STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Application of ITC Midwest LLC for a Certificate of Need for the Minnesota-Iowa 345 kV Transmission Line Project in Jackson, Martin, and Faribault Counties	PUC Docket No. ET-6675/CN-12-1053 OAH Docket No. 60-2500-30782
In the Matter of the Application of ITC Midwest for a Route Permit for the Minnesota-Iowa 345 kV Transmission Project and Associated Facilities in Jackson, Martin, and Faribault Counties	PUC Docket No. ET-6675/TL-12-1337 OAH Docket No. 60-2500-30782

REBUTTAL TESTIMONY OF

JOE BERRY

On Behalf of

ITC MIDWEST LLC

April 25, 2014

Exhibit _____

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I. INTRODUCTION

Q. PLEASE STATE YOUR NAME.

A. My name is Joe Berry.

Q. DID YOU PROVIDE DIRECT TESTIMONY IN THESE PROCEEDINGS ON FEBRUARY 24, 2014?

A. Yes. I provided direct testimony on behalf of ITC Midwest LLC ("ITC Midwest" or the "Company").

Q. HAVE YOU REVIEWED THE DIRECT TESTIMONY PROVIDED BY OTHER PARTIES?

A. Yes. I have reviewed the direct testimony filed by other parties.

Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

A. My rebuttal testimony addresses issues Department of Commerce, Division of Energy Resources ("DOC-DER") witnesses Adam Heinen and Dr. Steve Rakow raise in their direct testimony. My rebuttal testimony:

1) Summarizes the relationship between the Minnesota - Iowa 345 kV Transmission Project ("Project"), Multi-Value Project ("MVP") 3, MVP Project 4, and MVP Project 5;
2) Describes the local and regional needs supporting MVP Project 3;
3) Further discusses the engineering reasons why the 345 kV voltage is clearly superior to the 161 kV Rebuild Alternative in the near term

and to meet future needs in southwest Minnesota, Iowa, and the region; and

4) Provides further detail as to why the Lakefield Junction to Rutland Substation 345 kV Alternative ("Lakefield – Rutland 345 kV Alternative") was screened from consideration by demonstrating that (i) the alternative is clearly inferior to MVP Project 3 and the 161 kV Rebuild Alternative and (ii) in summer peak conditions, it would degrade transfer capability in southwest Minnesota.

Q. WHAT SCHEDULES ARE YOU PROVIDING IN SUPPORT OF YOUR REBUTTAL TESTIMONY?

A. Schedule 6: ITC Midwest LLC Lakefield – Rutland 345 kV Transmission Line Planning Study ("Lakefield Junction – Rutland 345 kV Study").

Schedule 7: Midcontinent Independent System Operator, Inc. ("MISO") response to DOC-DER Information Request No. 21.

Schedule 8: ITC Midwest response to DOC-DER Information Request No. 28.

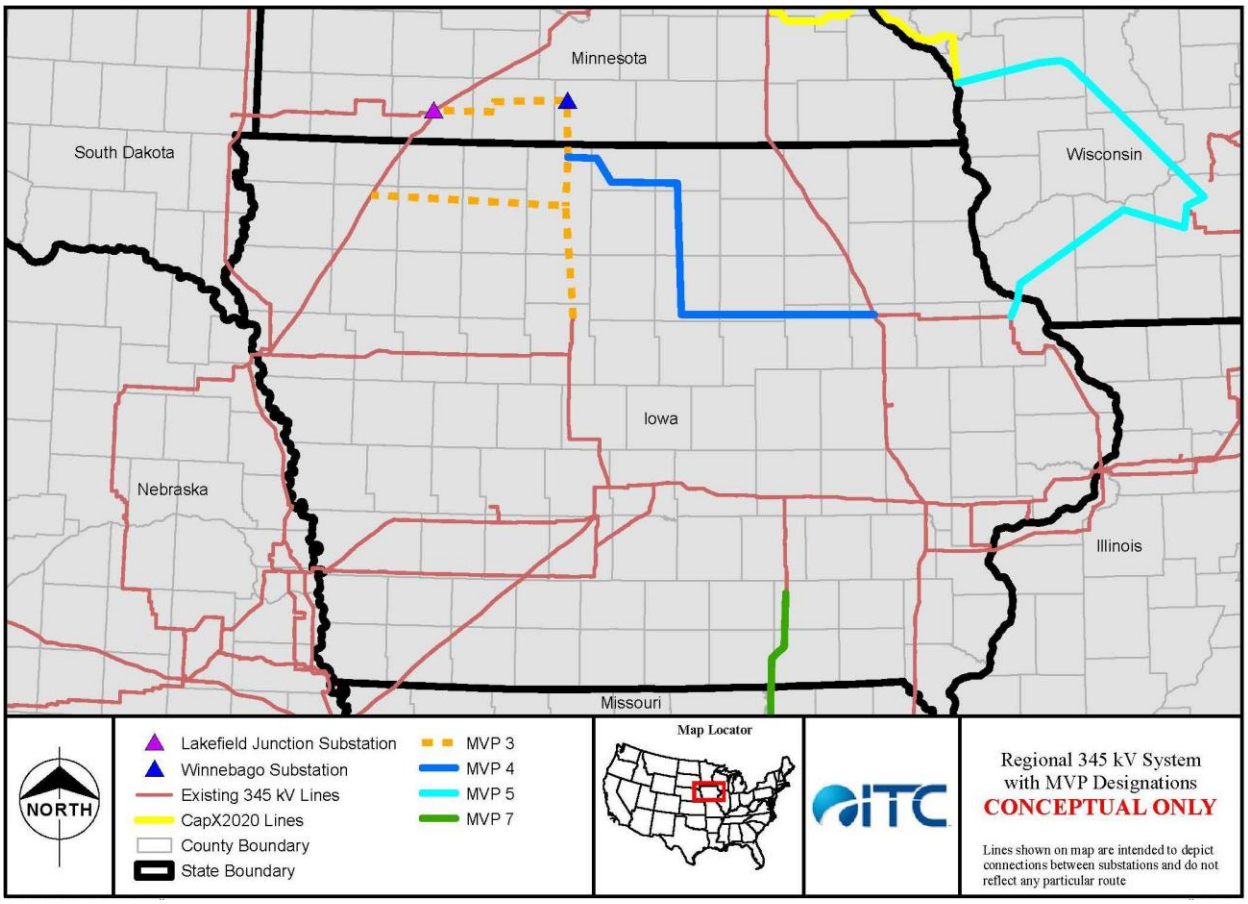
II. OVERVIEW OF MVP PROJECT 3, MVP PROJECT 4, AND MVP PROJECT 5

Q. IN THIS PROCEEDING, ITC MIDWEST PROVIDED ANALYSES SUPPORTING SEVERAL MULTI-VALUE PROJECTS, INCLUDING MVP PROJECT 3, MVP PROJECT 4, AND MVP PROJECT 5. HOW DO THESE MVPS RELATE TO THE PROJECT?

A. The Project is the name given to the ITC Midwest-owned portions of MVP Project 3. These portions are located in southwest Minnesota and northwest Iowa. The remaining segments of MVP Project 3 in Iowa will be constructed and owned by MidAmerican Energy Company ("MidAm"). The segments comprising MVP Project 3 meet certain needs individually and collectively in Minnesota and Iowa.

MVP Project 4 is closely related to MVP Project 3 and continues the 345 kV buildout into eastern Iowa. MVP Project 5 and MVP Project 7 complete the 345 kV buildout in eastern Iowa by connecting east to facilities in Madison, Wisconsin and south to Missouri. **Figure 1** below shows these MVP projects:

Figure 1: Regional 345 kV System With MVP Designations



Q. WHEN DETERMINING THE NEED FOR THE 345 KV FACILITIES PROPOSED IN MINNESOTA, SHOULD THE MINNESOTA PUBLIC UTILITIES COMMISSION ("COMMISSION") BE EVALUATING ALL OF MVP PROJECT 3 OR JUST THE PROJECT?

A. To evaluate the need for the Project, the Commission should consider the Project separately, as a necessary part of MVP Project 3 and part of the MVP Portfolio of 17 projects. The states of Minnesota and Iowa must ultimately evaluate MVP Project 3 from Lakefield Junction throughout southwest Minnesota and northwest Iowa. The segment of MVP Project 3 that ITC Midwest proposes to construct and own, the Project, by itself is needed to address constraints in southwest Minnesota and to provide transfer capability. The collective MVP Project 3 segments provide additional benefits to Minnesota and address additional needs in Iowa. The need for and benefits of the Project must be evaluated in the context of MVP Project 3 and the entire MVP Portfolio.

Q. HOW SHOULD MVP PROJECT 4 AND MVP PROJECT 5 BE CONSIDERED?

A. The analyses provided demonstrate that MVP Project 3 is needed and provides certain transfer capability and congestion relief that is further enhanced with the addition of MVP Project 4 and MVP Project 5. MVP Project 4, in particular, is closely linked with MVP Project 3 and builds upon its benefits. However, regardless of whether MVP Project 4 or MVP Project 5 is constructed, MVP Project 3 meets demonstrated needs in Minnesota, Iowa, and the region.

Q. BOTH MR. HEINEN AND DR. RAKOW RAISE QUESTIONS REGARDING THE RELIABILITY BENEFITS OF MVP PROJECT 3. WHAT IS YOUR OVERALL RESPONSE?

A. I believe their testimony does not fully recognize the reliability needs in Minnesota and fails to take into account any of the reliability benefits that MVP Project 3 alone and, in conjunction with MVP Project 4 and the rest of the MVP Portfolio, have outside the state of Minnesota. MVP Project 3 creates 345 kV ties within and between Minnesota and Iowa. To view MVP Project 3 solely on how it impacts southwest Minnesota is an incomplete analysis.

Q. DO YOU AGREE WITH DR. RAKOW'S ASSESSMENT ON PAGE 5 OF HIS DIRECT TESTIMONY OF THE NEEDS TO BE ADDRESSED BY MVP PROJECT 3?

A. No. Dr. Rakow summarizes a part of the Certificate of Need executive summary, but focuses on Minnesota-specific benefits. Dr. Rakow identifies the three main needs as follows:

- Increase generation outlet in southern Minnesota and northern Iowa to allow both existing and new generation to be exported from the Buffalo Ridge area;
- Eliminate the need for operating procedure known as special protection system ("SPSs"); and
- Decrease the cost of energy in Minnesota.

Dr. Rakow does not include additional information from the need chapter of the Certificate of Need Application or in my MVP Project 3 Planning Study. The Certificate of Need Application further states the needs of MVP Project 3 includes the removal of regional transmission system constraints throughout the MISO footprint and additionally the project significantly increases the transmission system's ability to reliably transfer generation, specifically including wind generation, throughout the MISO footprint. I also testified regarding the operational benefits MVP Project 3 provides in southwest Minnesota. Further, other studies provided by ITC Midwest witness Dr. Todd Schatzki of Analysis Group similarly provide information about regional benefits, including production cost savings, that Dr. Rakow does not reference here.

Q. SUMMARIZE THE NEEDS MVP PROJECT 3 ADDRESSES IN MINNESOTA AND IOWA.

A. MVP Project 3 addresses multiple reliability and efficiency needs in Minnesota:

- Improves reliability by enabling the reliable transmission of existing and future wind generated energy in southwest Minnesota and northwest Iowa necessary to meet renewable energy standard ("RES") requirements throughout the MISO Midwest footprint;
- Improves reliability in southwest Minnesota by relieving heavy loading of the existing 161 kV system in southern Minnesota, including the Fox Lake – Rutland – Winnebago Junction 161 kV line;

- Improves transmission system efficiency by reducing system losses;
- Reduces production costs by relieving constraints on the system in Minnesota and Iowa that lead to congestion;
- Enhances the reliability of the regional bulk transmission system by creating a new 345 kV transmission tie between Minnesota and Iowa. Wind generation adds to the operational variability and uncertainty inherent in all power systems. This reliability concern is significantly reduced with a robust grid which allows the benefits of diversity to be realized (geographic, resource, load); and
- Is expected to eliminate two SPSs (Fieldon Capacitor Bypass and Nobles County-Wilmarth) that are necessary to prevent overloading of the Fox Lake – Rutland – Winnebago Junction 161 kV line in the case of critical contingencies.

Q. ARE THERE ADDITIONAL OPERATIONAL BENEFITS THAT THE PROJECT BY ITSELF PROVIDES?

A. Yes. The Project will enhance operational flexibility with respect to maintenance outages for other transmission lines by providing an additional transmission connection between the Lakefield Junction and Huntley substations.

Q. YOU NOTED THERE ARE ADDITIONAL RELIABILITY NEEDS IN IOWA. WHAT ARE THOSE NEEDS?

A. The state of Iowa has similar needs as the state of Minnesota. Sixteen Category B and 14 Category C transmission constraints exist in Iowa that create bottlenecks and congestion on the transmission system which limits the amount of energy, including wind energy, which can be transferred into, within and out of the State. These constraints also cause existing renewable generation connected to the transmission system to be curtailed which limits the amount of low cost wind energy that can enter the MISO energy market.

Q. WITH RESPECT TO SPSS, MR. HEINEN NOTES THAT THEY ARE LISTED AS "INACTIVE" IN CERTAIN MTEP13 STUDIES. WHAT DOES THIS MEAN?

A. MISO's MTEP13 study indicated that the SPSs were not required to be activated to relieve the loading on the Fox Lake – Rutland – Winnebago Junction 161 kV transmission line and maintain system reliability. However, the results of the study did not provide justification for the retirement of the SPSs due to the fact that loading on the Fox Lake – Rutland – Winnebago Junction transmission line was still significantly high. The Project is expected to reduce the loading of the Fox Lake – Rutland – Winnebago Junction transmission line and enable the retirement of the SPSs which would enhance reliability in southwest Minnesota.

Q. THERE ARE ALSO BROADER RELIABILITY NEEDS IN THE MISO REGION. WHAT ARE THOSE NEEDS?

A. As detailed in MTEP11 and in the direct testimony of MISO witness Mr. Chatterjee, MVP Project 3 is part of a portfolio of projects needed to reliably and cost effectively integrate the renewable generation that will be needed in the coming years to meet RES requirements throughout the MISO footprint. There is no disagreement that the Buffalo Ridge is a premier wind resource region, that the wind generation development in this area will continue to support these RES requirements and that additional transmission is needed to enable the wind energy to be able to be transferred within Minnesota and to the surrounding states.

III. SUPERIORITY OF MVP PROJECT 3 COMPARED TO 161 kV REBUILD ALTERNATIVE

Q. DR. RAKOW ADVOCATES FOR THE 161 KV REBUILD ALTERNATIVE IN THE EVENT ITC MIDWEST DOES NOT AGREE TO A COST CAP. (RAKOW DIRECT TESTIMONY PP. 44 – 45.) IS THE 161 KV REBUILD ALTERNATIVE A REASONABLE ALTERNATIVE TO THE PROJECT AND THE OTHER SEGMENTS OF MVP PROJECT 3?

A. No. As stated in the Certificate of Need Application, p. 83, the 161 kV Rebuild Alternative benefits are entirely local: "While the 161 kV Rebuild Alternative could potentially resolve local overloading problems on the 161 kV system in southwest Minnesota, it provides little in the way of regional reliability benefits." In contrast, the Project and the rest of MVP

Project 3 meet local and regional reliability needs and provides local and regional economic benefits as detailed by Dr. Schatzki.

Q. ARE THERE GENERAL ENGINEERING PRINCIPLES THAT LEAD YOU TO THE CONCLUSION THAT A 345 KV VOLTAGE SOLUTION IS REQUIRED TO ADDRESS THE NEEDS IN SOUTHWEST MINNESOTA AND SURROUNDING STATES?

