1
OPENS A B'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-18
'
TRIP LINE FROM BUS
34048 TO BUS 34524 CKT
1
TRIP LINE FROM BUS
34524 TO BUS 34064 CKT
1
TRIP LINE FROM BUS
34048 TO BUS 34050 CKT
1
END
```

```
COM ' ALTW-19 Defined
as multi-terminal'
COM 'A 34121-34539 E
CALMS7-E CALMSY CKT
1  OPENS B C D'
COM 'B 34539-34122 E
CALMSY-E CALMS5 CKT
1  OPENS A C D'
COM 'C 34122-34126 E
CALMS5-MQOKETA5 CKT
1  VLD SGL'
COM 'D 34122-34124 E
CALMS5-DEWITT 5 CKT 1
SEE ALTW-20'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-19'
TRIP LINE FROM BUS
34121 TO BUS 34539 CKT
1
TRIP LINE FROM BUS
34539 TO BUS 34122 CKT
1
TRIP LINE FROM BUS
34122 TO BUS 34126 CKT
1
TRIP LINE FROM BUS
34122 TO BUS 34124 CKT
1
END

COM ' ALTW-20 Defined
as multi-terminal'
COM 'A 34122-34124 E
CALMS5-DEWITT 5 CKT 1
OPENS B'
COM 'B 34124-34143
DEWITT 5-DEWITT 9 CKT
1  VLD SGL'
COM '----------------------------
---------------------------- '
CONTINGENCY 'ALTW-20'
TRIP LINE FROM BUS
34122 TO BUS 34124 CKT
1
TRIP LINE FROM BUS
34124 TO BUS 34143 CKT
1
END

COM ' ALTW-21 Defined
as multi-terminal'
COM 'A 34122-64425 E
CALMS5-DAVNPRT5 CKT
1  OPENS B C'
COM 'B 34122-34123 E
CALMS5-GR MND 5 CKT 1
OPENS A C'
COM '----------------------------
---------------------------- '
CONTINGENCY 'ALTW-21'
TRIP LINE FROM BUS
34122 TO BUS 64425 CKT
1
TRIP LINE FROM BUS
34122 TO BUS 34123 CKT
1
END

COM 'ALTW-22  Defined
as multi-circuit, RW'
COM 'A 34180-34181
DENMARK5-BRLGTN 5
CKT 1  OPENS  B      RW'
COM 'B 34180-34181
DENMARK5-BRLGTN 5
CKT 2  OPENS  A      RW'
COM '----------------------------
---------------------------- '
CONTINGENCY 'ALTW-22'
TRIP LINE FROM BUS
34180 TO BUS 34181 CKT
1
TRIP LINE FROM BUS
34180 TO BUS 34181 CKT
2
END

COM 'ALTW-23 Defined as
multi-terminal'
COM 'A 34016-34017
EMERY  5-CGORDO 5
CKT 1  OPENS B'
COM 'B 34017-34139
CGORDO 5-HANCOCK5
CKT 1  OPENS A'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-23'
TRIP LINE FROM BUS
34016 TO BUS 34017 CKT
1
TRIP LINE FROM BUS
34017 TO BUS 34139 CKT
1
END

COM 'ALTW-24  Defined
as multi-terminal'
COM 'A 34028-34026
LORE  5-ASBURY 5 CKT
1  OPENS B,C,D'
COM 'B 34026-34027
ASBURY 5-CGROVE 5
CKT 1  OPENS A,C,D'
COM 'C 34027-34508
CGROVE 5-JULIAN 5 CKT
1  OPENS A,B,D'
COM 'D 34508-34030
JULIAN 5-SALEM N5 CKT
1  OPENS A,B,C'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-24'
TRIP LINE FROM BUS
34028 TO BUS 34026 CKT
1
TRIP LINE FROM BUS
34026 TO BUS 34027 CKT
1
TRIP LINE FROM BUS
34027 TO BUS 34508 CKT
1
TRIP LINE FROM BUS
34508 TO BUS 34030 CKT
1
END

COM ' ALTW-25 Defined
as multi-terminal'
COM ' A  34030-34031
SALEM  5-SO.GVW.5 CKT
1  OPENS B'
COM ' B  34031-34032
SO.GVW.5-8TH ST.5 CKT
1  OPENS A'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-25'
TRIP LINE FROM BUS
34030 TO BUS 34031 CKT
1
TRIP LINE FROM BUS
34031 TO BUS 34032 CKT
1
END

COM ' ALTW-26'
COM ' 01/28/03
COM ' **** Lakefield
Generating Station (LGS)
OPG ****'
COM ' '
COM ' LGS GUIDE
REQUIRES LGS TRIP
FOR LOSS OF'
COM ' LGS-WILMARTH
345KV LINE'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-26'
TRIP LINE FROM BUS
60331 TO BUS 60108 CKT
1 / LGS-WILMARTH
TRIP LINE FROM BUS
60331 TO BUS 63091 CKT
1  / LGS 1-2
TRIP LINE FROM BUS
60331 TO BUS 63092 CKT
1  / LGS 3-4
TRIP LINE FROM BUS
60331 TO BUS 63093 CKT
1  / LGS 5-6
END

COM ' ALTW-27 Defined
as multi-terminal'
COM ' A  64067-34529
BONDRNT5-HUXLEYT5
CKT 1  OPENS B'
COM ' C  34529-34061
HUXLEYT5-BNE JCT5
CKT 1  OPENS A'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-27'
TRIP LINE FROM BUS
64067 TO BUS 34529 CKT
1
TRIP LINE FROM BUS
34529 TO BUS 34061 CKT
1
END


COM ' ALTW-28 Defined
as multi-terminal,
Interregional'
COM 'A 34179-34068
JASPER 5-M-TOWN 5
CKT 1  OPENS B C D'
COM 'B 34179-34211
JASPER 5-NEWTON 5
CKT 1  OPENS A C D'
COM 'C 34179-34549
JASPER 5-JASPER Y CKT
1  OPENS A B D'
COM 'D 34549-34204
JASPER Y-JASPER 8 CKT
1  OPENS A B C'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-28'
TRIP LINE FROM BUS
34179 TO BUS 34068 CKT
1
TRIP LINE FROM BUS
34179 TO BUS 34211 CKT
1
TRIP LINE FROM BUS
34179 TO BUS 34549 CKT
1
TRIP LINE FROM BUS
34549 TO BUS 34204 CKT
1
END

COM ' ALTW-29 Defined
as multi-terminal,
Interregional'
COM 'A 34035-34037
ROCKCKW5-ROCK CK5
CKT 1  OPENS B C'
COM 'B 34035-34343
ROCKCKW5-ROCKCKW8
CKT 1  OPENS A C'
COM 'C 34035-34344
ROCKCKW5-ROCKCK 8
CKT 1  OPENS A B'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-29'
TRIP LINE FROM BUS
34035 TO BUS 34037 CKT
1
TRIP LINE FROM BUS
34035 TO BUS 34343 CKT
1
TRIP LINE FROM BUS
34035 TO BUS 34344 CKT
1
END

COM ' ALTW-30 Defined
as multi-terminal,
Interregional'
COM 'A 34037-34035
ROCK CK5-ROCKCKW5
CKT 1  OPENS B C'
COM 'B 34037-31437
ROCK CK5-ROCK CK3
CKT 1  OPENS A C'
COM 'C 34037-30290
ROCK CK5-ROCKCKE8
CKT 1  OPENS A B'
COM '----------------------------
----------------------------'
CONTINGENCY 'ALTW-30'
```