A. Yes. Given the significant amount of wind generated energy already connected in southwest Minnesota and northern Iowa and the expected new additions, the 345 kV class is the standard voltage. In general, lower voltage facilities cannot, as a practical matter, move large amounts of power across long distances. Regional transfers occur primarily on the higher voltage systems (345 kV and above) and rely on the lower voltage transmission system as contingency support. The MVP study evaluated a portfolio solution that could reliably integrate about 25 GW of renewable energy. The MISO and the MISO engineering community agreed a 345 kV system was the proper voltage for the objectives and the needs of the study.

Q. IN THE CONTEXT OF THE ENTIRE MVP PORTFOLIO ARE THERE DIFFERENCES IN HOW MUCH WIND ENERGY THE PROJECT AND 161 KV REBUILD ALTERNATIVE SUPPORT?

A. Yes. In my MVP Project 3 Planning Study, I evaluated these alternatives using an MRO 2011 series 2017 case and determined using an First Contingency Incremental Transfer Capability ("FCITC") analysis, how

much transfer capability the system would have under certain future generation assumptions. I then added megawatts of generation to the system to determine how much could be transferred before hitting a constraint of a system element. The MRO 2017 base cases in my MVP Project 3 Planning Study included MVP Project 1, Big Stone – Brookings Project, MVP Project 2, the Brookings County – Hampton Project, MVP Project 6, Ellendale – Big Stone Project, and MVP Project 13, the Michigan Thumb Loop Expansion.

As described in the testimony and exhibits of Dr. Schatzki, for purposes of the PROMOD analysis, the entire MVP Portfolio was assessed to determine how the performance would differ if certain projects, *i.e.*, MVP Project 3, Project 4, and Project 5 were removed.

The PROMOD analysis considered, as an input, calculations of how much prospective wind would have to be curtailed under certain scenarios, assuming the removal of various projects within the MVP Portfolio. Specifically, ITC Midwest started with a base case of all 17 MVPs, which, as described in MISO witness Mr. Digaunto Chatterjee's direct testimony, would require no curtailment of the prospective wind identified by MISO in their analysis of the MVP Portfolio. (Chatterjee direct testimony, p. 34.) As described in Dr. Schatzki's testimony and exhibits, ITC Midwest then analyzed how much prospective wind would need to be curtailed under multiple scenarios: 1) if MVP Project 3 and Project 4 were removed from

the portfolio; 2) if MVP Project 3 and Project 4 were removed and the 161 kV Rebuild Alternative were added; and 3) if MVP Project 4 were removed. All of these scenarios were also evaluated assuming MVP Project 5 was not constructed.

Q. WHAT WERE THE RESULTS OF THIS CURTAILMENT ANALYSIS?

A. The results are summarized in Table A3 of the Analysis Group November 2013 study attached to Dr. Schatzki's rebuttal testimony as Corrected Schedule 2[1]. The Table A3 curtailment results are shown as **Figure 2** below:

Figure 2: Wind Curtailment, by Case

Description	Wind Curtailment (MW)
With MVP 5 in Service	
MVP 3 and 4 In Service (Study Case 1)	0
MVP 3 In Service, MVP 4 Not in Service (Study Case 2)	689
161 kV Rebuild, MVP 4 Not In Service (Study Case 3)	872
MVP 3 & 4 Not In Service (Base Case)	1,130
With MVP 5 Not in Service	
MVP 3 and 4 In Service, MVP 5 Not In Service (Study Case 4)	2,779
MVP 3 In Service, MVP 4 & 5 Not in Service (Study Case 5)	2,958
161 kV Rebuild, MVP 4 & 5 Not In Service (Study Case 6)	3,562
MVP 3, 4 & 5 Not In Service (Base Case)	3,644

[1] Dr. Schatzki's rebuttal testimony provides a corrected Schedule 2 because this table was not included due to a PDF conversion error.

These curtailment numbers are based on the same generation assumptions used by MISO for the analysis of the entire MVP Portfolio. These modeling assumptions included prospective wind capacity at specific locations.

Q. THE LIST OF CONDITIONS STUDIED FOR THE PROMOD ANALYSIS DOES NOT INCLUDE A SCENARIO WHERE MVP PROJECT 4 AND THE 161 KV REBUILD ALTERNATIVE ARE IN SERVICE, BUT NOT MVP PROJECT 3. WHY NOT?

A. The individual segments of MVP Project 3 and Project 4 provide local benefits, but their efficacy on a regional basis is highly dependent on each other. The MVP Portfolio was designed, in significant part, to move generation from western Minnesota and Iowa to the east. MVP Project 3 and Project 4 are closely related and were jointly evaluated and considered in the MVP Portfolio analysis. MVP Project 3 connects Minnesota and northwestern Iowa. MVP Project 4 continues the west-east path, connecting MVP Project 3 to eastern Iowa. The PROMOD analyses were intended to look at the entire portfolio and evaluate the regional benefits of MVP Project 3 within that portfolio.

When looking at the regional benefit in the context of the entire portfolio and its objective of moving power from west to east, it was reasonable to assume that MVP Project 3 would be built without MVP Project 4 because it connects the generation in the two states, thereby meeting the goal of moving power to the east. However, in our judgment, it was not reasonable to assume that the portfolio would include MVP Project 4

without the MVP Project 3 connections but with the 161 kV Rebuild Alternative because the 161 kV Rebuild Alternative would be located entirely in Minnesota and would not provide the same west-east transfer in Minnesota and Iowa that the MVP 3 Project provides. Without the Minnesota-Iowa connection, the need for further transfer capability from western Iowa to eastern Iowa is diminished.

Q. WHAT DO THESE CURTAILMENT CALCULATIONS REVEAL ABOUT THE PERFORMANCE OF THE ALTERNATIVES?

A. The curtailment calculations demonstrate that MVP Project 3 has superior performance compared to the other alternatives with respect to enabling wind energy that is generated to be transferred across the transmission system.

Q. PLEASE EXPLAIN.

A. Whether you assume MVP Project 5 is in service or not, MVP Project 3 by itself, and in combination with MVP Project 4, enables more wind energy than the 161 kV Rebuild Alternative. Using MISO's curtailment analysis and taking the case with MVP Project 3 and Project 4 removed, for example, would require about 1,130 MW of the perspective wind identified by MISO to be curtailed. If the 161 kV Rebuild Alternative were constructed instead of MVP Project 3 and MVP Project 4, about 872 MW of prospective wind would still need to be curtailed, showing that the 161 kV Rebuild Alternative would avoid the curtailment of only about 258 MW of

wind whereas MVP Project 3 and MVP Project 4 avoid the curtailment of about 1,130 MW of prospective wind.

Q. CAN YOU DISCUSS ANY OTHER TYPE OF FACTORS THAT ENGINEERS WOULD CONSIDER WHEN CONCLUDING A 345 KV SYSTEM WAS WARRANTED FOR THE MVPS?

A. Yes, engineers often refer to the St. Clair curve as representing the practical limits of the movement of power with certain classes of voltage. The curve plots transmission line capability, in terms of surge impedance loading, versus the length of a proposed line.

Q. WHAT IS THE SURGE IMPEDANCE LOADING?

A. A transmission line, when energized with no power transmitted across the line, will generate reactive power, measured in vars. Conversely, when a transmission line is transmitting power, reactive power is consumed by the transmission line. The surge impedance loading is the amount of power that can be carried on a transmission line at the point when the reactive power consumed by the transmission line is equal to reactive power generated by the transmission line.

Q. IS THE SURGE IMPEDANCE LOADING FOR EACH TRANSMISSION LINE DIFFERENT?

A. Yes, the size of the conductor and configuration of the towers including the spacing of the conductors for any given transmission line affects the

surge impedance loading, but in general the voltage level of a transmission line dictates the scale of the surge impedance loading. For example, the surge impedance loading for a 161 kV transmission lines is around 75 MW and for a 345 kV lines is 390 MW. Looked at another way, the surge impedance loading for a 345 kV line is over five times greater than that of a 161 kV line.

Q. CAN YOU DESCRIBE THE SIGNIFICANCE OF THE SURGE IMPEDANCE LOADING TO THE ST. CLAIR CURVE?

A. The St. Clair curve provides practical limits to the amount of power carried by different voltages based upon the length of the circuit. For example, the curve can be interpreted as allowing a line loading of three times the surge impedance loading for a 50-mile transmission line, while only allowing a loading of up to one times the surge impedance loading for a 300-mile transmission line.

Q. IS THE ST. CLAIR CURVE AN ABSOLUTE LIMIT TO LINE DESIGN?

A. No, it is a consideration that is taken into account and provides guidance to engineers. It is not relevant for the installation of short transmission lines. Also, the specific transmission network on each end of a transmission line including any series compensation would affect the actual limits and surge impedance loading.

Q. THEN WHY WOULD THE ST. CLAIR CURVE BE A CONSIDERATION THE MVP DEVELOPMENT?

A. As I noted, about 25 GW of renewable generation was studied as part of MVP Portfolio study work. It was the consensus of MISO and the MISO engineering community that, given the limits of design for each voltage class, 345 kV lines provide the appropriate voltage level to move the energy currently anticipated to be developed effectively, reliably, and efficiently.

Q. CAN THE MVP PORTFOLIO BE OPTIMIZED BY REMOVING CERTAIN 345 KV LINE SEGMENTS WITH 161 KV SEGMENTS?

A. No. While generally each segment of an MVP project provides value and it is likely that a lower voltage solution could be identified for each segment if the segment was evaluated in isolation of regional benefits, the benefits of the MVP Portfolio would be lost. While each segment would likely capture some of the localized benefits which were provided by the MVP segment, the portfolio would no longer function as a robust 345 kV overlay and the regional benefits envisioned would be diminished, as the amount of power that could be efficiently or reliably transferred across and within the MISO regions would likely be reduced.

Q. DR. RAKOW ALSO NOTES THAT THE COST ESTIMATE FOR THE 161 KV REBUILD ALTERNATIVE DOES NOT HAVE A +/- PERCENT BAND FOR THE COST ESTIMATE OF $52 MILLION. WHY IS THERE NO RANGE PROVIDED FOR THIS ALTERNATIVE?

A. The estimate I developed for the 161 kV Rebuild Alternative was a screening level planning estimate prepared for my engineering study. The alternative was deemed not to satisfy the needs identified and therefore a detailed cost estimate was not developed.

Q. DOES THE LACK OF A COST BAND MEAN THE ESTIMATE IS INTENDED TO BE A FIXED, PRECISE NUMBER?

A. No. As I noted, this is a planning estimate. Such estimates are typically understood to have a range of +/- 50 percent.

Q. YOU HAVE IDENTIFIED MULTIPLE NEEDS THAT MVP PROJECT 3 ADDRESSES. HOW DOES THE PERFORMANCE OF MVP 3 COMPARE TO THE 161 KV REBUILD ALTERNATIVE?

A. MVP Project 3, at the 345 kV voltage, provides superior performance on multiple engineering measures:

- MVP Project 3 is more effective at alleviating/eliminating existing thermal violations on the transmission system without creating an unacceptable level of new violations. See Certificate of Need Application, pp. 79 and 87; MVP Project 3 Planning Study, p. 10.

- MVP Project 3 provides more transfer capability in nearly every scenario studied, assuming certain MVP facilities in place, as Dr. Rakow notes in his testimony, p. 41. See also, Certificate of Need Application, pp. 79-82.
- MVP Project 3 provides operational benefits, allowing flexibility in taking system outages. The 161 kV Rebuild Alternative does not add a new transmission line and, therefore, does not provide the operational benefits of the Project.
- MVP Project 3 enables more wind in the context of post MVP buildout. See Table A3 above.
- MVP Project 3 enables more flexibility in large scale wind development. In contrast, the 161 kV Rebuild Alternative is vulnerable to being "used up" depending on how generation develops in the area. As I noted in the Certificate of Need Application, the addition of only 500 MW of wind or other generation to the 161 kV Alternative would consume all the capacity of the upgraded line.
- MVP Project 3 provides regional transfer capability. The transfer capacity of the 161 kV Rebuild Alternative alone and in combination with MVP Project 4 is virtually identical, thereby reinforcing that the capacity benefits of the 161 kV Rebuild Alternative are limited to the 161 kV system in southern Minnesota and are local rather than regional in nature. The data supporting this conclusion is provided

in my study, MVP Project 3 Planning Study, Certificate of Need Application, Appendix J, p. 17.

- MVP Project 3's reduction of line losses and corresponding reduction of emissions from the reduced generation resulting from the reduced line losses is more than double the line loss/emissions reduction of the 161 kV Rebuild Alternative. This is shown on pages 19 through 21 of the MVP Project 3 Planning Study.

Q. YOU NOTED THAT MVP PROJECT 3 PROVIDES MORE TRANSFER CAPABILITY UNDER NEARLY EVERY SCENARIO. IS THERE ONE SCENARIO WHERE THERE IS A GREATER DIFFERENCE?

A. Yes. In the summer shoulder cases, with delivery to Minnesota or MISO east, MVP Project 3 alone and in conjunction with MVP Project 4, provides substantially more transfer capability as shown in Figure 20 and Figure 22 from the Certificate of Need Application and reproduced below as **Figure 3** and **Figure 4**.

Figure 3: Incremental Transfer Capability of Transmission Options Minnesota Shoulder Case

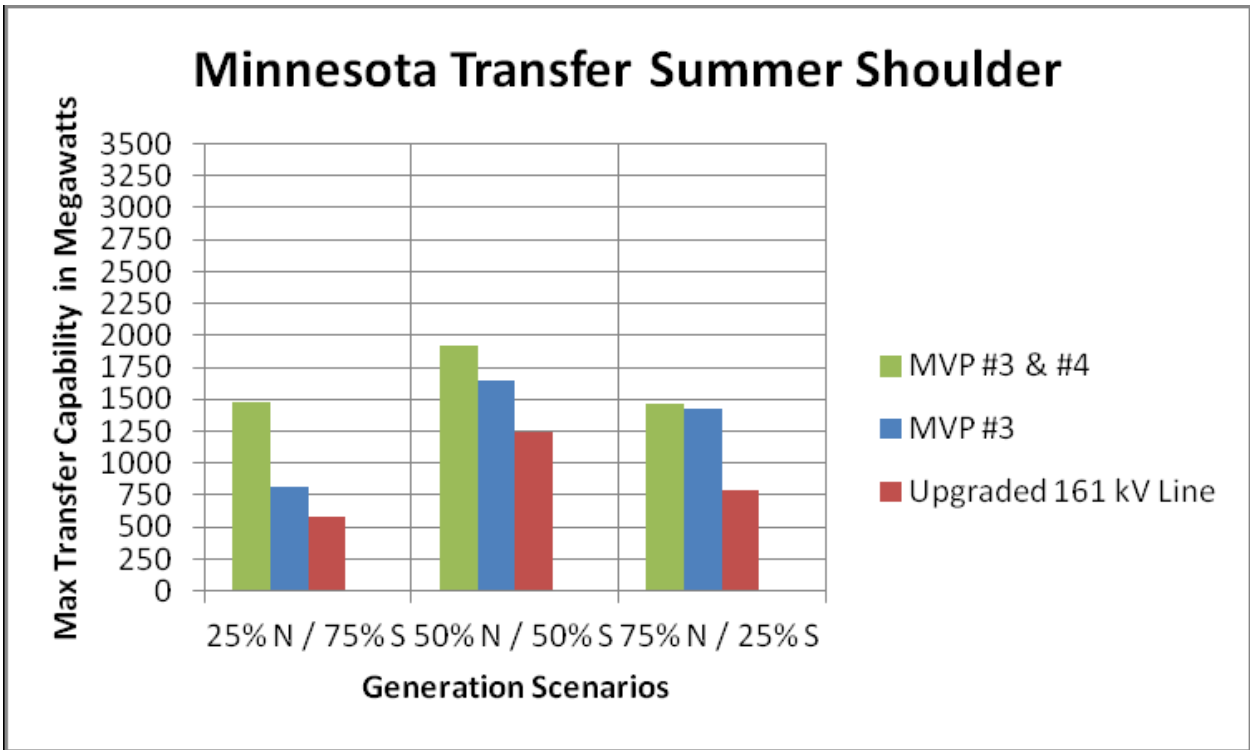
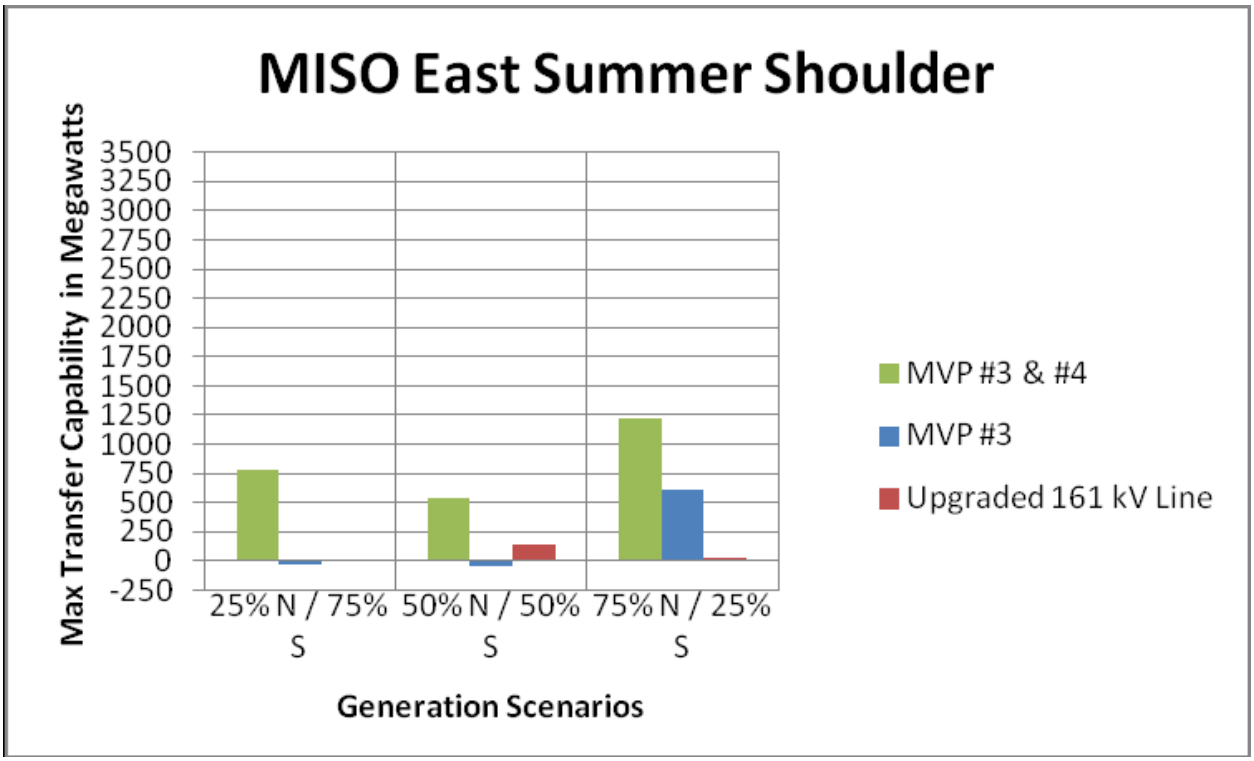


Figure 4: Incremental Transfer Capability of Transmission Options MISO East Summer Shoulder



Q. WHEN YOU PLAN THE SYSTEM, IS IT IMPORTANT TO DEVELOP A SYSTEM THAT CAN ACCOMMODATE MULTIPLE SCENARIOS?

A. Yes. With the uncertainty of future, we need to plan the system for multiple scenarios to provide the flexibility needed to support the expected addition of generation throughout southwest Minnesota.

Q. DR. RAKOW NOTES THAT ITC MIDWEST DOES NOT DISCUSS THE EFFECT OF THE 161 KV REBUILD ALTERNATIVE ON SPSS IN SOUTHWEST MINNESOTA. (RAKOW DIRECT TESTIMONY P. 43.) WOULD THE SPSS BE RETIRED IF THE 161 KV REBUILD ALTERNATIVE WERE SELECTED?

A. Based on my analyses and understanding of the electrical system in this area, I would expect that the 161 kV Rebuild Alternative would provide sufficient system support to enable the SPSs to be retired. However, that decision is ultimately MISO's.

Q. IN ADDITION TO THESE DIFFERENCES IN PERFORMANCE BASED ON TODAY'S SYSTEM TOPOLOGY AND NEEDS, ARE THERE OTHER FACTORS SUPPORTING A 345 KV LINE?

A. Yes. MVP Project 3 is part of a robust 345 kV bulk "highway" system designed to transmit significant amounts of generation throughout the MISO region. Like the interstate highway system, it is essential that all parts of the system be constructed with similar capability and that weaknesses are not created in the system that will prevent future growth and stability. Given the tremendous growth in wind generation resources in southwest Minnesota and northwest Iowa and the trend toward increased reliance on renewable energy, a 345 kV connection between Lakefield Junction Substation and Iowa is essential to supporting the long-term ability of the transmission system to reliably integrate wind generated resources in southwest Minnesota and Iowa.

IV. LAKEFIELD – RUTLAND 345 KV ALTERNATIVE

Q. IN THE CERTIFICATE OF NEED APPLICATION, ITC MIDWEST DESCRIBES HOW PLANNING ENGINEERS HAVE BEEN EVALUATING CONSTRAINTS IN SOUTHWEST MINNESOTA FOR A NUMBER OF YEARS. ONE OF THE ALTERNATIVES CONSIDERED IN THE MTEP09 WAS THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE. PLEASE GENERALLY DESCRIBE HOW THIS ALTERNATIVE FITS INTO THE EXISTING TRANSMISSION SYSTEM.

A. The Lakefield – Rutland 345 kV Alternative creates a "radial" 345 kV line from Lakefield Junction Substation to the 161 kV Rutland Substation – *i.e.,* a line that does not connect to the 345 kV network on both ends.

Q. DOES DR. RAKOW SUGGEST THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE PROJECT WOULD SOLVE ALL THE NEEDS SOLVED BY MVP PROJECT 3?

A. No. Dr. Rakow suggests the Lakefield – Rutland 345 kV Alternative is an effective alternative for relieving the Fox Lake-Rutland 161 kV flowgate but further states that "ITCM did not specify which claimed need would not be addressed by the Lakefield Junction-Rutland 345 kV alternative." p. 16.

Q. DOES MVP PROJECT 3 ADDRESS NEEDS THAT THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE WOULD NOT RESOLVE?

A. Yes. The Lakefield – Rutland 345 kV Alternative was proposed as a solution to a specific transmission congestion point and a MISO market

issue, the Fox Lake-Rutland flowgate. In contrast, MVP Project 3 is part of a solution to provide a robust backbone transmission system, which among other things, alleviates this same constraint and enables the implementation of state-initiated renewable portfolio standards throughout the MISO states. The design of the MVP Portfolio reduces congestion, increases reliability, and provide reduced energy costs across and amongst the MISO footprint. A robust regional 345 kV system also provides the ability to reliably operate the system with the flexibility required to accommodate coal-fired generation retirements and replacement of that generation with other resources.

Q. DOES DR. RAKOW CONCLUDE THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE MAY BE AN APPROPRIATE ALTERNATIVE TO MVP PROJECT 3 OR THE PROJECT?

A. It appears Dr. Rakow is not satisfied by the reasons the Lakefield – Rutland 345 kV Alternative was screened from consideration. Dr. Rakow's review of studies completed before MTEP11 (which approved the MVP Portfolio) leads Dr. Rakow to conclude that further data is required to show that the Lakefield – Rutland 345 kV Alternative cannot meet the identified needs that MVP Project meets.

Q. WHY WOULD THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE BE INCOMPATIBLE AS PART OF THE MVP PORTFOLIO?

A. In general, the MVP Portfolio is intended to strengthen the backbone transmission system to provide flexibility in siting of renewable sources and allows the efficient movement of power within and amongst the MISO footprint. The very nature of the study scope dictates a transmission voltage and connection that allow this flexibility and efficiency. As part of MISO's MVP analysis, several wind zones were identified as probable locations for wind energy development. In the upper Midwest, wind zone locations were also vetted by the Upper Midwest Transmission Development Initiative ("UMTDI"), a collaboration of five states, Iowa, Minnesota, North Dakota, South Dakota, and Wisconsin. One of the goals of the MVP studies was to provide the transmission that would enable these wind zones to develop and move power between the regions.

The Lakefield – Rutland 345 kV Alternative may be effective as solving some localized system needs, but it does not address Iowa constraints and is incompatible with the objectives of the MVP Portfolio study. Dr. Rakow does not consider the regional needs and how MVP Project 3 fits into the regional plan developed as part of a portfolio of bulk 345 kV transmission lines.

Q. IS IT APPROPRIATE TO TAKE STUDY RESULTS FROM THE MTEP09 REPORT ABOUT THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE AND CONCLUDE THAT THE ALTERNATIVE WOULD PERFORM SIMILARLY UNDER CURRENT PRESUMED CONDITIONS?

A. No. The generation assumptions in MTEP09 were significantly different than those in my study and also in MTEP11 which designated the entire MVP Portfolio. In MTEP09, the Lakefield – Rutland 345 kV Alternative was identified as a potential economic project intended to relieve the Fox Lake – Rutland constraint based on existing and planned generation additions anticipated at the time. These assumed generation levels did not account for the amount of renewable generation that will need to be installed in the MISO footprint to meet RES obligations. In MTEP11, MISO undertook a more robust analysis to identify a portfolio of transmission facilities necessary to reliably interconnect and transfer renewable resources throughout the MISO footprint.

Q. WHAT SPECIFIC CONCLUSIONS DID THE MTEP09 REACH REGARDING THIS ALTERNATIVE?

A. MISO listed the alternative in Appendix C, indicating it requires additional study. Dr. Rakow correctly notes that MISO erroneously states in parts of the report that it should be considered for Appendix B treatment, those projects with documented need and effectiveness. The complete paragraph of the excerpt Dr. Rakow includes in his testimony confirms that the

technical review group did not reach any final conclusions about this alternative:

> One concern raised by the TRG was the potential overload of the Rutland - Winnebago 161 kV line with the 345 kV upgrade ending at the Rutland substation. Additional economic sensitivity analysis was performed with the Rutland - Winnebago 161 kV included in the list of monitored elements. The economic benefit results are provided in Table 8.3-11. Compared to the original case the total benefits go down slightly as expected; however, the project still exceed the 2.0 B/C ratio threshold and is qualified for Appendix B consideration. <u>Additional sensitivities are required to determine what effects this plan has on the surrounding system's low voltage line flows. Those sensitivities along with reliability analysis must be performed prior to Appendix A recommendation.</u>[2]

We included this discussion in responses to discovery from the DOC-DER, **Schedule 8**.

[2] Dr. Rakow's testimony does not include the underlined portion of the excerpt.

Q. IN LIGHT OF DR. RAKOW'S DIRECT TESTIMONY, DID YOU CONDUCT FURTHER ENGINEERING ANALYSIS TO DEMONSTRATE THAT THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE WAS APPROPRIATELY SCREENED FROM FURTHER ANALYSIS BY ITC MIDWEST?

A. Yes. I used the same modeling and generation assumptions as I did in my MVP Project 3 Planning Study and ran a transfer analysis to determine the transfer capability of the Lakefield – Rutland 345 kV Alternative compared to the 161 kV Rebuild Alternative, MVP Project 3 and the combination of MVP Project 3 and MVP Project 4.

Q. DESCRIBE THE RESULTS OF YOUR STUDY.

A. Under every scenario studied, the Lakefield – Rutland 345 kV transmission line causes the overload of the Rutland – Winnebago Junction 161 kV line. As a result, the Lakefield – Rutland 345 kV Alternative results in the least amount of new transfer capability. In fact, under summer peak conditions, the Lakefield – Rutland 345 kV Alternative would reduce transfer capability below current levels. A table summarizing the transfer capability analysis is provided as **Figure 5** below:

1 **Figure 5: Maximum Gross Transfer Capability**

Lakefield - Rutland 345 kV Alternative

	Base Case		Lakefield – Rutland 345 kV*		MVP 3		MVP 3 and MVP 4	
Minnesota Transfer	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**
Buffalo Ridge-25% N/75% S	2513.9	445.7	1781.9	-322.5**	3323.2	2909.0	3997.9	3321.6
Buffalo Ridge-50% N/50% S	2603.8	438.9	1836.7	-314.2**	4244.5	3351.4	4523.6	3756.8
Buffalo Ridge-75% N/25% S	2697.3	432.4	1894.9	-306.4**	4129.5	2892.1	4161.5	2931.2
MISO East Transfer								
Buffalo Ridge-25% N/75% S	2201.0	436.7	1962.1	-327.5**	2176.0	2005.4	2974.7	2179.0
Buffalo Ridge-50% N/50% S	2575.9	430.2	1975.4	-319.5**	2386.9	2184.0	2977.1	2366.1
Buffalo Ridge-75% N/25% S	2038.3	424.0	1928.2	-311.8**	2645.9	2397.1	3266.3	2600.8

* All of the results are from a DC FCITC.
** A negative FCITC indicates that an element is overloaded due to a contingency before a transfer starts.

2
3
4 **Q. HOW WOULD THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE PERFORM IF**
5 **THE 161 KV REBUILD ALTERNATIVE WERE ALSO CONSTRUCTED TO MITIGATE**
6 **THE RUTLAND – WINNEBAGO 161 KV OVERLOAD?**
7 A. The transfer capability would increase less than the 161 kV Rebuild
8 Alternative alone under the scenario studies, as shown in **Figure 6** below.
9 In other words, the Lakefield – Rutland 345 kV Alternative provides less
10 benefit than the 161 kV Rebuild Alternative alone.
11

Figure 6: Maximum Gross Transfer Capability

Lakefield – Rutland 345 kV and 161 kV Rebuild

	Lakefield – Rutland 345 kV*		Lakefield – Rutland 345 kV and Rutland – Winnebago Jct. Rebuild*		161 kV Rebuild Alternative	
Minnesota Transfer	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**
Buffalo Ridge-25% N/75% S	1781.9	-322.5**	3015.1	2138.8	3087.6	2559.4
Buffalo Ridge-50% N/50% S	1836.7	-314.2**	3821.7	2449.7	3841.5	3224.7
Buffalo Ridge-75% N/25% S	1894.9	-306.4**	3323.5	2029.5	3490.1	2827.1
MISO East Transfer						
Buffalo Ridge-25% N/75% S	1962.1	-327.5**	2583.6	1775.6	2201.3	1842.6
Buffalo Ridge-50% N/50% S	1975.4	-319.5**	3038.7	1902.3	2576.8	1974.3
Buffalo Ridge-75% N/25% S	1928.2	-311.8**	2778.1	1905.7	2067.5	2034.8

Q. DO YOU BELIEVE ANY FURTHER INVESTIGATION OF THE LAKEFIELD – RUTLAND 345 KV ALTERNATIVE IS WARRANTED?

A. No. Its performance is clearly inferior to MVP Project 3 and the 161 kV Rebuild Alternative. No further analysis is justified.

V. CONCLUSION

Q. DO YOU CONTINUE TO RECOMMEND THAT THE COMMISSION GRANT A CERTIFICATE OF NEED FOR THE PROJECT?

A. Yes. The Project alone and in connection with MVP Project 4 and the rest of the MVP Portfolio addresses multiple local and regional needs.

Q. DOES THIS COMPLETE YOUR REBUTTAL TESTIMONY?

A. Yes.

6107029

ITC Midwest LLC
Lakefield – Rutland 345 kV Transmission Line
Planning Study

April 10, 2014

Performed and Submitted by
Joseph Berry

1. Executive Study

This study was performed to determine if a Lakefield – Rutland 345 kV transmission line would be a reasonale alternative to the proposed facilities in ITC Midwest's Certificate of Need application.