```
TRIP LINE FROM BUS
34037 TO BUS 34035 CKT
1
TRIP LINE FROM BUS
34037 TO BUS 34036 CKT
1
TRIP LINE FROM BUS
34037 TO BUS 34342 CKT
1
END

COM ' ALTW-31 Defined
as multi-terminal'
COM 'A 34050-34049 GU
CTR 5-SCRANTN5 CKT 1
OPENS B C'
COM 'B 34049-34165
SCRANTN5-SCRANTN9
CKT 1  OPENS A C'
COM 'C 34049-34054
SCRANTN5-GR  JCT5
CKT 1  SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-31'
TRIP LINE FROM BUS
34050 TO BUS 34049 CKT
1
TRIP LINE FROM BUS
34049 TO BUS 34165 CKT
1
TRIP LINE FROM BUS
34049 TO BUS 34054 CKT
1
END

COM ' ALTW-32 Defined
as multi-terminal'
COM 'A 34180-34181
DENMARK5-BRLGTN 5
CKT 1  OPENS  B'
COM 'B 34180-34181
DENMARK5-VIELE  5 CKT
1  OPENS  A'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-32'
TRIP LINE FROM BUS
34180 TO BUS 34181 CKT
1
TRIP LINE FROM BUS
34180 TO BUS 34081 CKT
1
END

COM 'ALTW-33  Defined
as multi-circuit'
COM 'A 34189-34172
OTTUMWA5-EIC   5 CKT
1  OPENS   B C'
COM 'B 34172-34547 EIC
5-EIC   Y CKT 1  SGL'
COM 'C 34547-34173 EIC
Y-EIC   8 CKT 1  SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-33'
TRIP LINE FROM BUS
34189 TO BUS 34172 CKT
1
TRIP LINE FROM BUS
34172 TO BUS 34547 CKT
1
TRIP LINE FROM BUS
34547 TO BUS 34173 CKT
1
END

COM 'ALTW-34  Defined
as multi-circuit,
Interregional'
COM 'A 34190-34174
BRDGPRT5-EICTAP 5
CKT 1  OPENS B C'
COM 'B 34172-34174 EIC
5-EICTAP 5 CKT 1
OPENS A C'
COM 'C 34174-64096
EICTAP  5-BEACON 5
CKT 1  OPENS A B'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-34'
TRIP LINE FROM BUS
34190 TO BUS 34174 CKT
1
TRIP LINE FROM BUS
34172 TO BUS 34174 CKT
1
TRIP LINE FROM BUS
34174 TO BUS 64096 CKT
1
END

COM 'ALTW-35  Defined
as multi-terminal, common
tower'
COM 'A 64189-34179
NEANKNY 5-JASPER 5
CKT 1  OPENS  B Tower'
COM 'B 34058-64189
PERRY  5-NEANKNY5
CKT 1  OPENS  A Tower.
Opens C'
COM 'C 34054-34058  GR
JCT 5-PERRY  5 CKT 1
OPENS  D,E '
COM 'D 34058-34166
PERRY  5-PERRY  9 CKT
1  SGL'
COM 'E 34058-34166
PERRY  5-PERRY  9 CKT
2  SGL'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-35'
TRIP LINE FROM BUS
64189 TO BUS 34179 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 64189 CKT
1
TRIP LINE FROM BUS
34054 TO BUS 34058 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
1
TRIP LINE FROM BUS
34058 TO BUS 34166 CKT
2
END

COM 'ALTW-36  Defined
as multi-terminal, tower'
COM 'A 34508-34030
JULIAN 5-SALEM  5 CKT 1
OPENS B C D E TOWER'
COM 'B 34030-34031
SALEM  5-SO.GVW.5 CKT
1  OPENS A F TOWER'
COM 'C 34028-34026
LORE  5-ASBURY 5 CKT
1  OPENS A,D,E'
COM 'D 34026-34027
ASBURY 5-CGROVE 5
CKT 1  OPENS A,C,E'
COM 'E 34027-34508
CGROVE 5-JULIAN 5 CKT
1  OPENS A,C,D'
COM 'F 34031-34032
SO.GVW.5-8TH ST.5 CKT
1  OPENS B'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-36'
TRIP LINE FROM BUS
34508 TO BUS 34030 CKT
1
TRIP LINE FROM BUS
34030 TO BUS 34031 CKT
1
TRIP LINE FROM BUS
34028 TO BUS 34026 CKT
1
TRIP LINE FROM BUS
34026 TO BUS 34027 CKT
1
TRIP LINE FROM BUS
34027 TO BUS 34508 CKT
1
TRIP LINE FROM BUS
34031 TO BUS 34032 CKT
1
END

COM ' NEXT
CONTINGENCY NOT
TAKEN, COMMENTED
OUT '
COM 'ALTW-37  Defined
as Common Tower'
COM 'A 34016-34015
EMERY  5-LIME CK5
OPENS B Tower'
COM 'A 34010-34015
HAYWARD5-LIME CK5
OPENS A Tower'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-37'
TRIP LINE FROM BUS
34016 TO BUS  34015
CKT 1
TRIP LINE FROM BUS
34010 TO BUS  34015
CKT 1
END

COM ' NEXT
CONTINGENCY NOT
TAKEN, COMMENTED
OUT '
COM 'ALTW-38  Defined
as multi-terminal,
interregional, tower'
COM 'A 34028-34032
LORE  5-8TH ST.5 CKT 1
OPENS B Tower'
COM 'B 34028-34033
LORE  5-TRK RIV5 CKT 1
OPENS A C D Tower'
COM 'C 34033-69503 TRK
RIV5-CASVILL5 CKT 1
OPENS B D'
COM 'D 34033-34465 TRK
RIV5-TURK RV8 CKT 1
OPENS B C'
COM '-------------------------
-------------------------'
CONTINGENCY 'ALTW-38'
TRIP LINE FROM BUS
34028 TO BUS 34032 CKT
1
TRIP LINE FROM BUS
34028 TO BUS 34033 CKT
1
TRIP LINE FROM BUS
34033 TO BUS 69503 CKT
1
TRIP LINE FROM BUS
34033 TO BUS 34465 CKT
1
END

COM        END ALTW
Contingencies'
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
13
END
COM '  '
COM '  '
COM ' '
CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
14
END
COM ' '
COM ' '
COM ' '
COM 'ALL BRANCHES AS
SINGLE OUTAGES'
COM 'AND ALL INT TIES '

SINGLE TIE FROM AREA
600 TO AREA 331
SINGLE TIE FROM AREA
600 TO AREA 364
SINGLE TIE FROM AREA
600 TO AREA 366

SINGLE TIE FROM AREA
608 TO AREA 703
```

```
SINGLE TIE FROM AREA
635 TO AREA 130
SINGLE TIE FROM AREA
635 TO AREA 331
SINGLE TIE FROM AREA
635 TO AREA 356
SINGLE TIE FROM AREA
635 TO AREA 363
SINGLE TIE FROM AREA
635 TO AREA 540

SINGLE TIE FROM AREA
640 TO AREA 130
SINGLE TIE FROM AREA
640 TO AREA 534
SINGLE TIE FROM AREA
640 TO AREA 540

SINGLE TIE FROM AREA
645 TO AREA 536

SINGLE TIE FROM AREA
652 TO AREA 130
SINGLE TIE FROM AREA
652 TO AREA 331

SINGLE TIE FROM AREA
667 TO AREA 703

SINGLE TIE FROM AREA
680 TO AREA 364

CONTINGENCY 'test'
TRIP LINE FROM BUS
99998 TO BUS 99999 CKT
15
END
END
END
```

Power Flow System Monitor File