2. Study Models, Input Files, and Assumption

This study was performed using the same Summer Peak and Summer Shoulder base case models, input files, and assumptions that were used in the March 22, 2013, ITC Midwest LLC's Multi-Value Project 3 Planning Study ("MVP Project 3 Planning Study").

A new set of study models were created to include a Lakefield to Rutland 345 kV transmission line. These models are listed below and were used in both the AC Contingency analysis and the FCITC analysis.

- MRO 2017 Summer Shoulder 70% Peak (LKFD_RTLD)
- MRO 2017 Summer Peak (LKFD_RTLD)

3. AC Contingency Analysis

An AC Contingency Analysis, with no transfer on the transmission system, was performed on the new study models and then compared to AC Contingency Analysis performed on the base cases from ITC Midwest's Planning Study to determine if any thermal violations were created with the addition of a Lakefield – Rutland 345 kV transmission line on the transmission system. The MRO 2017 Summer Shoulder 70% Peak AC Contingency Analysis results are provided as Appendix 1, and The MRO 2017 Summer Peak AC Contingency Analysis results are provided as Appendix 2.

a. MRO 2017 Summer Shoulder 70% Peak

The AC Contingency Analysis for the Summer Shoulder 70% Peak (LKFD_RTLD) model resulted in three new violations compared to the base case results. These violations include the Triboji 161/69 kV transformer, ADRIANM8 – RUSHMRT8 69 kV circuit, OSCELCT8 – ALLNDRF8 69 kV circuit, and the HANCOCK8 – KLEMME 8 69 kV circuit.

b. MRO 2017 Summer Peak

The Contingency Analysis for the MRO 2017 Summer Peak (LKFD_RTLD) model identified one new violation when compared to the base case results. This violation was the RUTLAND5 – WINBAGO5 161 kV circuit.

4. FCITC Analysis

An analysis of the transfer capability of the transmission system was performed for the Lakefield – Rutland 345 kV transmission line. Again this analysis was performed in the same manner that it was performed in ITC Midwest's Planning Study.

Table 1 below compares the maximum gross transfer capability of the Lakefield – Rutland 345 kV FCITC analysis with the outputs of the Base Case, MVP #3 alone, and MVP #3 and MVP #4 in combination from ITC Midwest's Planning Study.

Table 1 - Maximum Gross Transfer Capability

	Base Case		Lakefield – Rutland 345 kV*		MVP 3		MVP 3 and MVP 4	
Minnesota Transfer	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**	**Summer Shoulder**	**Summer Peak**
Buffalo Ridge-25% N/75% S	2513.9	445.7	1781.9	-322.5**	3323.2	2909.0	3997.9	3321.6
Buffalo Ridge-50% N/50% S	2603.8	438.9	1836.7	-314.2**	4244.5	3351.4	4523.6	3756.8
Buffalo Ridge-75% N/25% S	2697.3	432.4	1894.9	-306.4**	4129.5	2892.1	4161.5	2931.2
MISO East Transfer								
Buffalo Ridge-25% N/75% S	2201.0	436.7	1962.1	-327.5**	2176.0	2005.4	2974.7	2179.0
Buffalo Ridge-50% N/50% S	2575.9	430.2	1975.4	-319.5**	2386.9	2184.0	2977.1	2366.1
Buffalo Ridge-75% N/25% S	2038.3	424.0	1928.2	-311.8**	2645.9	2397.1	3266.3	2600.8

* All of the results are from a DC FCITC.
** A negative FCITC indicates that an element is overloaded due to a contingency before a transfer starts.

As Table 1 shows that the Lakefield – Rutland 345 kV transmission line project actually reduces transfer capability when compared to the base case results and does not provide any of the benefits that MVP #3 alone or in combination with MVP #4 provides in all of the scenarios studied.

The results of the FCITC analysis are shown in Appendix 3.

5. Conclusion:

This study confirms that a Lakefield – Rutland 345 kV transmission line would not be a valid alternative to the proposed facilities in ITC Midwest's Certificate of Need application. Specifically, Lakefield – Rutland 345 kV transmission line would create additional thermal overloads on the transmission system and does not create the additional outlet capacity for energy transfers. The Lakefield – Rutland 345 kV transmission line is not recommended as an alternative.

Appendix 1: SU70 AC Contingency Analysis

** From bus	** **	To bus	** CKT	SU70 Study AC Run: ContM	SU70 BC AC Run: ContM	SU70 Study AC Run: BaseFlow	SU70 BC AC Run: BaseFlow	SU70 Study AC Run: Ratin	SU70 BC AC Run: Ratin	SU70 Study AC Run: Loading %	SU70 BC AC Run: Loading %	SU70 Study AC Run: Contingency Descriptio
605639 WOLFTAP8	69.0 618923	GRE-RUSHMOR8	69.0 1	93.1	72.0	2.4	2.4	45.4	45.4	205.1	158.5	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
605639 WOLFTAP8	69.0 630110	RUSHMRT8	69.0 1	90.2	70.5	4.6	4.5	45.4	45.4	198.6	155.3	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
618923 GRE-RUSHMOR8	69.0 630674	SIBLEY	69.0 1	88.8	72.9	4.1	4.0	48.0	48.0	184.9	151.9	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630023 TRIBOJI8	69.0 630687	FLYCLD 8	69.0 1	107.0	78.4	4.1	4.1	58.0	58.0	184.6	135.2	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630023 TRIBOJI8	69.0 631102	TRIBOJI5	161 1	83.6		46.2		82.0		102.0		ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630056 MAGNLIA8	69.0 630108	ADRIANT8	69.0 1	61.3	60.1	1.9	1.9	47.0	47.0	130.5	127.9	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630057 ADRIANM8	69.0 630110	RUSHMRT8	69.0 1	75.6		4.5		69.0		109.6		ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630128 HAYWD#18	69.0 680275	T GLEN	69.0 1	92.9	93.1	22.5	22.8	70.0	70.0	132.6	133.1	ITCM-C807-TR-LN(LmCk-NIW-Haywd)
630139 ADAMS 8	69.0 680379	MCNEIL W	69.0 1	46.9	46.2	19.5	19.1	45.0	45.0	104.2	102.8	ITCM-C807-TR-LN(LmCk-NIW-Haywd)
630197 LMCK W 8	69.0 631047	LIME CK5	161 1	165.1	164.8	45.0	45.2	74.7	74.7	221.0	220.6	ITCM-C816-TR-LN(Emery-LCk-LCkTr)
630198 LMCK E 8	69.0 630208	MCNWCSS8	69.0 1	105.6	105.0	43.3	42.9	103.0	103.0	102.6	101.9	ITCM-C816-TR-LN(Emery-LCk-LCkTr)
630473 OSCELCT8	69.0 630673	ALLNDRF	69.0 1	96.3		6.5		77.0		125.1		ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630473 OSCELCT8	69.0 630687	FLYCLD 8	69.0 1	101.4	74.7	9.2	9.2	58.0	58.0	174.9	128.8	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630673 ALLNDRF	69.0 630674	SIBLEY	69.0 1	94.4	75.0	6.0	5.9	48.0	48.0	196.7	156.2	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630821 HANCOCK8	69.0 656871	KLEMME 8	69.0 1	41.1		12.3		41.0		100.1		ITCM-C918-LN-LN(Emry-Flyd-Emry-Shfd)
631036 NIW 5	161 631047	LIME CK5	161 1	225.2	225.4	38.5	40.4	200.0	200.0	112.6	112.7	ITCM-C816-TR-LN(Emery-LCk-LCkTr)
631047 LIME CK5	161 631048	EMERY 5	161 1	233.7	231.7	133.5	132.1	200.0	200.0	116.9	115.8	ITCM-B110-NW-LIMECK161_TRE
631047 LIME CK5	161 631048	EMERY 5	161 1	201.5	200.3	133.5	132.1	200.0	200.0	100.8	100.1	ITCM-C205-NW-BF(Adams_bkr_6620)
631047 LIME CK5	161 631048	EMERY 5	161 1	233.7	231.7	133.5	132.1	200.0	200.0	116.9	115.8	ITCM-C309-NW-SB(LimeCrk1_161kV)
631049 CGORDO_5	161 631103	HANCOCK5	161 1	225.3	224.3	104.3	103.4	223.0	223.0	101.0	100.6	ITCM-C918-LN-LN(Emry-Flyd-Emry-Shfd)
631174 GLENWRTH5	161 680542	GLENWTH8	69.0 1	113.8	115.1	59.1	59.4	100.0	100.0	113.8	115.1	631044 HAYWD#25 161 631174 GLENWRTH5 161 1
631174 GLENWRTH5	161 680542	GLENWTH8	69.0 1	110.1	111.4	59.1	59.4	100.0	100.0	110.1	111.4	ITCM-B109-NW-HAYWARD161_TR2
631174 GLENWRTH5	161 680542	GLENWTH8	69.0 1	110.1	111.4	59.1	59.4	100.0	100.0	110.1	111.4	ITCM-C306-NW-SB(BUSHayward2_161kV)
635001 CBLUFFS5	161 635011	INDNCRK5	161 1	371.6	371.3	142.2	142.0	371.0	371.0	100.2	100.1	MEC-C547

Appendix 2: SUM AC Contingency Analysis

**	From bus	**	**	To bus	**	CKT	SUM Study AC Run: ContM	SUM BC AC Run: ContM	SUM Study AC Run: BaseFlow	SUM BC AC Run: BaseFlow	SUM Study AC Run: Ratin	SUM BC AC Run: Ratin	SUM Study AC Run: Loading %	SUM BC AC Run: Loading %	SUM Study AC Run: Contingency Descriptio
605083	HENDRSN8	69.0	605223	KELSO SS 8	69.0	1	52.8	53.3	31.7	31.7	51.7	51.7	102.1	103.1	601050 HELENA 3 345 601072 SHEAK LK3 345 1
605089	ARLNGTN8	69.0	618723	GRE-JSNLDTP8	69.0	1	48.4	48.9	27.2	27.2	47.8	47.8	101.3	102.4	601050 HELENA 3 345 601072 SHEAK LK3 345 1
605279	BUTRFLD8	69.0	619326	GRE-SVEADTP8	69.0	1	48.5	48.0	5.0	3.2	48.0	48.0	101.1	100.0	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
605279	BUTRFLD8	69.0	630072	MT LAKE8	69.0	1	46.7	46.1	3.5	1.9	36.0	36.0	129.8	128.1	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
613370	RUTLAND5	161	631043	WINBAGO5	161	1	178.7		106.4		165.0		108.3		601004 WILMART3 345 601033 FIELD_N3 345 1
613370	RUTLAND5	161	631043	WINBAGO5	161	1	178.7		106.4		165.0		108.3		601029 LKFLDXL3 345 601032 FIELD_S3 345 1
613370	RUTLAND5	161	631043	WINBAGO5	161	1	178.7		106.4		165.0		108.3		601032 FIELD_S3 345 601033 FIELD_N3 345 1
619017	GRE-SHRDNTP8	69.0	630069	WABASSO8	69.0	1	50.9	52.4	13.1	14.2	45.4	45.4	112.1	115.3	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630023	TRIBOJI8	69.0	631102	TRIBOJI5	161	1	90.9	90.3	56.6	56.4	82.0	82.0	110.9	110.2	ITCM-C215-NW-BF(Cayler-Triboji-TribojiTR)
630023	TRIBOJI8	69.0	631102	TRIBOJI5	161	1	92.5	91.8	56.6	56.4	82.0	82.0	112.8	112.0	ITCM-C925-LN-LN(HrnL-Brew-SpRk-RkCo)
630066	HERONLK8	69.0	630163	HLK ETH8	69.0	1	98.9	98.4	24.7	26.1	69.0	69.0	143.4	142.6	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630069	WABASSO8	69.0	630111	WATERBURY8	69.0	1	45.6	46.8	8.0	9.0	45.0	45.0	101.2	104.0	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630075	WILDERJ8	69.0	630076	LAKFLDM8	69.0	1	83.7	84.6	15.1	16.1	69.0	69.0	121.4	122.5	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630075	WILDERJ8	69.0	630079	WINDMSW8	69.0	1	83.8	84.4	13.4	14.4	69.0	69.0	121.4	122.3	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630076	LAKFLDM8	69.0	630081	LKFLD698	69.0	1	83.5	84.2	19.0	20.0	82.0	82.0	101.9	102.6	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630079	WINDMSW8	69.0	630846	WILDER2J8	69.0	1	102.9	102.1	17.1	18.5	72.0	72.0	142.8	141.8	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
630163	HLK ETH8	69.0	630846	WILDER2J8	69.0	1	107.2	106.6	17.1	18.5	69.0	69.0	155.4	154.6	ITCM-C932-LN-LN(RkCo-Elk-Lkfd-HnLk)
631050	HAZLTON5	161	636200	BLKHAWK5	161	1	219.2	219.9	104.7	105.0	200.0	200.0	109.6	110.0	ITCM-C936-LN-LN(DYSART-WASH-HAZ)
631051	HAZL S 5	161	636210	WASHBRN5	161	1	202.2	202.8	77.0	77.1	196.0	196.0	103.2	103.5	ITCM-C937-LN-LN(DYT-WASH-HAZ-BLK)
631095	E CALMS5	161	631096	GR MND 5	161	1	208.1	208.8	94.7	94.9	200.0	200.0	104.0	104.4	ITCM-C921-LN-LN(RC-Salm-MNV-Tiff)
631095	E CALMS5	161	636616	SB 56 5	161	1	228.2	229.0	61.4	61.6	223.0	223.0	102.3	102.7	ITCM-C922-LN-LN(QC-RC-MrgnV-Tiff)

Appendix 3: FCITC Analysis

SU70 LKFL – RTLD Buffalo Ridge 25%N/75%S – MN Scenario

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
1781.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		27.8	165.0	0.07701
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
2147.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.05876
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
2147.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.05876
		C:601032 FIELD_S3 345 601033 FIELD_N3 345 1			
		Open 601032 FIELD_S3 345 601033 FIELD_N3 34 5 1			
3015.1	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.5	-147.0	-0.04362
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3015.3	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.5	-147.0	-0.04362
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3042.2	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.03418
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3218	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.2	212.0	0.06875
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3356	L:636001 WEBSTER5 161 636025 HAYES 5 161 1		6.1	210.0	0.06076
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3392.2	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.06528
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3392.3	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.06528
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3422.6	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.0	-201.0	-0.05523
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3438.9	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.04548
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3438.9	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.04548
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3575.2	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.05284
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3575.3	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.05284
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3992.6	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.06216
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			

SU70 LKFL – RTLD Buffalo Ridge 25%N/75%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4085.3	L:602003 BLUEETA5 161 631043 WINBAGO5 161 1		-52.5	-200.0	-0.03611
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
4179	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-60.6	206.0	0.06379
		C:ITCM-C923-LN-LN(CGrd-Hnck-Web-Leh)			
		Open 631049 CGORDO 5 161 631103 HANCOCK5 16 1 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4190.9	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.05923
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4423.7	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-1.1	-864.0	-0.19507
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4423.7	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-1.1	-864.0	-0.19507
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4577.3	L:636020 FT.DODG5 161 636023 TATELYL5 161 1		-59.8	-224.0	-0.03588
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4609.5	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:MEC-C529			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4609.5	L:635200 RAUN 3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4704.6	L:636001 WEBSTER5 161 656353 HOPE5 161 1		-11.4	208.0	0.04663
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4746.8	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.03783
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4746.8	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.03783
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4786.6	L:602002 SOUTHBE5 161 602003 BLUEETA5 161 1		-43.4	-216.3	-0.03611
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
4839.8	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.04038
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4839.8	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.04038
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 50%N/50%S – MN Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
1836.7	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		27.8	165.0	0.07471
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
2092.3	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06033
		C:601029 LKFLDXL3 345 601032 FIELD_S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
2092.3	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06033
		C:601032 FIELD_S3 345 601033 FIELD_N3 345 1			
		Open 601032 FIELD_S3 345 601033 FIELD_N3 34 5 1			
3821.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.04093
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3821.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.04093
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4154.7	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.5	-147.0	-0.03166
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4155.1	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.5	-147.0	-0.03166
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4562.4	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-0.5	-147.0	-0.03212
		C:ITCM-C923-LN-LN(CGrd-Hnck-Web-Leh)			
		Open 631049 CGORDO 5 161 631103 HANCOCK5 16 1 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4567.7	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.2	212.0	0.04843
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4582.1	L:602003 BLUEETA5 161 631043 WINBAGO5 161 1		-52.5	-200.0	-0.03220
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
4786.2	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.04627
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4786.3	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.04627
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 50%N/50%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4793.8	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.0	-201.0	-0.03943
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4931.4	L:601004 WILMART3 345 601033 FIELD N3 345 1		-216.9	-1195.1	-0.19835
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4975.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.03797
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4975.6	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.03797
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 75%N/25%S – MN Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
1894.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		27.8	165.0	0.07242
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
2039.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06189
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2039.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06189
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3323.5	L:631102 TRIBOJI5 161 631124 DKSN_CO5 161 1		-111.6	-223.0	-0.03351
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
3944.7	L:652504 BROOKNG7 115 652538 WHITE 7 115 1		-31.9	-176.0	-0.03654
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4300.4	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.03637
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4300.4	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.03637
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4590.1	L:652529 WATERTN3 345 652537 WHITE 3 345 1		95.8	-792.0	-0.19342
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4649.7	L:601004 WILMART3 345 601033 FIELD N3 345 1		-216.9	-1195.1	-0.21037
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4910	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		33.8	918.0	0.18008
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			

SU70 LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario

FCITC	Limiting Constraint	Contingency	PreShift	Ratin	TDF
1962.1	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		27.8	165.0	0.06993
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
2024.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06233
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
2024.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06233
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2138.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.04862
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2138.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.04862
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2286.6	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.06840
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2286.6	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.06840
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2403.7	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.5	-147.0	-0.05472
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
2545.1	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-256.2	-335.0	-0.03097
		C:ITCM-C207-SE-BF(OGS-Wap-OGS345-161)			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 631115 OTTUMWA5 161 631143 OTTUMWA3 34 5 1			
2967.7	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.2	212.0	0.07455
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3014.3	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05958
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3014.3	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05958
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3077.3	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.0	-201.0	-0.06143
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3108.1	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.07125
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3108.2	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		-9.4	212.0	0.07125
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3156.7	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-215.5	-335.0	-0.03786
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			

SU70 LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3189	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.05924
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3189.1	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-12.1	-201.0	-0.05924
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3318.2	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-210.1	-335.0	-0.03764
		C:ITCM-B111-SW-OGS-WAPELLO-1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 1			
3323.6	L:636001 WEBSTER5 161 636025 HAYES 5 161 1		6.1	210.0	0.06136
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3467.4	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-208.2	-335.0	-0.03658
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
3598.5	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-157.4	-320.0	-0.04518
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3621.9	L:631115 OTTUMWA5 161 631143 OTTUMWA3 345 1		-187.3	-400.0	-0.05873
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
3626.6	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-203.1	-335.0	-0.03638
		C:ITCM-B112-SW-OGS-WAPELLO-2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 2			
3650.1	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.06800
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3684	L:636020 FT.DODG5 161 636023 TATELYL5 161 1		-59.8	-224.0	-0.04458
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3740.9	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.05224
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3740.9	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.05224
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3804.1	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.06525
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
3804.2	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.06525
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
3847.6	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		61.8	178.0	0.03019
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
4270.1	L:631110 WAPELLO5 161 631111 JEFF 5 161 1		84.6	223.0	0.03242
		C:C2-HILLS-934			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Open 636400 HILLS 3 345 636630 SUB 92 3 34 5 1			
		Open 636630 SUB 92 3 345 636640 LOUISA 3 34 5 1			
		Open 636620 WALCOTT3 345 636630 SUB 92 3 34 5 1			
		Set bus 636400 HILLS 3 345 load to-50.0 MW			

SU70 LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4271.9	L:631110 WAPELLO5 161 631111 JEFF 5 161 1		84.5	223.0	0.03242
		C:C2-HILLS-924			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Open 636400 HILLS 3 345 636645 SUB T 3 34 5 1			
		Open 636640 LOUISA 3 345 636645 SUB T 3 34 5 1			
		Open 345435 7PALM TAP 345 636645 SUB T 3 34 5 1			
4297.1	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		15.5	217.0	0.04688
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4314.4	L:631110 WAPELLO5 161 631111 JEFF 5 161 1		85.3	223.0	0.03192
		C:635730 MNTZUMA3 345 636400 HILLS 3 345 1			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
4488.7	L:635200 RAUN 3 345 645451 S3451 3 345 1		16.8	956.0	0.20923
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4539.7	L:635200 RAUN 3 345 645451 S3451 3 345 1		15.6	956.0	0.20714
		C:635600 GRIMES 3 345 636010 LEHIGH 3 345 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4546.5	L:635200 RAUN 3 345 645451 S3451 3 345 1		14.8	956.0	0.20701
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4570.5	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		40.0	178.0	0.03019
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
4609.5	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:635200 RAUN 3 345 635368 SHELDON 3 345 1			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
4609.5	L:635200 RAUN 3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4609.5	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:MEC-C529			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4609.5	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		0.3	-864.0	-0.18750
		C:C2-RAUN-0150			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4854	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		0.8	165.0	0.03383
		Base Case			
4947.6	L:631143 OTTUMWA3 345 635730 MNTZUMA3 345 1		-187.4	-478.0	-0.05873
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
4951.7	L:635600 GRIMES 3 345 636010 LEHIGH 3 345 1		-137.2	-1152.0	-0.20493
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4951.7	L:635600 GRIMES 3 345 636010 LEHIGH 3 345 1		-137.2	-1152.0	-0.20493
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario

FCITC	Limiting Constraint	Contingency	PreShift	Ratin	TDF
1975.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06390
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
1975.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06390
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
1977.1	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.7	165.0	0.06390
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2449.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.06385
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2449.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.06385
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2524	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.04120
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2524	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.04120
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2869.5	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-32.4	-147.0	-0.03993
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3176	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-111.6	-223.0	-0.03506
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
3208.6	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-120.5	-223.0	-0.03196
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3208.6	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-120.5	-223.0	-0.03196
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
3252.7	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05521
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3252.7	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05521
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3299.3	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-215.5	-335.0	-0.03622
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
3375.8	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		61.8	178.0	0.03441
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
3467.7	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-210.1	-335.0	-0.03602
		C:ITCM-B111-SW-OGS-WAPELLO-1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 1			
3624	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-208.2	-335.0	-0.03499
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			

SU70 LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3790	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-203.1	-335.0	-0.03481
		C:ITCM-B112-SW-OGS-WAPELLO-2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 2			
3830.4	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-157.4	-320.0	-0.04244
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3922.1	L:631115 OTTUMWA5 161 631143 OTTUMWA3 345 1		-187.3	-400.0	-0.05423
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
3965.4	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		17.4	212.0	0.04906
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3965.4	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		17.4	212.0	0.04906
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4006.7	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-32.9	-201.0	-0.04195
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4006.7	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-32.9	-201.0	-0.04195
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4010	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		40.0	178.0	0.03441
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
4068.9	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		12.8	212.0	0.04896
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4091.3	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-29.3	-201.0	-0.04197
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4131.6	L:601043 NLAX 5 161 602026 MAYFAIR5 161 1		75.2	216.0	0.03408
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
4446.4	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.04395
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4446.4	L:635200 RAUN 3 345 635201 RAUN 5 161 2		139.6	335.0	0.04395
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4570.5	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		15.5	217.0	0.04408
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4575.8	L:631110 WAPELLO5 161 631111 JEFF 5 161 1		84.5	223.0	0.03027
		C:C2-HILLS-924			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Open 636400 HILLS 3 345 636645 SUB T 3 34 5 1			
		Open 636640 LOUISA 3 345 636645 SUB T 3 34 5 1			
		Open 345435 7PALM TAP 345 636645 SUB T 3 34 5 1			
4578.1	L:631110 WAPELLO5 161 631111 JEFF 5 161 1		84.6	223.0	0.03024
		C:C2-HILLS-934			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Open 636400 HILLS 3 345 636630 SUB 92 3 34 5 1			
		Open 636630 SUB 92 3 345 636640 LOUISA 3 34 5 1			
		Open 636620 WALCOTT3 345 636630 SUB 92 3 34 5 1			
		Set bus 636400 HILLS 3 345 load to-50.0 MW			
4741.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		0.8	165.0	0.03463
		Base Case			

SU70 LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4747.9	L:636020 FT.DODG5 161 636023 TATELYL5 161 1		-59.8	-224.0	-0.03459
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4767.1	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-145.3	-332.2	-0.03921
		C:631139 HAZLTON3 345 631144 MITCHLCO3 345 1			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
4851.6	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-151.3	-332.2	-0.03728
		C:ITCM-C939-LN-LN(HAZ-MCO-RC-SALEM)			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
		Open 631140 SALEM 3 345 631141 ROCK CK3 34 5 1			
4912.2	L:635200 RAUN 3 345 645451 S3451 3 345 1		16.8	956.0	0.19119
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4925.7	L:635200 RAUN 3 345 645451 S3451 3 345 1		176.9	956.0	0.15818
		C:1-4			
		Remove unit 4 from bus 635024 CBLUF4G 26.0799.9 MW			
		Remove unit 3 from bus 635023 CBLUF33G 24.0703.8 MW			
4936.3	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-18.2	206.0	0.04542
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4936.3	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-18.2	206.0	0.04542
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4953.5	L:635200 RAUN 3 345 645451 S3451 3 345 1		33.8	956.0	0.18618
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4960.3	L:631139 HAZLTON3 345 631144 MITCHLCO3 345 1		-269.1	-873.0	-0.12174
		C:ITCM-C702-GEN-LN(Arnold-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629074 ARNOLD1G 22.0577.8 MW			
4978.2	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		-42.2	206.0	0.04986
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4995.8	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-136.3	-332.2	-0.03921
		C:601002 ADAMS 3 345 631144 MITCHLCO3 345 1			
		Open 601002 ADAMS 3 345 631144 MITCHLCO3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario

FCITC	Limiting Constraint	Contingency	PreShift	Ratin	TDF
1928.2	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06546
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
1928.2	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.8	165.0	0.06546
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
1929.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		38.7	165.0	0.06546
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2029.5	L:631183 CAYLER5 161 656570 WISDOM5 161 1		134.6	209.0	0.03667
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
2029.5	L:631183 CAYLER5 161 656570 WISDOM5 161 1		134.6	209.0	0.03667
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2030.5	L:631183 CAYLER5 161 656570 WISDOM5 161 1		134.5	209.0	0.03667
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2430.3	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-120.5	-223.0	-0.04220
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
2430.3	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-120.5	-223.0	-0.04220
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2431.4	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-120.4	-223.0	-0.04220
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2638	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.05929
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2638	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-163.6	-320.0	-0.05929
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3007	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		61.8	178.0	0.03863
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
3078.2	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.03378
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3078.2	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-43.0	-147.0	-0.03378
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3455.4	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-215.5	-335.0	-0.03459
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
3516.3	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-32.4	-147.0	-0.03259
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3532.1	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05084
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3532.1	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		37.4	217.0	0.05084
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3551.9	L:640133 COLMBUS4 230 652509 FTRANDL4 230 1		-84.7	-192.0	-0.03022
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3551.9	L:640133 COLMBUS4 230 652509 FTRANDL4 230 1		-84.7	-192.0	-0.03022
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3571.9	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		40.0	178.0	0.03863
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
3631.3	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-210.1	-335.0	-0.03439
		C:ITCM-B111-SW-OGS-WAPELLO-1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 1			
3685	L:601043 NLAX 5 161 602026 MAYFAIR5 161 1		75.2	216.0	0.03821
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
3795.5	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-208.2	-335.0	-0.03341
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
3968.8	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-203.1	-335.0	-0.03324
		C:ITCM-B112-SW-OGS-WAPELLO-2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 2			
3999.8	L:603010 LKYNKTN7 115 603134 BUFFRID7 115 1		-54.0	-174.6	-0.03014
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4094.2	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-157.4	-320.0	-0.03971
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4113.3	L:652504 BROOKNG7 115 652538 WHITE 7 115 1		-31.9	-176.0	-0.03504
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4276.6	L:631115 OTTUMWA5 161 631143 OTTUMWA3 345 1		-187.3	-400.0	-0.04974
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
4340.6	L:601007 SPLTRTA3 345 652537 WHITE 3 345 1		-144.6	-717.0	-0.13186
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4341.5	L:601006 SPLT RK3 345 601007 SPLTRTA3 345 1		-144.6	-717.1	-0.13186
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4373.6	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-145.3	-332.2	-0.04273
		C:631139 HAZLTON3 345 631144 MITCHLCO3 345 1			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
4433.8	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-151.3	-332.2	-0.04080
		C:ITCM-C939-LN-LN(HAZ-MCO-RC-SALEM)			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
		Open 631140 SALEM 3 345 631141 ROCK CK3 34 5 1			
4459.7	L:602023 LACROSS5 161 602026 MAYFAIR5 161 1		-45.7	-216.1	-0.03821
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
4470.8	L:631139 HAZLTON3 345 631144 MITCHLCO3 345 1		-269.1	-873.0	-0.13507
		C:ITCM-C702-GEN-LN(Arnold-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629074 ARNOLD1G 22.0577.8 MW			
4486.6	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		32.6	717.0	0.15254
		C:635200 RAUN 3 345 635368 SHELDON 3 345 1			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
4487.2	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		32.6	717.1	0.15254
		C:635200 RAUN 3 345 635368 SHELDON 3 345 1			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
4528	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		69.0	918.0	0.18750
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
4528	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		69.0	918.0	0.18750
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
4531	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		68.4	918.0	0.18750
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
4583.4	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-136.3	-332.2	-0.04273
		C:601002 ADAMS 3 345 631144 MITCHLCO3 345 1			
		Open 601002 ADAMS 3 345 631144 MITCHLCO3 34 5 1			