```
MONITOR BRANCHES IN SYSTEM MonArea
MONITOR TIES FROM SYSTEM MonArea
COM
MONITOR VOLTAGE RANGE SYSTEM MonArea 0.90 1.10
END
busnames
MONITOR FLOWGATE 6001 'NDEX' RATING 1967
BRANCH FROM BUS 'LELANDO3 345' TO BUS 'FTTHOMP3 345' CKT 1
BRANCH FROM BUS 'LELANDO3 345' TO BUS 'GROTON 3 345' CKT 1
BRANCH FROM BUS 'ANTELOP3 345' TO BUS 'BRDLAND3 345' CKT 1
BRANCH FROM BUS 'SULLYBT4 230' TO BUS 'OAHE   4 230' CKT 1
BRANCH FROM BUS 'BISON  4 230' TO BUS 'MAURINE4 230' CKT 1
BRANCH FROM BUS 'BIGSTON4 230' TO BUS 'BLAIR  4 230' CKT 1
BRANCH FROM BUS 'MORRIS 4 230' TO BUS 'GRANITF4 230' CKT 1
BRANCH FROM BUS 'AUDUBON4 230' TO BUS 'HUBBARD4 230' CKT 1
BRANCH FROM BUS 'INMAN  4 230' TO BUS 'WINGRIV4 230' CKT 1
BRANCH FROM BUS 'ELLENDL7 115' TO BUS 'ABDNJCT7 115' CKT 1
BRANCH FROM BUS 'EDGELEY7 115' TO BUS 'ORDWAY 7 115' CKT 1
BRANCH FROM BUS 'FORMAN 7 115' TO BUS 'SUMMIT-7 115' CKT 1
BRANCH FROM BUS 'CANBY  4 230' TO BUS 'GRANITF4 230' CKT P1
BRANCH FROM BUS 'ALEXAND7 115' TO BUS 'DGLASCO7 115' CKT 1
BRANCH FROM BUS 'LAPORTE7 115' TO BUS 'AKELEY7  115' CKT 1
BRANCH FROM BUS 'KERKHO 7 115' TO BUS 'KERKHOT7 115' CKT 1
BRANCH FROM BUS 'DRAYTON4 230' TO BUS 'LETELER4 230' CKT 1
BRANCH FROM BUS 'RUGBY  4 230' TO BUS 'GLENBOR4 230' CKT 1
END
MONITOR FLOWGATE 6002 'MHEX_S' RATING 1972
BRANCH FROM BUS 'LETELER4 230' TO BUS 'DRAYTON4 230' CKT 1
BRANCH FROM BUS 'DORSEY 2 500' TO BUS 'ROSEAUN2 500' CKT 1
BRANCH FROM BUS 'RICHER 4 230' TO BUS 'ROSEAU 4 230' CKT 1
BRANCH FROM BUS 'GLENBOR4 230' TO BUS 'RUGBY  4 230' CKT 1
END
MONITOR FLOWGATE 6004 'MWSI' RATING 1271
BRANCH FROM BUS 'EAU CL 3 345' TO BUS 'ARP 345  345' CKT 1
BRANCH FROM BUS 'PR ISLD3 345' TO BUS 'BYRON  3 345' CKT 1
END
END
```

Power Flow Subsystem File

```
COM SYSTEM
DISCRIPTION Data
COM

SYSTEM MonArea
 AREA 364
 AREA 365
 AREA 366
 AREA 600
 AREA 680
END

SYSTEM ATC_con
 JOIN 'GROUP 1'
  AREA 364
  AREA 365
  AREA 366
  kvrange 60 160
 end
END

SYSTEM MAPP
 AREAS 600 699
 AREA 331
END

SYSTEM MAPP_HV
 JOIN 'GROUP 1'
  AREAS 600 699
  AREA 331
  KVRANGE 69 500
 END
END

SYSTEM NORTHMAPP
  AREA 667
  AREA 680
  AREAS 600 626
  ZONE 90
  ZONES 653 654
  ZONE 103
  ZONE 105
  ZONE 990
  ZONE 101
  ZONE 659
  ZONE 106
END

SYSTEM NSP_mon
 Join 'group 1'
  AREA 600
  AREA 613
  AREA 618
  AREA 652
  AREA 626
  AREA 331
  kvrange 60 500
 end
END

SYSTEM NSP_con
 Join 'group 1'
  AREA 600
  AREA 613
  AREA 618
  AREA 652
  AREA 626
  AREA 331
  kvrange 110 400
 end
END

SYSTEM NSP
  ZONE 603
  Zone 601
END

SYSTEM
NORTHMAPP_HV
 JOIN 'GROUP 1'
  AREA 667
  KVRANGE 110 500
 END
 JOIN 'GROUP 2'
  AREA 680
  KVRANGE 110 500
 END
 JOIN 'GROUP 3'
  AREAS 600 626
  KVRANGE 110 500
 END
 JOIN 'GROUP 4'
  ZONE 90
  KVRANGE 110 500
 END
 JOIN 'GROUP 5'
  ZONES 653 654
  KVRANGE 110 500
 END
 JOIN 'GROUP 6'
  ZONE 103
  KVRANGE 110 500
 END
 JOIN 'GROUP 7'
  ZONE 105
  KVRANGE 110 500
 END
 JOIN 'GROUP 8'
  ZONE 990
  KVRANGE 110 500
 END
 JOIN 'GROUP 9'
  ZONE 101
  KVRANGE 110 500
 END
 JOIN 'GROUP 10'
  ZONE 659
  KVRANGE 110 500
 END
 JOIN 'GROUP 11'
  ZONE 106
  KVRANGE 110 500
 END
END

SYSTEM
NOMAPP_HV_EX
 JOIN 'GROUP 1'
  AREA 667
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 2'
  AREA 680
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 3'
  AREAS 600 626
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 4'
  ZONE 90
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 5'
  ZONES 653 654
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 6'
  ZONE 103
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 7'
  ZONE 105
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 8'
  ZONE 990
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 9'
  ZONE 101
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 10'
  ZONE 659
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 11'
  ZONE 106
  KVRANGE 110 500
  OWNERS 1 996
 END
END

SYSTEM NDAREA_HV
 JOIN 'GROUP 1'
  AREA 626
  KVRANGE 110 500
 END
 JOIN 'GROUP 2'
  AREAS 608 611
  KVRANGE 110 500
 END
 JOIN 'GROUP 3'
  ZONE 90
  KVRANGE 110 500
 END
 JOIN 'GROUP 4'
  ZONES 653 654
  KVRANGE 110 500
 END
 JOIN 'GROUP 5'
  ZONE 103
  KVRANGE 110 500
 END
 JOIN 'GROUP 6'
  ZONE 105
  KVRANGE 110 500
 END
 JOIN 'GROUP 7'
  ZONE 990
  KVRANGE 110 500
 END
 JOIN 'GROUP 8'
  ZONE 101
  KVRANGE 110 500
 END
 JOIN 'GROUP 9'
  ZONE 659
  KVRANGE 110 500
 END
 JOIN 'GROUP 10'
  ZONE 106
  KVRANGE 110 500
 END
 JOIN 'GROUP 11'
  AREA 618
  KVRANGE 110 500
 END
END