SU70 LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4593.6	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		57.9	717.0	0.14349
		C:ITCM-C104-NW-CT(Lkfld-Nobles-Elk-Magn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 602039 ROCK CO5 161 631038 MAGNLIA5 16 1 1			
		Open 630056 MAGNLIA8 69.0 631038 MAGNLIA5 16 1 1			
		Open 631038 MAGNLIA5 161 631039 ELK 5 16 1 1			
4594.2	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		57.9	717.1	0.14349
		C:ITCM-C104-NW-CT(Lkfld-Nobles-Elk-Magn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 602039 ROCK CO5 161 631038 MAGNLIA5 16 1 1			
		Open 630056 MAGNLIA8 69.0 631038 MAGNLIA5 16 1 1			
		Open 631038 MAGNLIA5 161 631039 ELK 5 16 1 1			
4609.5	L:631139 HAZLTON3 345 631144 MITCHLCO3 345 1		-238.8	-873.0	-0.13758
		C:601028 EAU CL 3 345 699244 ARP 345 345 1			
		Open 601028 EAU CL 3 345 699244 ARP 345 34 5 1			
4628.2	L:602004 SPLT RK4 230 652523 SIOUXFL4 230 1		19.8	499.0	0.10353
		C:601006 SPLT RK3 345 601008 SPLTRTB3 345 1			
		Open 601006 SPLT RK3 345 601008 SPLTRTB3 34 5 1			
4628.2	L:602004 SPLT RK4 230 652523 SIOUXFL4 230 1		19.8	499.0	0.10353
		C:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1			
		Open 601008 SPLTRTB3 345 652564 SIOUXCY3 34 5 1			
4634.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		0.8	165.0	0.03542
		Base Case			
4680.5	L:681521 SENECA 5 161 681525 GRANGRAE 161 1		58.8	221.1	0.03468
		C:631139 HAZLTON3 345 631144 MITCHLCO3 345 1			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
4686.7	L:631139 HAZLTON3 345 631144 MITCHLCO3 345 1		-294.1	-873.0	-0.12351
		C:2-6			
		Remove unit 1 from bus 636641 LOUIS31G 24.0638.7 MW			
		Remove unit 1 from bus 629074 ARNOLD1G 22.0577.8 MW			
4723.1	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		46.4	717.0	0.14199
		C:ITCM-C103-NW-CT(Lkfld-Nobles-Elk-Hrnlk)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 618900 GRE-BREWSTR5 161 631040 HRN LK 5 16 1 1			
		Open 618900 GRE-BREWSTR5 161 631039 ELK 5 16 1 1			
		Open 630066 HERONLK8 69.0 631040 HRN LK 5 16 1 1			
4723.7	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		46.4	717.1	0.14199
		C:ITCM-C103-NW-CT(Lkfld-Nobles-Elk-Hrnlk)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 618900 GRE-BREWSTR5 161 631040 HRN LK 5 16 1 1			
		Open 618900 GRE-BREWSTR5 161 631039 ELK 5 16 1 1			
		Open 630066 HERONLK8 69.0 631040 HRN LK 5 16 1 1			
4735.3	L:601006 SPLT RK3 345 B$1583 SPLT 10 1.00 1		137.5	448.2	0.06562
		C:601006 SPLT RK3 345 601008 SPLTRTB3 345 1			
		Open 601006 SPLT RK3 345 601008 SPLTRTB3 34 5 1			
4735.4	L:601006 SPLT RK3 345 B$1583 SPLT 10 1.00 1		137.5	448.2	0.06562
		C:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1			
		Open 601008 SPLTRTB3 345 652564 SIOUXCY3 34 5 1			
4737.5	L:603016 SPLT RK7 115 B$1583 SPLT 10 1.00 1		-137.3	-448.2	-0.06562
		C:601006 SPLT RK3 345 601008 SPLTRTB3 345 1			
		Open 601006 SPLT RK3 345 601008 SPLTRTB3 34 5 1			
4737.5	L:603016 SPLT RK7 115 B$1583 SPLT 10 1.00 1		-137.3	-448.2	-0.06562
		C:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1			
		Open 601008 SPLTRTB3 345 652564 SIOUXCY3 34 5 1			
4794.3	L:681521 SENECA 5 161 681525 GRANGRAE 161 1		66.1	221.1	0.03234
		C:ITCM-C939-LN-LN(HAZ-MCO-RC-SALEM)			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
		Open 631140 SALEM 3 345 631141 ROCK CK3 34 5 1			
4812.7	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		36.9	223.0	0.03866
		C:C2-RAUN-0150			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4812.7	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		36.9	223.0	0.03866
		C:MEC-C529			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4864.4	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		44.6	223.0	0.03667
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
4881.1	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		15.5	217.0	0.04127
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4913.6	L:681521 SENECA 5 161 681525 GRANGRAE 161 1		50.7	221.1	0.03468
		C:601002 ADAMS 3 345 631144 MITCHLCO3 345 1			
		Open 601002 ADAMS 3 345 631144 MITCHLCO3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MN Scenario

FCITC	Limiting Constrair	Contingency	PreShift	Ratin	TDF
-322.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.05947
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-322.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.05947
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
-314.7	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		183.7	165.0	0.05947
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2583.6	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		77.9	212.0	0.05190
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2583.6	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		77.9	212.0	0.05190
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2706.3	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		72.4	212.0	0.05160
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2724	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.04398
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2724	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.04398
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3524.3	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-171.3	-864.0	-0.19654
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3524.3	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-171.3	-864.0	-0.19654
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3582.9	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-28.0	-147.0	-0.03323
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3582.9	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-28.0	-147.0	-0.03323
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3652.6	L:636001 WEBSTER5 161 636025 HAYES 5 161 1		-11.0	210.0	0.06050
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3702.1	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-140.4	-864.0	-0.19546
		C:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1			
		Open 601008 SPLTRTB3 345 652564 SIOUXCY3 34 5 1			
3790.3	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		26.7	206.0	0.04730
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3790.3	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		26.7	206.0	0.04730
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3810.5	L:601004 WILMART3 345 601033 FIELD N3 345 1		-477.5	-1195.1	-0.18832
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3835.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.2	-201.0	-0.04244
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3835.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.2	-201.0	-0.04244
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3916	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		20.8	206.0	0.04730
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
3957.4	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-32.9	-201.0	-0.04249
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
3991.3	L:602003 BLUEETA5 161 631043 WINBAGO5 161 1		-53.4	-200.0	-0.03673
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
3994.5	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		71.4	212.0	0.03519
		Base Case			
4033.2	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.7	-147.0	-0.03254
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4050.6	L:601004 WILMART3 345 601033 FIELD N3 345 1		-448.6	-1195.1	-0.18430
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
4057.8	L:601004 WILMART3 345 601033 FIELD N3 345 1		-447.5	-1195.1	-0.18424
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
4175.4	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		65.4	217.0	0.03631
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4175.4	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		65.4	217.0	0.03631
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4225.4	L:631138 LAKEFLD3 345 635368 SHELDON 3 345 1		-134.8	-864.0	-0.17259
		Base Case			
4614.2	L:635200 RAUN 3 345 635368 SHELDON 3 345 1		1.2	-864.0	-0.18750
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4634.3	L:636001 WEBSTER5 161 656353 HOPE5 161 1		-10.6	208.0	0.04717
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4690.1	L:601004 WILMART3 345 601033 FIELD N3 345 1		-393.0	-1195.1	-0.17102
		Base Case			
4726.6	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		-198.3	-918.0	-0.15227
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4743.1	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		-64.2	-717.0	-0.13763
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4743.9	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		-64.2	-717.1	-0.13763
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4782.1	L:602002 SOUTHBE5 161 602003 BLUEETA5 161 1		-40.6	-216.3	-0.03673
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
4847.8	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-496.8	-1277.1	-0.16097
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
4933	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		10.8	167.0	0.03167
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			

SUM LKFL – RTLD Buffalo Ridge 50%N/50%S – MN Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
-314.2	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.06103
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-314.2	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.06103
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD_N3 34 5 1			
-306.7	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		183.7	165.0	0.06103
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
3038.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.03943
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3038.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.03943
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3443.9	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		77.9	212.0	0.03894
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3443.9	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		77.9	212.0	0.03894
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3582	L:601004 WILMART3 345 601033 FIELD N3 345 1		-477.5	-1195.1	-0.20034
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3611.5	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		72.4	212.0	0.03866
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3958.7	L:601004 WILMART3 345 601033 FIELD_N3 345 1		-448.6	-1195.1	-0.18858
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
3965.6	L:601004 WILMART3 345 601033 FIELD N3 345 1		-447.5	-1195.1	-0.18852
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
4261.1	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-496.8	-1277.1	-0.18313
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
4467.5	L:602003 BLUEETA5 161 631043 WINBAGO5 161 1		-53.4	-200.0	-0.03282
		C:ITCM-B102-NW-LAKEFIELD_SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			

SUM LKFL – RTLD Buffalo Ridge 50%N/50%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4586.2	L:601004 WILMART3 345 601033 FIELD N3 345 1		-393.0	-1195.1	-0.17490
		Base Case			
4649.3	L:652529 WATERTN3 345 652537 WHITE 3 345 1		-94.4	-792.0	-0.15004
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4746.2	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		65.4	217.0	0.03194
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4746.2	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		65.4	217.0	0.03194
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4759.9	L:601004 WILMART3 345 601072 SHEAK LK3 345 1		486.7	1277.1	0.16605
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4776.8	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		10.8	167.0	0.03271
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MN Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
-306.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.06260
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-306.4	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.2	165.0	0.06260
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
-299	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		183.7	165.0	0.06260
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2778.1	L:652504 BROOKNG7 115 652538 WHITE 7 115 1		-73.2	-176.0	-0.03699
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
3379.3	L:601004 WILMART3 345 601033 FIELD N3 345 1		-477.5	-1195.1	-0.21235
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3435.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.03487
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3435.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-200.2	-320.0	-0.03487
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3588.6	L:652529 WATERTN3 345 652537 WHITE 3 345 1		-94.4	-792.0	-0.19439
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3736.9	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-95.7	-223.0	-0.03407
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
3801.1	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-496.8	-1277.1	-0.20529
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
3870.9	L:601004 WILMART3 345 601033 FIELD N3 345 1		-448.6	-1195.1	-0.19286
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
3877.5	L:601004 WILMART3 345 601033 FIELD N3 345 1		-447.5	-1195.1	-0.19281
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
3947.9	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		48.4	167.0	0.03003
		C:601004 WILMART3 345 601072 SHEAK LK3 345 1			
		Open 601004 WILMART3 345 601072 SHEAK LK3 34 5 1			
3951.8	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		281.6	918.0	0.16105
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3951.8	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		281.6	918.0	0.16105
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
3966.3	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		279.2	918.0	0.16105
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
4006.7	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		45.3	167.0	0.03037
		C:601050 HELENA 3 345 601072 SHEAK LK3 345 1			
		Open 601050 HELENA 3 345 601072 SHEAK LK3 34 5 1			
4067.9	L:601054 HAZEL CK3 345 B$0052 1.00 6		75.2	336.0	0.06412
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4068.5	L:601053 HAZEL CK4 230 B$0052 1.00 6		-75.1	-336.0	-0.06412
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MN Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4101.8	L:601053 HAZEL CK4 230 602008 MINVALY4 230 1		75.0	338.0	0.06412
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4198	L:601006 SPLT RK3 345 B$1583 SPLT 10 1.00 1		141.3	448.2	0.07311
		C:3Wnd: OPEN B$1584 SPLT 11 11			
		Open 601006 SPLT RK3 345 B$1584 SPLT 11 1.0 0 11			
		Open 603016 SPLT RK7 115 B$1584 SPLT 11 1.0 0 11			
		Open 605037 SPK13.82 13.8 B$1584 SPLT 11 1.0 0 11	NA		
4199.3	L:603016 SPLT RK7 115 B$1583 SPLT 10 1.00 1		-141.2	-448.2	-0.07311
		C:3Wnd: OPEN B$1584 SPLT 11 11			
		Open 601006 SPLT RK3 345 B$1584 SPLT 11 1.0 0 11			
		Open 603016 SPLT RK7 115 B$1584 SPLT 11 1.0 0 11			
		Open 605037 SPK13.82 13.8 B$1584 SPLT 11 1.0 0 11	NA		
4283.4	L:601006 SPLT RK3 345 B$1584 SPLT 11 1.00 1		139.3	448.2	0.07212
		C:3Wnd: OPEN B$1583 SPLT 10 10			
		Open 601006 SPLT RK3 345 B$1583 SPLT 10 1.0 0 10			
		Open 603016 SPLT RK7 115 B$1583 SPLT 10 1.0 0 10			
		Open 605036 SPK13.81 13.8 B$1583 SPLT 10 1.0 0 10	NA		
4284.6	L:603016 SPLT RK7 115 B$1584 SPLT 11 1.00 1		-139.2	-448.2	-0.07212
		C:3Wnd: OPEN B$1583 SPLT 10 10			
		Open 601006 SPLT RK3 345 B$1583 SPLT 10 1.0 0 10			
		Open 603016 SPLT RK7 115 B$1583 SPLT 10 1.0 0 10			
		Open 605036 SPK13.81 13.8 B$1583 SPLT 10 1.0 0 10	NA		
4486.8	L:601004 WILMART3 345 601033 FIELD N3 345 1		-393.0	-1195.1	-0.17877
		Base Case			
4535.2	L:601004 WILMART3 345 601072 SHEAK LK3 345 1		486.7	1277.1	0.17428
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4630.2	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		10.8	167.0	0.03375
		C:ITCM-B102-NW-LAKEFIELD SPS			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Set bus 615100 GRE-TRIMWNDW.575 generation to0.0 MW			
		Set bus 615041 GRE-LGS 31G13.8 generation to0.0 MW			
		Set bus 615042 GRE-LGS 32G13.8 generation to0.0 MW			
		Set bus 615043 GRE-LGS 33G13.8 generation to0.0 MW			
		Set bus 615044 GRE-LGS 34G13.8 generation to0.0 MW			
		Set bus 615045 GRE-LGS 35G13.8 generation to0.0 MW			
		Set bus 615046 GRE-LGS 36G13.8 generation to0.0 MW			
4689.5	L:601054 HAZEL CK3 345 B$0052 1.00 6		104.7	336.0	0.04932
		C:3Wnd: OPEN B$1801 WT2 KU1A 1			
		Open 652529 WATERTN3 345 B$1801 WT2 KU1A 1.0 0 1			
		Open 652530 WATERTN4 230 B$1801 WT2 KU1A 1.0 0 1			
		Open 652237 WATERT19 13.8 B$1801 WT2 KU1A 1.0 0 1	NA		
4690.3	L:601053 HAZEL CK4 230 B$0052 1.00 6		-104.7	-336.0	-0.04932
		C:3Wnd: OPEN B$1801 WT2 KU1A 1			
		Open 652529 WATERTN3 345 B$1801 WT2 KU1A 1.0 0 1			
		Open 652530 WATERTN4 230 B$1801 WT2 KU1A 1.0 0 1			
		Open 652237 WATERT19 13.8 B$1801 WT2 KU1A 1.0 0 1	NA		
4715.9	L:652537 WHITE 3 345 B$1774 WHT KU1A 1.00 1		74.7	250.0	0.03717
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4717.5	L:652538 WHITE 7 115 B$1774 WHT KU1A 1.00 1		-74.6	-250.0	-0.03717
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4733.7	L:601053 HAZEL CK4 230 602008 MINVALY4 230 1		104.5	338.0	0.04932
		C:3Wnd: OPEN B$1801 WT2 KU1A 1			
		Open 652529 WATERTN3 345 B$1801 WT2 KU1A 1.0 0 1			
		Open 652530 WATERTN4 230 B$1801 WT2 KU1A 1.0 0 1			
		Open 652237 WATERT19 13.8 B$1801 WT2 KU1A 1.0 0 1	NA		
4775.5	L:601029 LKFLDXL3 345 601032 FIELD S3 345 1		479.8	1493.9	0.21235
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4775.5	L:601032 FIELD S3 345 601033 FIELD N3 345 1		479.8	1493.9	0.21235
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4852.7	L:601050 HELENA 3 345 601072 SHEAK LK3 345 1		-432.7	-1277.1	-0.17401
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
-327.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06233
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-327.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06233
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
-319.9	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.9	165.0	0.06233
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
1730.3	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		106.5	165.0	0.03383
		Base Case			
1775.6	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.06840
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
1775.6	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.06840
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2159.4	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.06203
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2159.4	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.06203
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2267.2	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		71.6	212.0	0.06193
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
2460.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.04862
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2460.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.04862
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2576.7	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05958
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2576.7	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05958
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2788.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.2	-147.0	-0.04728
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2838.8	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-191.8	-320.0	-0.04518
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3119.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.3	-201.0	-0.05216
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3119.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.3	-201.0	-0.05216
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3139.4	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		26.8	206.0	0.05707
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3139.4	L:636050 WRIGHT 5 161	636235 WALL LK5 161 1	26.8	206.0	0.05707
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3219.4	L:636230 FRANKLN5 161	636235 WALL LK5 161 1	-32.9	-201.0	-0.05221
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
3246.1	L:636050 WRIGHT 5 161	636235 WALL LK5 161 1	20.9	206.0	0.05703
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
3293.5	L:601043 NLAX 5 161	681531 LAC TAP5 161 1	78.4	178.0	0.03023
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
3373.8	L:631045 WNBAGOS5 161	631180 FREEBORN5 161 1	48.6	167.0	0.03509
		C:601004 WILMART3 345 601072 SHEAK LK3 345 1			
		Open 601004 WILMART3 345 601072 SHEAK LK3 34 5 1			
3429.2	L:631045 WNBAGOS5 161	631180 FREEBORN5 161 1	45.5	167.0	0.03542
		C:601050 HELENA 3 345 601072 SHEAK LK3 345 1			
		Open 601050 HELENA 3 345 601072 SHEAK LK3 34 5 1			
3583	L:631115 OTTUMWA5 161	631143 OTTUMWA3 345 1	-189.6	-400.0	-0.05872
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
3608.1	L:636001 WEBSTER5 161	636025 HAYES 5 161 1	-11.4	210.0	0.06136
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
3652.7	L:636001 WEBSTER5 161	636050 WRIGHT 5 161 1	71.9	212.0	0.03836
		Base Case			
3807	L:631045 WNBAGOS5 161	631180 FREEBORN5 161 1	39.3	167.0	0.03353
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
3874.4	L:635201 RAUN 5 161	640377 TEKAMAH5 161 1	35.4	217.0	0.04688
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4107.7	L:631110 WAPELLO5 161	631115 OTTUMWA5 161 2	-207.8	-335.0	-0.03097
		C:ITCM-C207-SE-BF(OGS-Wap-OGS345-161)			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 631115 OTTUMWA5 161 631143 OTTUMWA3 34 5 1			
4227.4	L:636020 FT.DODG5 161	636023 TATELYL5 161 1	-35.6	-224.0	-0.04458
		C:MEC-C519			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 636001 WEBSTER5 161 636020 FT.DODG5 16 1 1			
4337.2	L:635200 RAUN 3 345	B$0223 1.00 1	102.5	335.0	0.05361
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4337.2	L:635200 RAUN 3 345	B$0223 1.00 1	102.5	335.0	0.05361
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4337.9	L:635201 RAUN 5 161	B$0223 1.00 1	-102.5	-335.0	-0.05361
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4337.9	L:635201 RAUN 5 161	B$0223 1.00 1	-102.5	-335.0	-0.05361
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4348.2	L:601043 NLAX 5 161	681531 LAC TAP5 161 1	46.6	178.0	0.03023
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
4389	L:601004 WILMART3 345	601033 FIELD_N3 345 1	-483.1	-1195.1	-0.16222
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4418.5	L:631110 WAPELLO5 161	631115 OTTUMWA5 161 2	-167.7	-335.0	-0.03786
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
4500.9	L:635200 RAUN 3 345	635201 RAUN 5 161 2	99.9	335.0	0.05224
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 25%N/75%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4500.9	L:635200 RAUN 3 345	635201 RAUN 5 161 2	99.9	335.0	0.05224
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4568	L:631138 LAKEFLD3 345	635368 SHELDON 3 345 1	-174.5	-864.0	-0.15095
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4568	L:631138 LAKEFLD3 345	635368 SHELDON 3 345 1	-174.5	-864.0	-0.15095
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
4574.9	L:635200 RAUN 3 345	645451 S3451 3 345 1	179.2	956.0	0.16980
		C:1-4			
		Remove unit 4 from bus 635024 CBLUF4G 26.0870.0 MW			
		Remove unit 3 from bus 635023 CBLUF33G 24.0757.0 MW			
4575	L:601004 WILMART3 345	601033 FIELD N3 345 1	-453.8	-1195.1	-0.16203
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
4583.2	L:601004 WILMART3 345	601033 FIELD N3 345 1	-452.8	-1195.1	-0.16197
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
4614.7	L:631138 LAKEFLD3 345	635368 SHELDON 3 345 1	1.3	-864.0	-0.18750
		C:635200 RAUN 3 345 635368 SHELDON 3 345 1			
		Open 635200 RAUN 3 345 635368 SHELDON 3 34 5 1			
4614.7	L:635200 RAUN 3 345	635368 SHELDON 3 345 1	1.3	-864.0	-0.18750
		C:631138 LAKEFLD3 345 635368 SHELDON 3 345 1			
		Open 631138 LAKEFLD3 345 635368 SHELDON 3 34 5 1			
4626.9	L:631110 WAPELLO5 161	631115 OTTUMWA5 161 2	-160.8	-335.0	-0.03764
		C:ITCM-B111-SW-OGS-WAPELLO-1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 1			
4631.2	L:635200 RAUN 3 345	645451 S3451 3 345 1	34.1	956.0	0.19907
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4631.2	L:635200 RAUN 3 345	645451 S3451 3 345 1	34.1	956.0	0.19907
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4728.9	L:631110 WAPELLO5 161	631115 OTTUMWA5 161 1	-162.0	-335.0	-0.03658
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
4770.9	L:601015 BLUE LK3 345	601050 HELENA 3 345 1	-502.7	-1277.1	-0.16232
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
4814	L:636001 WEBSTER5 161	636020 FT.DODG5 161 1	61.7	210.0	0.03081
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4814	L:636001 WEBSTER5 161	636020 FT.DODG5 161 1	61.7	210.0	0.03081
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
4908.6	L:631143 OTTUMWA3 345	635730 MNTZUMA3 345 1	-189.7	-478.0	-0.05872
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
4935	L:631110 WAPELLO5 161	631115 OTTUMWA5 161 1	-155.5	-335.0	-0.03638
		C:ITCM-B112-SW-OGS-WAPELLO-2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 2			
4958.1	L:635600 GRIMES 3 345	636010 LEHIGH 3 345 1	-156.6	-1152.0	-0.20076
		C:3Wnd: OPEN B$0195 1			
		Open 636000 WEBSTER3 345 B$0195 1.0 0 1			
		Open 636001 WEBSTER5 161 B$0195 1.0 0 1			
		Open 636002 WEBS1XT9 13.8 B$0195 1.0 0 1	NA		
4979	L:636230 FRANKLN5 161	636235 WALL LK5 161 1	-33.3	-201.0	-0.03367
		Base Case			

SUM LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
-319.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06389
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-319.5	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06389
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
-312.1	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.9	165.0	0.06389
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
1690.3	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		106.5	165.0	0.03462
		Base Case			
1902.3	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.06385
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
1902.3	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.06385
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2516	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.6	-223.0	-0.03196
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
2516	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.6	-223.0	-0.03196
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2522.2	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.4	-223.0	-0.03196
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2730.1	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.04906
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2730.1	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.04906
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2780.5	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05521
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2780.5	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05521
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2868	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		71.6	212.0	0.04896
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
2889.9	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		78.4	178.0	0.03445
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
2903.9	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.04120
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
2903.9	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.04120
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3021.7	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-191.8	-320.0	-0.04244
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3151	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		48.6	167.0	0.03757
		C:601004 WILMART3 345 601072 SHEAK LK3 345 1			
		Open 601004 WILMART3 345 601072 SHEAK LK3 34 5 1			
3206	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		45.5	167.0	0.03789
		C:601050 HELENA 3 345 601072 SHEAK LK3 345 1			
		Open 601050 HELENA 3 345 601072 SHEAK LK3 34 5 1			
3301.8	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.2	-147.0	-0.03993
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3527.2	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		39.3	167.0	0.03619
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
3575.9	L:601043 NLAX 5 161 602026 MAYFAIR5 161 1		94.0	216.0	0.03412
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
3815.3	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		46.6	178.0	0.03445
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
3879.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.3	-201.0	-0.04194
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3879.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-38.3	-201.0	-0.04194
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3880	L:631115 OTTUMWA5 161 631143 OTTUMWA3 345 1		-189.6	-400.0	-0.05423
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
3944.6	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		26.8	206.0	0.04542
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3944.6	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		26.8	206.0	0.04542
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3955.8	L:631041 LAKEFLD5 161 631124 DKSN_CO5 161 1		113.6	240.0	0.03196
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD_S3 34 5 1			
3955.8	L:631041 LAKEFLD5 161 631124 DKSN_CO5 161 1		113.6	240.0	0.03196
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
3962	L:631041 LAKEFLD5 161 631124 DKSN_CO5 161 1		113.4	240.0	0.03196
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
4004.5	L:636230 FRANKLN5 161 636235 WALL LK5 161 1		-32.9	-201.0	-0.04197
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4080.5	L:636050 WRIGHT 5 161 636235 WALL LK5 161 1		20.9	206.0	0.04537
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
4086.4	L:601004 WILMART3 345 601033 FIELD_N3 345 1		-483.1	-1195.1	-0.17423
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4120.9	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		35.4	217.0	0.04408
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 50%N/50%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4197.8	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-502.7	-1277.1	-0.18449
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
4457.3	L:601004 WILMART3 345 601033 FIELD N3 345 1		-453.8	-1195.1	-0.16631
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
4465.1	L:601004 WILMART3 345 601033 FIELD N3 345 1		-452.8	-1195.1	-0.16625
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
4618	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-167.7	-335.0	-0.03622
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
4780.3	L:B$0025 1.00 631046 ADAMS 5 161 9		49.3	-263.2	-0.06537
		C:601002 ADAMS 3 345 615306 GRE-PL VLLY3 345 1			
		Open 601002 ADAMS 3 345 615306 GRE-PL VLLY3 34 5 1			
4780.7	L:601002 ADAMS 3 345 B$0025 1.00 9		49.3	-263.2	-0.06537
		C:601002 ADAMS 3 345 615306 GRE-PL VLLY3 345 1			
		Open 601002 ADAMS 3 345 615306 GRE-PL VLLY3 34 5 1			
4835.3	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-160.8	-335.0	-0.03602
		C:ITCM-B111-SW-OGS-WAPELLO-1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
		Open 630048 WAPELLO8 69.0 631110 WAPELLO5 16 1 1			
4841.9	L:602023 LACROSS5 161 602026 MAYFAIR5 161 1		-50.9	-216.1	-0.03412
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
4911	L:635200 RAUN 3 345 645451 S3451 3 345 1		179.2	956.0	0.15818
		C:1-4			
		Remove unit 4 from bus 635024 CBLUF4G 26.0870.0 MW			
		Remove unit 3 from bus 635023 CBLUF33G 24.0757.0 MW			
4942.5	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 1		-162.0	-335.0	-0.03500
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 2			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 2			
4951.8	L:635200 RAUN 3 345 645451 S3451 3 345 1		34.1	956.0	0.18618
		C:LEHIGH 0350			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
4951.8	L:635200 RAUN 3 345 645451 S3451 3 345 1		34.1	956.0	0.18618
		C:LEHIGH-B360			
		Open 635200 RAUN 3 345 636010 LEHIGH 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 636000 WEBSTER3 345 636010 LEHIGH 3 34 5 1			
4997.1	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-145.6	-332.2	-0.03734
		C:ITCM-C939-LN-LN(HAZ-MCO-RC-SALEM)			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
		Open 631140 SALEM 3 345 631141 ROCK CK3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario

FCITC	Limiting Constrain	Contingency	PreShift	Ratin	TDF
-311.8	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06545
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
-311.8	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		185.4	165.0	0.06545
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
-304.6	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		184.9	165.0	0.06545
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
35.5	L:603010 LKYNKTN7 115 603134 BUFFRID7 115 1		-173.5	-174.6	-0.03014
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
1652.2	L:613370 RUTLAND5 161 631043 WINBAGO5 161 1		106.5	165.0	0.03542
		Base Case			
1905.7	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.6	-223.0	-0.04220
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
1905.7	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.6	-223.0	-0.04220
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
1910.4	L:631102 TRIBOJI5 161 631124 DKSN CO5 161 1		-142.4	-223.0	-0.04220
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
2048.5	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.05929
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
2048.5	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-198.5	-320.0	-0.05929
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
2574.4	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		78.4	178.0	0.03868
		C:601043 NLAX 5 161 602026 MAYFAIR5 161 1			
		Open 601043 NLAX 5 161 602026 MAYFAIR5 16 1 1			
2926.7	L:652504 BROOKNG7 115 652538 WHITE 7 115 1		-73.4	-176.0	-0.03504
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
2955.8	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		48.6	167.0	0.04005
		C:601004 WILMART3 345 601072 SHEAK LK3 345 1			
		Open 601004 WILMART3 345 601072 SHEAK LK3 34 5 1			
2996.3	L:631041 LAKEFLD5 161 631124 DKSN CO5 161 1		113.6	240.0	0.04220
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
2996.3	L:631041 LAKEFLD5 161 631124 DKSN CO5 161 1		113.6	240.0	0.04220
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3000.9	L:631041 LAKEFLD5 161 631124 DKSN CO5 161 1		113.4	240.0	0.04220
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
3010	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		45.5	167.0	0.04036
		C:601050 HELENA 3 345 601072 SHEAK LK3 345 1			
		Open 601050 HELENA 3 345 601072 SHEAK LK3 34 5 1			
3019.3	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05084
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
3019.3	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		63.5	217.0	0.05084
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3077.1	L:640133 COLMBUS4 230 652509 FTRANDL4 230 1		-99.0	-192.0	-0.03021
		C:MEC-C528			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
3077.1	L:640133 COLMBUS4 230 652509 FTRANDL4 230 1		-99.0	-192.0	-0.03021
		C:C2-RAUN-0270			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3189.6	L:601043 NLAX 5 161 602026 MAYFAIR5 161 1		94.0	216.0	0.03825
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
3229.8	L:640386 TWIN CH4 230 652565 SIOUXCY4 230 1		-191.8	-320.0	-0.03971
		C:635200 RAUN 3 345 640226 HOSKINS3 345 1			
		Open 635200 RAUN 3 345 640226 HOSKINS3 34 5 1			
3285.8	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		39.3	167.0	0.03885
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3384	L:601007 SPLTRTA3 345 652537 WHITE 3 345 1		-270.8	-717.0	-0.13185
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3385	L:601006 SPLT RK3 345 601007 SPLTRTA3 345 1		-270.8	-717.1	-0.13185
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3394.7	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		281.5	918.0	0.18750
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
3394.7	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		281.5	918.0	0.18750
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3398.7	L:601043 NLAX 5 161 681531 LAC TAP5 161 1		46.6	178.0	0.03868
		C:602023 LACROSS5 161 602026 MAYFAIR5 161 1			
		Open 602023 LACROSS5 161 602026 MAYFAIR5 16 1 1			
3407.4	L:601029 LKFLDXL3 345 631138 LAKEFLD3 345 1		279.1	918.0	0.18750
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
3541.6	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.03378
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3541.6	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-27.4	-147.0	-0.03378
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3710.8	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.03610
		C:GRIMES-B904			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3710.8	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		78.1	212.0	0.03610
		C:MEC-C522			
		Open 635590 FALLOW 3 345 635600 GRIMES 3 34 5 1			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
3747.6	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-502.7	-1277.1	-0.20665
		C:601050 HELENA 3 345 601052 LKMARION3 345 1			
		Open 601050 HELENA 3 345 601052 LKMARION3 34 5 1			
3822.8	L:601004 WILMART3 345 601033 FIELD N3 345 1		-483.1	-1195.1	-0.18624
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
3830.4	L:631183 CAYLER5 161 656570 WISDOM5 161 1		68.5	209.0	0.03667
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
3830.4	L:631183 CAYLER5 161 656570 WISDOM5 161 1		68.5	209.0	0.03667
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
3834.9	L:631183 CAYLER5 161 656570 WISDOM5 161 1		68.4	209.0	0.03667
		C:601004 WILMART3 345 601033 FIELD N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
3902.1	L:636001 WEBSTER5 161 636050 WRIGHT 5 161 1		71.6	212.0	0.03598
		C:MEC-C549			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			
		Open 631077 PERRY 5 161 635607 BITRSWT5 16 1 1			
3947.5	L:652529 WATERTN3 345 652537 WHITE 3 345 1		-96.7	-792.0	-0.17613
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4046.1	L:631079 BNE JCT5 161 636020 FT.DODG5 161 1		-15.2	-147.0	-0.03259
		C:GRIMES-B905			
		Open 635600 GRIMES 3 345 635700 SYCAMOR3 34 5 2			
		Open 635600 GRIMES 3 345 636010 LEHIGH 3 34 5 1			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4230.7	L:631115 OTTUMWA5 161 631143 OTTUMWA3 345 1		-189.6	-400.0	-0.04973
		C:ITCM-C703-GEN-LN(OGS-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629075 OTTUMW1G 24.0709.0 MW			
4297.6	L:B$0025 1.00 631046 ADAMS 5 161 9		49.3	-263.2	-0.07271
		C:601002 ADAMS 3 345 615306 GRE-PL VLLY3 345 1			
		Open 601002 ADAMS 3 345 615306 GRE-PL VLLY3 34 5 1			
4298	L:601002 ADAMS 3 345 B$0025 1.00 9		49.3	-263.2	-0.07271
		C:601002 ADAMS 3 345 615306 GRE-PL VLLY3 345 1			
		Open 601002 ADAMS 3 345 615306 GRE-PL VLLY3 34 5 1			
4313.3	L:601006 SPLT 0		140.7	448.2	0.07128
		C:3Wnd: OPEN B$1584 SPLT 11 11			
		Open 601006 SPLT RK3 345 B$1584 SPLT 11 1.0 0 11			
		Open 603016 SPLT RK7 115 B$1584 SPLT 11 1.0 0 11			
		Open 605037 SPK13.82 13.8 B$1584 SPLT 11 1.0 0 11	NA		
4314.6	L:603016 SPLT 0		-140.6	-448.2	-0.07128
		C:3Wnd: OPEN B$1584 SPLT 11 11			
		Open 601006 SPLT RK3 345 B$1584 SPLT 11 1.0 0 11			
		Open 603016 SPLT RK7 115 B$1584 SPLT 11 1.0 0 11			
		Open 605037 SPK13.82 13.8 B$1584 SPLT 11 1.0 0 11	NA		
4318.9	L:602023 LACROSS5 161 602026 MAYFAIR5 161 1		-50.9	-216.1	-0.03825
		C:601043 NLAX 5 161 681531 LAC TAP5 161 1			
		Open 601043 NLAX 5 161 681531 LAC TAP5 16 1 1			
4345.5	L:601004 WILMART3 345 601033 FIELD_N3 345 1		-453.8	-1195.1	-0.17058
		C:ITCM-C203-NW-BF(Rutland-Winbago)			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
		Open 613350 RUTLAND 69.0 613370 RUTLAND5 16 1 1			
4352.9	L:601004 WILMART3 345 601033 FIELD N3 345 1		-452.8	-1195.1	-0.17054
		C:613370 RUTLAND5 161 631043 WINBAGO5 161 1			
		Open 613370 RUTLAND5 161 631043 WINBAGO5 16 1 1			
4400.9	L:601006 SPLT 1		138.8	448.2	0.07031
		C:3Wnd: OPEN B$1583 SPLT 10 10			
		Open 601006 SPLT RK3 345 B$1583 SPLT 10 1.0 0 10			
		Open 603016 SPLT RK7 115 B$1583 SPLT 10 1.0 0 10			
		Open 605036 SPK13.81 13.8 B$1583 SPLT 10 1.0 0 10	NA		
4400.9	L:635201 RAUN 5 161 640377 TEKAMAH5 161 1		35.4	217.0	0.04127
		C:635200 RAUN 3 345 645451 S3451 3 345 1			
		Open 635200 RAUN 3 345 645451 S3451 3 34 5 1			
4402.1	L:603016 SPLT 1		-138.7	-448.2	-0.07031
		C:3Wnd: OPEN B$1583 SPLT 10 10			
		Open 601006 SPLT RK3 345 B$1583 SPLT 10 1.0 0 10			
		Open 603016 SPLT RK7 115 B$1583 SPLT 10 1.0 0 10			
		Open 605036 SPK13.81 13.8 B$1583 SPLT 10 1.0 0 10	NA		
4492	L:602004 SPLT RK4 230 652523 SIOUXFL4 230 1		33.9	499.0	0.10354
		C:601006 SPLT RK3 345 601008 SPLTRTB3 345 1			
		Open 601006 SPLT RK3 345 601008 SPLTRTB3 34 5 1			
4492	L:602004 SPLT RK4 230 652523 SIOUXFL4 230 1		33.9	499.0	0.10354
		C:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1			
		Open 601008 SPLTRTB3 345 652564 SIOUXCY3 34 5 1			
4566.9	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-145.6	-332.2	-0.04086
		C:ITCM-C939-LN-LN(HAZ-MCO-RC-SALEM)			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
		Open 631140 SALEM 3 345 631141 ROCK CK3 34 5 1			
4602.9	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		56.5	717.0	0.14349
		C:ITCM-C104-NW-CT(Lkfld-Nobles-Elk-Magn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 602039 ROCK CO5 161 631038 MAGNLIA5 16 1 1			
		Open 630056 MAGNLIA8 69.0 631038 MAGNLIA5 16 1 1			
		Open 631038 MAGNLIA5 161 631039 ELK 5 16 1 1			
4603.5	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		56.5	717.1	0.14349
		C:ITCM-C104-NW-CT(Lkfld-Nobles-Elk-Magn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 602039 ROCK CO5 161 631038 MAGNLIA5 16 1 1			
		Open 630056 MAGNLIA8 69.0 631038 MAGNLIA5 16 1 1			
		Open 631038 MAGNLIA5 161 631039 ELK 5 16 1 1			