SYSTEM
NDAREA_HV_EX
 JOIN 'GROUP 1'
  AREA 626
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 2'
  AREAS 608 611
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 3'
  ZONE 90
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 4'
  ZONES 653 654
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 5'
  ZONE 103
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 6'
  ZONE 105
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 7'
  ZONE 990
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 8'
  ZONE 101
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 9'
  ZONE 659
  KVRANGE 110 500
  OWNERS 1 996
 END
 JOIN 'GROUP 10'
  ZONE 106
```

```
 KVRANGE 110 500
 OWNERS 1 996
END
JOIN 'GROUP 11'
 AREA 618
 KVRANGE 110 500
 OWNERS 1 996
 END
END

SYSTEM
SOUTHMAPP_HV
JOIN 'GROUP 1'
 ZONES 653 654
 KVRANGE 110 500
END
JOIN 'GROUP 2'
 ZONE 663
 KVRANGE 110 500
END
JOIN 'GROUP 3'
 AREAS 640 650
 KVRANGE 110 500
END
JOIN 'GROUP 4'
 AREA 680
 KVRANGE 110 500
END
JOIN 'GROUP 5'
 AREA 635
 KVRANGE 110 500
END
JOIN 'GROUP 6'
 AREA 331
 KVRANGE 110 500
END
JOIN 'GROUP 7'
 AREA 633
 KVRANGE 110 500
END
JOIN 'GROUP 8'
 AREA 539
 KVRANGE 110 500
END
JOIN 'GROUP 9'
 ZONE 107
 KVRANGE 110 500
END
JOIN 'GROUP 10'
 ZONE 640
 KVRANGE 110 500
END
JOIN 'GROUP 11'
 ZONE 603
 KVRANGE 110 500
 END
END

END
```

Addendum to

2008 Northwest Wisconsin Load-Serving Study

Prepared by: Justin Michlig

Participants: Xcel Energy, Inc.

August 31, 2011

Summary

Since the publication of the Northwest Wisconsin Load-Serving Study in April 2008 ("2008 Study"), Xcel Energy, Inc. ("Xcel Energy") has continued to do further work to optimize the design of its recommended plan to build a 17-mile 161 kV transmission line from Stone Lake Substation to a new 161 kV switchyard at Couderay Substation with a 70 MVA 161/69 kV transformer at Couderay ("Project"). The purpose of this addendum is summarize the 2008 Study conclusions, provide updated information regarding those conclusions, and address issues raised by refinements in the design of the proposed Project.

Overview of 2008 Study

The transmission system in Northwestern Wisconsin is electrically isolated, primarily serving load within that region. The 2008 Study focused on this large geographical area, which is bounded by Duluth, MN, Eau Claire, WI, Bergland, MI, and Wausau, WI. Within this area there is a large Bulk Electric transmission ring that runs from the Stone Lake Substation to Ashland, WI, to Ironwood, MI, to Park Falls, WI, and on through the Osprey Substation to Chippewa Falls, WI.

There are five main sources of power into this area:

- Stone Lake 345/161 kV transformer
- Chippewa Falls, with connections to Eau Claire
- Bayfront Generating Plant
- Stinson, with connections to Minnesota
- Hydro generation

Within this region, the area around Hayward, WI has experienced significant growth from the additions of new homes and businesses in the past several decades. Growth is expected to continue as the area increases in popularity as a destination for tourists, and as an attractive place for people to reside seasonally and year-round. There is also additional industrial load growth, such as increased pumping stations associated with area pipelines.

The 2008 Study showed low voltages and overloading along the 69 kV line connecting load-serving substations between Stone Lake and Big Falls. The primary outages of concern were the loss of the 69 kV connections between Stone Lake and Stone Lake Pump, and between Big Falls and Whitetail. The peak load levels in this area exceed the capacity of transmission system in the event of either of these outages, and Xcel Energy planning studies show this situation worsening over time. The 2008 Study therefore focused on the transmission power source closest to the area of need, concluding that introducing a 161 kV transmission power source at Couderay to from Stone Lake will addresses this problem.

Update on Alternatives Analysis

Upon the 2008 Study determining that this new high voltage transmission power source would address the identified need, no further analysis of other new transmission lines has been done. The 2008 analysis examined multiple options throughout Northwest Wisconsin to address the

low voltage and overload issues currently in the region between Stone Lake and Big Falls. It showed that the addition of a new 161 kV source to the existing 69 kV line at Couderay (Option H) was a much more robust and cost-effective solution. The only other solutions that were deemed "viable" were re-conductoring the Stone Lake-Edgewater Pump 69 kV line (Option E), adding a 161 kV line between Big Falls and Stone Lake (Option D), or adding a 161 kV line between Stone Lake and Edgewater (Option F). To be clear, the 2008 Study identified these as solutions in theory, but as the Study went on to show, they are not practically viable.

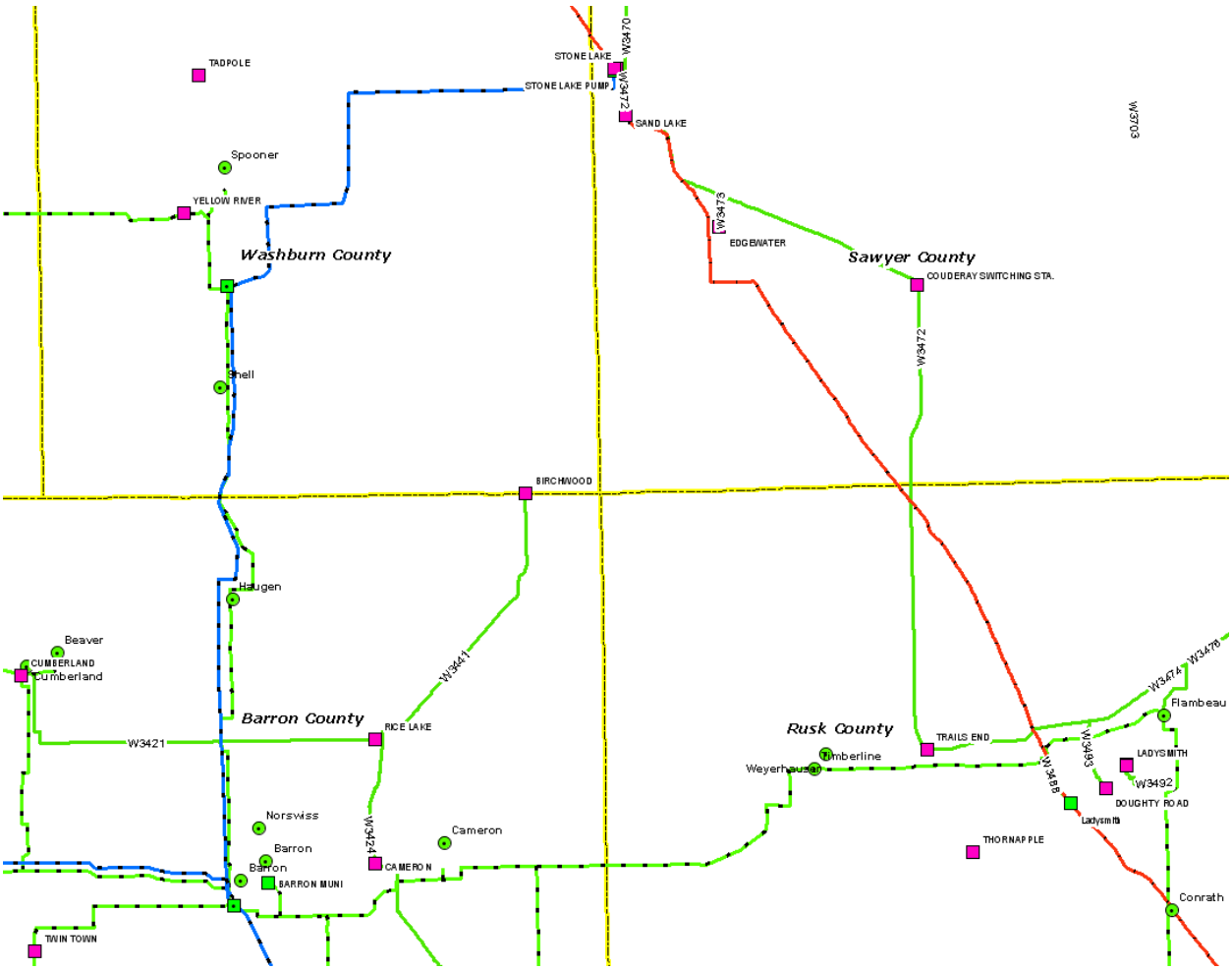