SUM LKFL – RTLD Buffalo Ridge 75%N/25%S – MISO Scenario Cont.

FCITC	Limiting Constraint	Contingency	PreShift	Rating	TDF
4653.3	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-133.1	-332.2	-0.04279
		C:631139 HAZLTON3 345 631144 MITCHLCO3 345 1			
		Open 631139 HAZLTON3 345 631144 MITCHLCO3 34 5 1			
4757.1	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		48.5	223.0	0.03667
		C:601032 FIELD S3 345 601033 FIELD N3 345 1			
		Open 601032 FIELD S3 345 601033 FIELD N3 34 5 1			
4757.1	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		48.5	223.0	0.03667
		C:601029 LKFLDXL3 345 601032 FIELD S3 345 1			
		Open 601029 LKFLDXL3 345 601032 FIELD S3 34 5 1			
4761.6	L:631102 TRIBOJI5 161 631183 CAYLER5 161 1		48.4	223.0	0.03667
		C:601004 WILMART3 345 601033 FIELD_N3 345 1			
		Open 601004 WILMART3 345 601033 FIELD N3 34 5 1			
4801.6	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		40.1	717.0	0.14098
		C:ITCM-C102-NW-CT(Lkfld-Nobles-Dksn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 631041 LAKEFLD5 161 631124 DKSN CO5 16 1 1			
4802.2	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		40.1	717.1	0.14098
		C:ITCM-C102-NW-CT(Lkfld-Nobles-Dksn)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 631041 LAKEFLD5 161 631124 DKSN CO5 16 1 1			
4819.9	L:601008 SPLTRTB3 345 652564 SIOUXCY3 345 1		32.6	717.0	0.14199
		C:ITCM-C103-NW-CT(Lkfld-Nobles-Elk-Hrnlk)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 618900 GRE-BREWSTR5 161 631040 HRN LK 5 16 1 1			
		Open 618900 GRE-BREWSTR5 161 631039 ELK 5 16 1 1			
		Open 630066 HERONLK8 69.0 631040 HRN LK 5 16 1 1			
4820.5	L:601006 SPLT RK3 345 601008 SPLTRTB3 345 1		32.6	717.1	0.14199
		C:ITCM-C103-NW-CT(Lkfld-Nobles-Elk-Hrnlk)			
		Open 601034 NOBLES 3 345 631138 LAKEFLD3 34 5 1			
		Open 618900 GRE-BREWSTR5 161 631040 HRN LK 5 16 1 1			
		Open 618900 GRE-BREWSTR5 161 631039 ELK 5 16 1 1			
		Open 630066 HERONLK8 69.0 631040 HRN LK 5 16 1 1			
4826.4	L:631045 WNBAGOS5 161 631180 FREEBORN5 161 1		18.2	167.0	0.03082
		Base Case			
4836.5	L:631110 WAPELLO5 161 631115 OTTUMWA5 161 2		-167.7	-335.0	-0.03459
		C:631110 WAPELLO5 161 631115 OTTUMWA5 161 1			
		Open 631110 WAPELLO5 161 631115 OTTUMWA5 16 1 1			
4914.7	L:631139 HAZLTON3 345 631144 MITCHLCO3 345 1		-209.2	-873.0	-0.13506
		C:ITCM-C702-GEN-LN(Arnold-Mont-Hills)			
		Open 635730 MNTZUMA3 345 636400 HILLS 3 34 5 1			
		Remove unit 1 from bus 629074 ARNOLD1G 22.0577.8 MW			
4960.6	L:601054 HAZEL CK3 345 B$0052 1.00 6		76.4	336.0	0.05233
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4961.4	L:601053 HAZEL CK4 230 B$0052 1.00 6		-76.4	-336.0	-0.05233
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4980.6	L:681521 SENECA 5 161 681523 GENOA 5 161 1		-119.1	-332.2	-0.04279
		C:601002 ADAMS 3 345 631144 MITCHLCO3 345 1			
		Open 601002 ADAMS 3 345 631144 MITCHLCO3 34 5 1			
4994.7	L:601004 WILMART3 345 601072 SHEAK LK3 345 1		492.2	1277.1	0.15714
		C:601031 BRKNGCO3 345 601048 LYON CO 3 345 1			
		Open 601031 BRKNGCO3 345 601048 LYON CO 3 34 5 1			
4997	L:652537 WHITE 3 345 B$1774 WHT KU1A 1.00 1		74.9	250.0	0.03504
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			
4997.8	L:601015 BLUE LK3 345 601050 HELENA 3 345 1		-376.8	-1277.1	-0.18014
		C:601051 HMPT CNR3 345 601052 LKMARION3 345 1			
		Open 601051 HMPT CNR3 345 601052 LKMARION3 34 5 1			
4998.8	L:652538 WHITE 7 115 B$1774 WHT KU1A 1.00 1		-74.8	-250.0	-0.03504
		C:652529 WATERTN3 345 652537 WHITE 3 345 1			
		Open 652529 WATERTN3 345 652537 WHITE 3 34 5 1			

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State of Minnesota
DEPARTMENT OF COMMERCE
DIVISION OF ENERGY RESOURCES

Utility Information Request

Docket Number: ET6675/CN-12-1053 Date of Request:November 22, 2013

Requested From: Warren J. Day/Warren J. Day
Attorneys for Midcontinent
Independent System Operator, Inc.
Response Due:December 6, 2013

Analyst Requesting Information: Steve Rakow

Type of Inquiry:

[ ] Financial	[ ] Rate of Return	[ ] Rate Design
[ ] Engineering	[ ] Forecasting	[ ] Conservation
[ ] Cost of Service	[ ] CIP	[ ] Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
21	MTEP09 at page 196 discusses the Lakefield Junction – Rutland 345 kV line as a solution to the Fox Lake–Rutland 161kV flowgate and concludes "the project still exceed the 2.0 B/C ratio threshold and is qualified for Appendix B consideration." MTEP10 at page 205 reviewed four alternatives for the Fox Lake–Rutland 161kV flowgate, none of which included the Lakefield Junction – Rutland 345 kV line. Please explain why a project (Lakefield Junction – Rutland 345 kV) with a 2.0 benefit cost ratio in MTEP09 was not carried forward to the analysis in MTEP10.
Response:	The MTEP09 discussion in the same paragraph on page 196, as referenced in Information Request 21, states that "[a]dditional sensitivities are required to determine what effects the plan has on the surrounding system's low voltage line flows. These sensitivities along with reliability analyses must be performed prior to Appendix A recommendation." Because this project was contained within other system alternatives being actively studied to address broader needs subsequent to MTEP09 analyses, it was not separately carried forward as a

distinct option in MTEP10 or MTEP11. Specifically, in the continuing evaluation of projects after MTEP09 was released, the Lakefield Junction – Rutland 345 kV line was evaluated as part of larger scale transmission options through the Regional Generation Outlet Study (RGOS) initiative, which was aimed at identifying regional transmission plans needed for the efficient and reliable delivery of renewable portfolio standard (RPS) mandates within the MISO region.

The Lakefield –Rutland 345 kV project was also part of the Lakefield – Winnebago project listed in MTEP10 at page 205. These projects were proposed to be included in the Candidate MVP Portfolio analysis for further evaluation from a broader regional view. Other, related alternative transmission initiatives were also being evaluated during this post-MTEP09 period. Like the Lakefield Junction – Rutland 345 kV line, these initiatives were not reported in Appendix A of MTEP 10 since their evaluation was not complete.

Response by: Digaunto Chatterjee

Title: Senior Manager of Resource Forecasting

Department: Transmission Access Management

Telephone: 317.249.5635

List sources of information:

MTEP09 Report

MTEP10 Report, MTEP11 Report

RGOS Report

State of Minnesota

DEPARTMENT OF COMMERCE
DIVISION OF ENERGY RESOURCES

Utility Information Request

Docket Number: ET6675/CN-12-1053 Date of Request: February 6, 2014

Requested From: David Grover, Manager Regulatory Strategy Response Due: February 18, 2014

Analyst Requesting Information: Steve Rakow

Type of Inquiry:

[ ] Financial	[ ] Rate of Return	[ ] Rate Design
[ ] Engineering	[ ] Forecasting	[ ] Conservation
[ ] Cost of Service	[ ] CIP	[ ] Other:

If you feel your responses are trade secret or privileged, please indicate this on your response.

Request No.	
28	The Petition at page 89, regarding the Lakefield Junction—Rutland alternative, states that "the termination of the 345 kV line at Rutland resulted in constraints farther east on the 161 kV system, increasing loading on the 161 kV line between Rutland and Winnebago Junction." However, MTEP09 addressed this concern: > One concern raised by the TRG [technical review group] was the potential overload of the Rutland - Winnebago 161 kV line, with the 345 kV upgrade ending at the Rutland substation. Additional economic sensitivity analysis was performed with the Rutland - Winnebago 161 kV included in the list of monitored elements. The economic benefit results are provided in Table 8.3-11. Compared to the original case the total benefits go down slightly as expected; however, the project still exceeds the 2.0 B/C ratio threshold and is qualified for Appendix B consideration. Please provide further screening analysis explaining why the Lakefield Junction—Rutland alternative does not merit detailed analysis. Otherwise, please provide a detailed economic and engineering analysis of the Lakefield Junction—Rutland alternative.
Response:	The Department is correct that MISO performed additional economic sensitivity analysis to account for additional congestion created on the Rutland-Winnebago 161 kV line by the 345 kV project, and found that while the 345 kV project's potential benefits were reduced, the project still qualified for further consideration. For this reason, MISO listed the Lakefield Junction-Rutland 345 kV project in MTEP 09 Appendix C (see MISO's response to IR #20), noting in the MTEP 09 report that: *Additional sensitivities are required to determine what effects this plan has on the surrounding system's low voltage line flows. Those sensitivities along with reliability analysis must be performed prior to Appendix A recommendation.*

As further discussed in the MISO responses to IRs #21 and #22, additional analysis of the Lakefield Junction – Rutland 345 kV alternative was not performed in MTEP 10 or MTEP 11 because the Lakefield Junction – Rutland 345 kV facilities were included within options being studied to address a broader set of needs, including public policy requirements, generator interconnection and reliability needs in addition to congestion. This more comprehensive analysis in later MTEP cycles ultimately resulted in the 17-Project MVP portfolio being approved in MTEP 11 Appendix A, which included the Minnesota-Iowa 345 kV Project facilities as part of MVP 3.

The Lakefield Junction-Rutland 345 kV alternative does not merit additional detailed analysis because its facilities alone would not meet the broader set of needs being addressed by the MVP 3. However, because the Lakefield Junction – Rutland 345 kV facilities are part of the Minnesota-Iowa 345 kV project, the potential congestion relief benefits examined in MTEP 09 will be achieved as part of the Minnesota-Iowa 345 kV project.

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