While Option E's re-conductoring of Stone Lake-Edgewater Pump 69 kV line fixed the Stone Lake Pump-Sand Lake 69 kV overload, the only way to address the Stone Lake 161/69 kV transformer issues was by adding a second 161/69 kV transformer at Stone Lake. See 2008 Study at page 18, Table 12. The low voltages that still exist with this option were proposed to be mitigated by seven 7.2 MVAR cap banks. This is possible in theory, but not practically. See 2008 Study at page 19. Consequently, Option E cannot actually address the low voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses, and therefore is not a viable option to address the system deficiencies in the Stone Lake-Big Falls area.

Option D was not deemed viable in comparison with Option H because of its expense. While Option D's addition of a roughly 56-mile long 161 kV line between Big Falls and Stone Lake addresses the critical Stone Lake/Stone Lake Pump and Big Falls/Whitetail overloads, it does not address the Stone Lake 161/69 kV transformer overloading issues, nor the low voltage issues in the area, unless a 161/69 kV transformer is added at Couderay. See 2008 Study at page 12. The longer line length and added transformer makes Option D roughly two and one-half times more expensive than Option H without delivering appreciably greater electric performance. See 2008 Study at page 18, Table 11.

Like Option D, Option F fixes the Stone Lake Pump-Sand Lake 69 kV line and Stone Lake 161/69 kV transformer overload issues. But this option only addresses the Stone Lake 161/69 transformer loading issues through 2015. To overcome this, Option F relies on, among other facilities, the same additional capacitance as Option E, which cannot as a practical matter be installed to address low voltage issues on the Stone Lake, Edgewater, North Central, Whitetail, Trails End, or Big Falls 69 kV buses. See 2008 Study at pages 14-15.

One other possible alternative to Option H that was not formally studied is a new 161 kV transmission line from Baron to Rice Lake to Couderay. See Figure 1 below. But that is a significantly more expensive alternative. While the scope of substation work would be similar, utilizing the connection at Baron to introduce a 161 kV power source to the Stone Lake/Couderay area would require at least 42 miles of 161 kV line to be constructed, with at least 15 miles of that line constructed in new ROW. See Figure 1 below. The Baron-Couderay Option would therefore cost roughly three times more than building an approximately 17-mile 161 kV line with about 7 miles of new ROW between Stone Lake and Couderay. Because it was so much more expensive, the Baron-Couderay 161 kV option was not deemed to be a prudent alternative worthy of further study.

Figure 1: Baron – Couderay Option



Update on Project Area Transmission System

The previous model series used to study Northwestern Wisconsin and propose the Stone Lake – Couderay Project was from the 2007 MRO model creation process. There have been no transmission changes to the system in the Stone Lake - Big Falls area, which is the area of need identified in the 2008 Study. The 69 kV line between Stone Lake Substation and Osprey Substation (which is adjacent to the Big Falls Substation) has remained a 4/0 ACSR line since 1951. Also, no reactive devices have been added. The loads on this line directly affect the voltages present on the 69 kV system pre- and post-contingent.

A review of the most constraining issues in the Stone Lake – Osprey/Big Falls area continues to show the need for this Project. This review was based on the 2010 series 2012 summer peak MRO models. Loads in the area were scaled to determine the point at which the transmission system was no longer able to meet criteria under outages. Images 1 and 2 below are screen captures from PSS/E, a power flow program. These show the most limiting contingencies in the area and the maximum load serving capability.

Image 1: Stone Lake – Stone Lake Pump Outage

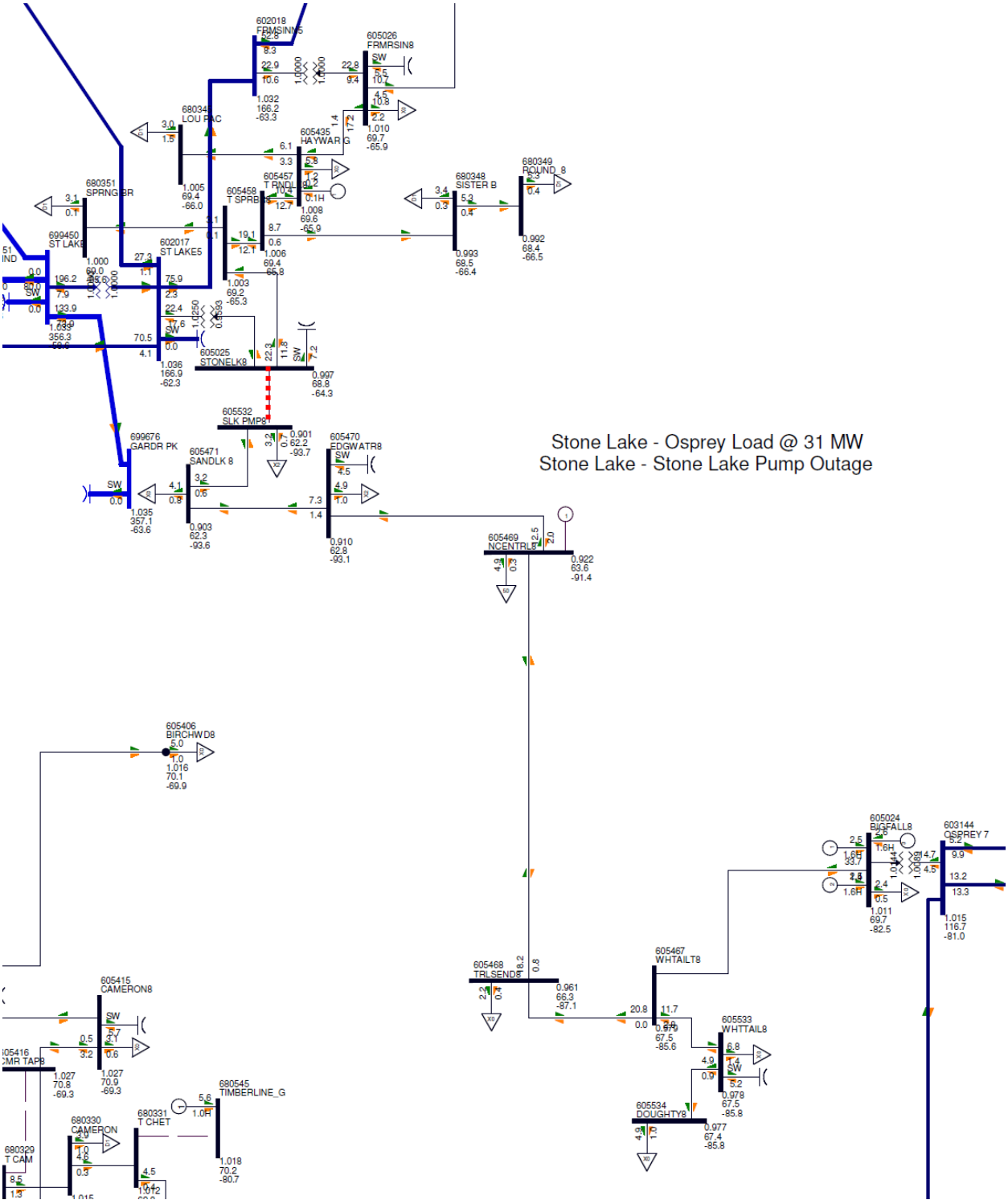
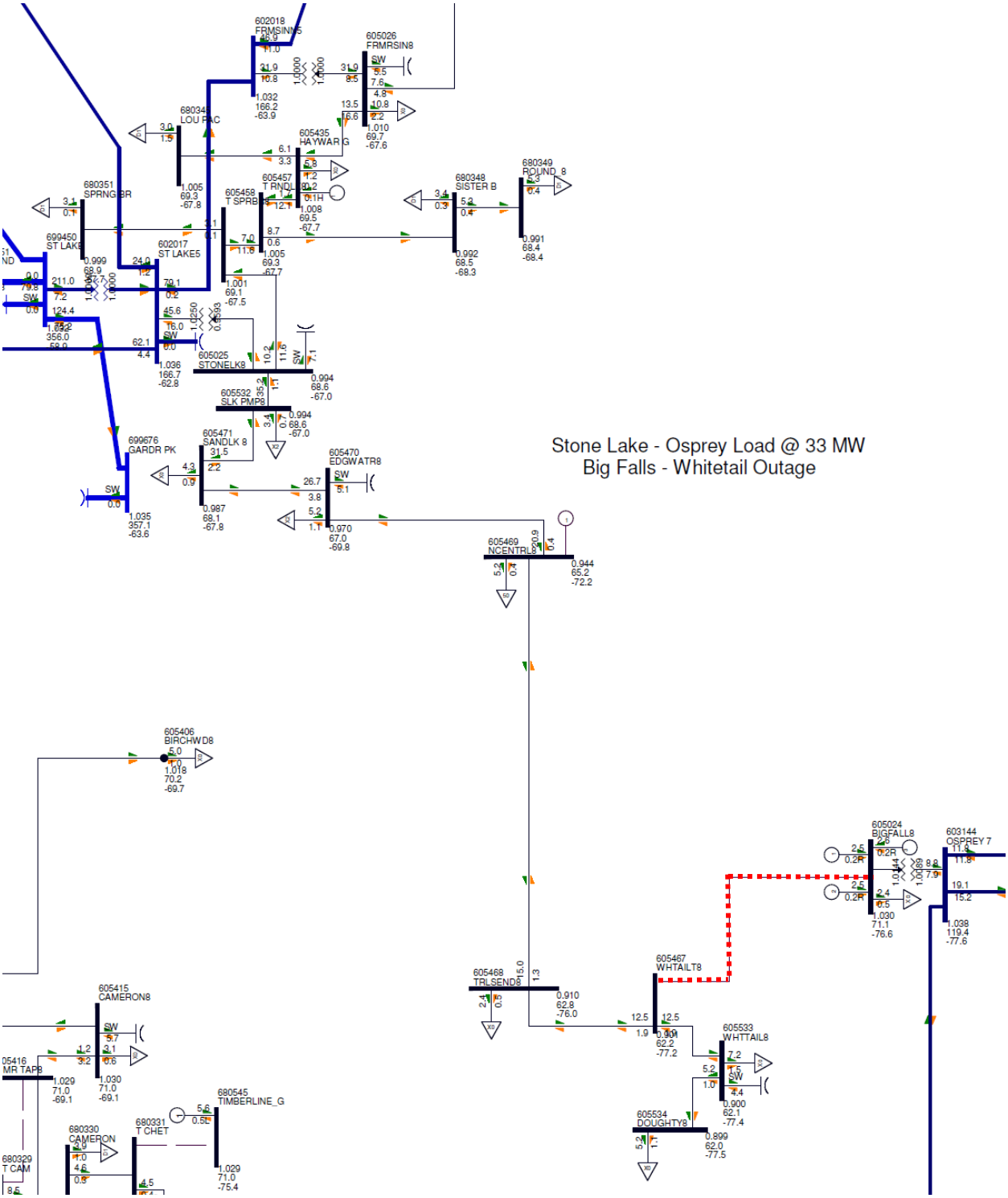


Image 2: Big Falls – Whitetail Outage



The Project's need area loads were scaled to meet a 90% minimum voltage criteria under post-contingent conditions. During the Stone Lake – Stone Lake Pump outage the maximum load that can be served is 31 MW. If an outage occurs on the line between Big Falls – Whitetail, 33 MW can be served. Loads in the 2007 models were higher than these values, however; the models showed a net load of nearly 50 MW. This far exceeds the transmission capability in the Project area in the event of either of the above contingencies.

After the project is completed, the transmission system between Stone Lake and Big Falls/Osprey is able to handle more than 50 MWs of load. Images 3 and 4 below show power flows for the same outages with the proposed Project in Xcel Energy's preferred route. The load growth from the largest area peak would be about 30% to reach 50 MWs.

Image 3: Project in Preferred Route: Stone Lake – Stone Lake Pump Outage

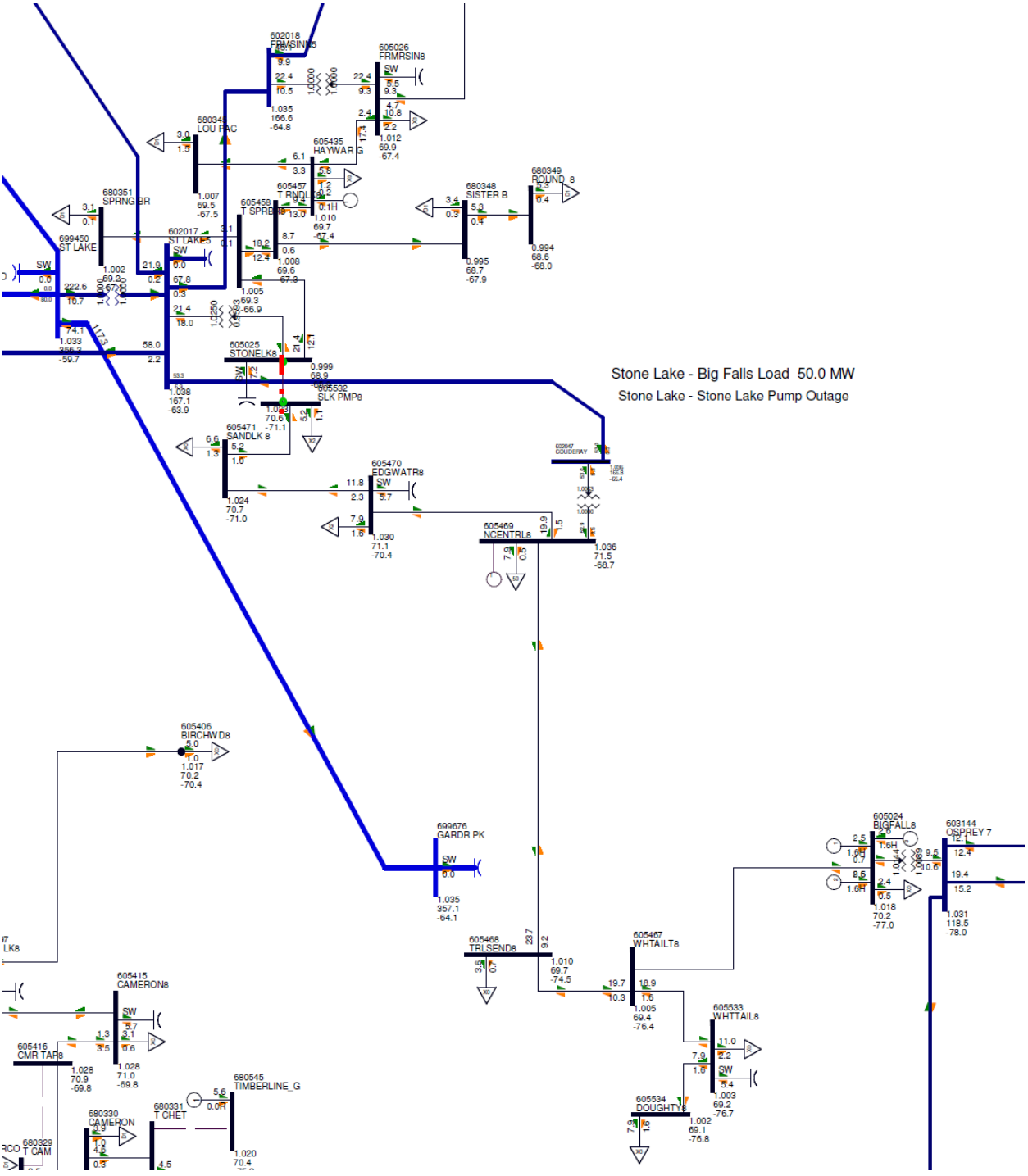
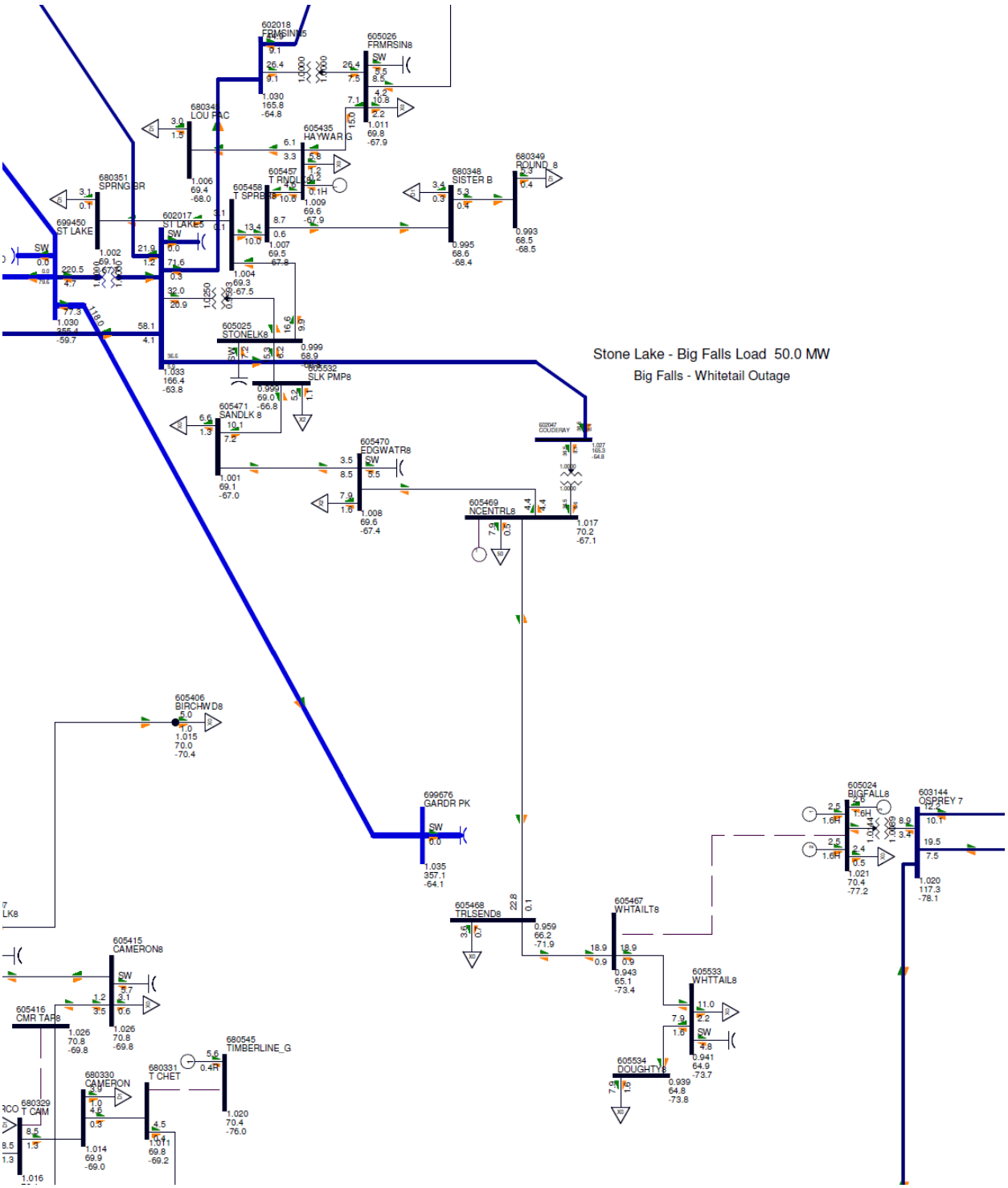


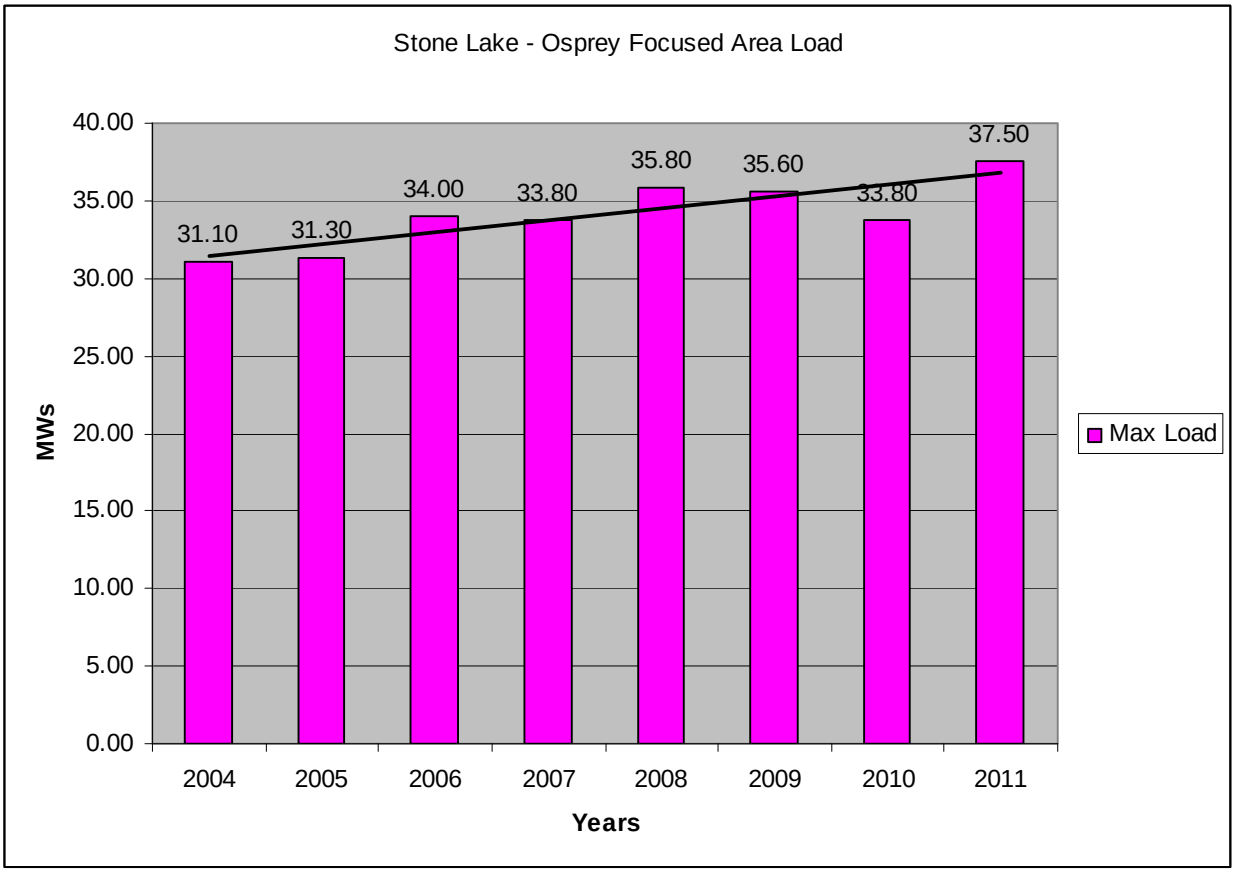
Image 4: Project in Preferred Route: Big Falls - Whitetail Outage



Peak Load History

Graph 1 below shows the maximum yearly loadings for the Stone Lake - Big Falls/Osprey area, which also shows the Project is still needed. A general trend of load growth can be seen from the data, and it is evident that the area's load during peak conditions exceeds the area's transmission system capabilities.

Graph 1: Yearly Maximum Loading



Update on Project Elements

The Project has been refined since it was identified in the 2008 Study. The Project now consists of the following elements:

Substation Components:

- Constructing a new 161/69 kV substation (Radisson Substation) across the road from the existing Couderay Substation in Section 20 of Radisson Township, and removing the Couderay Substation. The Radisson Substation will be designed to accommodate two 161-69 kV, 70 MVA autotransformers, two 161 kV line terminations and three 69 kV line terminations. The 161 kV system will be configured in a standard ring bus scheme

designed for future expansion to a breaker-and-one-half-breaker scheme. The 69 kV system will be configured in a standard straight bus scheme.

- Upgrading the Stone Lake Substation in Section 5 of Bass Lake Township. The upgrades would be installed within the existing fenced area. The upgrade includes installation of a 161 kV line termination, a 161 kV breaker, a motor operated disconnect switch, and a motor operator on the existing switch in position 6R2B6 to create a sixth position in the existing 161 kV ring bus. The existing substation configuration is not conducive to convert to a breaker and a half scheme due to the limited space available and existing layout.
- Making no changes to the components within the Sand Lake Substation and Edgewater Pumping Station.
- Construct new 69 kV connection between the new Radisson substation and the Northwestern Wisconsin Electric Company (NWEC) owned Stacik distribution substation.

Transmission Components:

- Rebuilding the existing 69 kV connection between the Stone Lake Substation and the new Radisson Substation, including maintaining the connections to the Sand Lake Substation and the Edgewater Pumping Station.
- Constructing a 161 kV connection between the Stone Lake Substation and the new Radisson Substation.

Double Circuiting

The 2008 Study stated that using double circuiting for the Project would be a NERC classified contingency. This was based on regulatory discussions at that time about the entire 69 kV system, or at least portions of it, being converted to Bulk Electric System status. This would require all transmission projects to be constructed to handle this contingency. But none of the 69 kV system has been designated as Bulk Electric System, and there is no further discussion that it will be. Therefore double-circuiting the Project with portions of the area's 69 kV system is not recognized by NERC as a contingency raising system reliability concerns.

Another reason double-circuiting the Project is no longer deemed to be a reliability concern is because Xcel Energy is also proposing that the 161/69 kV line at Couderay/Radisson be continued down to Osprey. Once this extension is in service, a loss of the double circuit 161/69 kV line at any point between Stone Lake and Couderay will not cause any system reliability issues. The Stone Lake-Osprey 161 kV Transmission Project, which Xcel Energy proposes to put into service in 2015, is discussed below.

Need for New Couderay-Osprey 161/69 kV Line

Part of the additional analysis of the Northwestern Wisconsin system since 2008 is a study of the effects of hydro generation on the load serving capability of the transmission system. This study

found that during low water years no hydro generation is available for most of the year. Without the hydro generation that was assumed in the 2008 Study, the transmission system east of Couderay/Radisson to Osprey is not able to reliably meet the increased demand from new customers. Thus the necessary ISD for extending the 161/69 kV line down to Osprey, which the 2008 Study identified as sometime after 2030, moved up to 2015. The continuation of the 161\69 kV upgrade down to Osprey was the most logical choice of the options evaluated and best met the need in the Ladysmith area. Xcel Energy is currently working on the CPCN application for this Project. See *Application of Northern States Power Company-Wisconsin to Remove, Replace, and Double-Circuit 36 Miles of Transmission Facilities from 69 kV to 161/69 kV, Between the Couderay and Osprey Substations in Sawyer and Rusk Counties, Wisconsin*, PSC Docket No. 4220-CE-178.

Conclusion

The primary outages of concern in the 2008 Study and this addendum are the loss of the 69 kV connections between Stone Lake – Stone Lake Pump and Big Falls – Whitetail. The peak load levels in the Stone Lake-Big Falls area are greater than the capacity of the transmission system if either of these outages occurs, and Xcel Energy planning studies show this situation worsening over time. Introducing a 161 kV transmission power source at Stone Lake to run to Couderay addresses the problem.

In addition to the inadequate load serving capability, the majority of the 69 kV line between Stone Lake and Big Falls is approximately 50 years old. Major refurbishment work will need to take place on the line to ensure reliable operation in the near future. Rebuilding the existing 69 kV line while adding the new 161 kV circuit will further strengthen the reliability of the electric system that services the area. It is the best option to address the load serving needs because it provides a solid source and mitigates the need the line to be refurbished.

Without any transmission improvements, area outages will require load shedding so equipment will not be damaged. With the present summer and winter peaks, approximately 7 MWs of load would need to be shed so further equipment damage would not take place. This would mean that 4200 – 7000 customers would be without power until repairs could be made to fix the outage. Peak conditions happen on hot summer and cold winter days. The outage on a cold winter would stop furnaces and electric heat from being available. Even with the load shedding procedure, an outage can nevertheless result in extended outages during peak load times and cause damage to major transmission components.