BEFORE THE PUBLIC SERVICE COMMISSION

OF THE STATE OF NORTH DAKOTA

In the Matter of the Application of Montana-Dakota Utilities Co, a Division of MDU Resources Group, Inc., for an Advance Determination of Prudence of Montana-Dakota's Participation & Ownership Interest in the Big Stone II Generating Station	**)**	**Case No. PU-06-482**

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DIRECT TESTIMONY

OF

TIMOTHY J. ROGELSTAD, PE

MANAGER OF DELIVERY PLANNING

OTTER TAIL POWER COMPANY

DECEMBER 1, 2006

BEFORE THE NORTH DAKOTA PUBLIC SERVICE COMMISSION

DIRECT TESTIMONY OF TIMOTHY J. ROGELSTAD, PE

I. INTRODUCTION

Q: Please state your name and business address.

A: My name is Timothy J. Rogelstad. My business address is 215 South Cascade Street, Fergus Falls, Minnesota 56537.

Q: By whom are you employed, and in what capacity?

A: I am employed by Otter Tail Power Company ("Otter Tail" or "OTP"), a division of Otter Tail Corporation, as the Manager of Delivery Planning.

Q: What is your educational background?

A: I graduated from North Dakota State University in 1989 with a Bachelor's Degree in Electrical and Electronics Engineering.

Q: What is your employment history?

A: I have been an employee of Otter Tail Power Company for the past seventeen years. I started with the company in 1989 as a substation design engineer in the System Engineering Department. In 1992, I transferred to the Transmission Planning department as a Planning Engineer. In 1998, I was promoted to supervisor of Transmission Planning, and in 2002 I was promoted to Manager of Delivery Planning.

Q: What are your responsibilities in your current position?

A: My current job responsibilities include managing four primary areas – transmission planning, transmission contracts, capital allocation, and reliability performance. In this proceeding, I have two direct accountabilities which include overseeing the transmission studies completed for this project, as well as overseeing the project management for the Big Stone Unit II transmission project.

Q: What work experience have you had relating to transmission planning?

A: In most of my professional career I have been involved with transmission planning. My experience ranges from being involved in the details of building models for transmission studies and completing transmission studies, to acting as project manager for a 100 mile 230 kV transmission project, to managing a department that is responsible for transmission planning at Otter Tail.

Q: Have you been involved in any regional planning activities?

A: Yes, I have. Over my career, I have been involved in a number of planning activities at the regional level with the Mid-Continent Area Power Pool (MAPP) and the Midwest Independent Transmission System Operator (MISO) and with other organizations as well. These activities include the following:

- MAPP Model Building Working Group
- MAPP Transmission Reliability Working Group
- MAPP Line Loading Relief Working Group
- MAPP Design Review Sub-Committee

- MAPP Planning Committee
- Past chair of the MAPP RRV SPG (Red River Valley Sub-Regional Planning Group)
- MISO Planning Sub-Committee
- CAPX Technical Team
- CAPX Tariff Team
- Upper Great Plains Transmission Coalition

Q: Are you a registered professional engineer?

A: Yes, I am a registered professional engineer in the states of Minnesota, North Dakota and South Dakota.

Q: What professional organizations do you belong to?

A: I am currently a member of Institute of Electrical and Electronics Engineers (IEEE). My involvement in this organization has included being Past chair of the Red River Valley Section. I am also a member of the Minnesota Society of Professional Engineers.

II. PURPOSE AND SUMMARY OF TESTIMONY

Q: What is the purpose of your testimony?

A: The purpose of my testimony is to describe the transmission planning work that has gone into the selection of the Big Stone Transmission Project. I explain certain requirements that must be met in order to interconnect a new generation source to the

transmission grid and to deliver electricity to customers. I also describe the regional benefits associated with the new transmission facilities.

Q: Please summarize your testimony.

A: The Co-owners are continually engaged in planning efforts to ensure that the transmission system will function as required. When new generation is planned, utilities must complete a number of planning studies to investigate the impact of the new facility on the transmission system and to determine what new transmission infrastructure is required to accommodate the new facility to ensure that all regional reliability standards are adhered to. In this case, the Co-owners have undertaken several planning steps to determine how best to interconnect Big Stone Unit II to the transmission system. As is typical, the planning began with screening studies to identify certain transmission facilities with the greatest potential to provide a reliable interconnection. This work was followed with a specific Interconnection Study required by the Midwest Independent Transmission System Operator (MISO) and then with a Delivery Service Study to determine the impacts of the proposed interconnection on a broader geographic basis. Planning continues until the new facilities are actually placed into operation and even then, additional transmission studies continue.

The planning studies that were undertaken in this case with respect to Big Stone Unit II show that additional transmission in South Dakota and Minnesota is required to accommodate the proposed generation unit.

The planning for the project has also taken into account other potential transmission and generation needs in the region that have been identified in other planning efforts. Because of this coordination, the Big Stone Transmission Project is highly compatible with other possible projects and transmission plans in the region.

The Design Review Subcommittee of the Mid-Continent Area Power Pool ("MAPP") recently conditionally approved the Interconnection Study and the Delivery Service Study which forms the basis for the facilities proposed in this matter. We expect final approval of these same studies by the Midwest Independent Transmission Systems Operator ("MISO") by the end of January 2007.

III. TRANSMISSION PLANNING

Q: Can you describe generally the transmission planning process?

A: Generally, transmission planning is an ongoing, continuous process of ensuring that the large transmission grid in this country is operated in a reliable and economic fashion. The transmission grid is a huge machine. In fact, the National Academy of Engineering recently selected electrification as the single greatest engineering achievement of the 20th Century, above the automobile, computers, space exploration, and many other achievements. The connected electrical transmission grid has likewise been referred to as the most complicated machine operating today.

Transmission planning in the Dakota's and throughout the country is done primarily on a regional basis. In this region, transmission engineers and other stakeholders work with MAPP and MISO, and the various regulatory agencies, to

develop plans to ensure the continued reliable and economical operation of the transmission system. MAPP and MISO maintain various committees, such as its Subregional Planning Groups (SPGs) and other transmission planning groups, to focus on the additional transmission infrastructure in the region.

MISO participates with MAPP and the regional utilities in planning and works in close coordination with the SPGs. As a federally designated Regional Transmission Organization, MISO has the responsibility of developing plans for maintaining the transmission system throughout the MISO footprint.

Q: Is it necessary to consider regional impacts when performing transmission planning?

A: Yes, it certainly is. We want to provide a transmission grid that operates as efficiently as possible. Rather than identify a separate plan for each transmission need, we as transmission planners look for synergies of potential transmission projects that will address multiple needs within a region. What geographic area encompasses a region varies from study to study but it is generally broader than a single utility's service area. Also, because of the regional nature of the transmission system, transmission additions can have a far-reaching impact on the system. We have to ensure that new additions do not have unanticipated adverse impacts on other parts of the grid.

Q: Are there regional needs for additional transmission in the region that includes North Dakota, South Dakota and Minnesota?

A: Yes, there certainly are. Transmission investment nationally declined in real dollar terms from 1975 to 1998, despite increasing electrical demand. The electrical transmission system in the Dakota's and Minnesota mirrors this trend, consisting primarily of a network of transmission lines, most of which were built several decades ago. Stagnant investment combined with ongoing load growth is causing constraints in the regional transmission system. North Dakota has tremendous energy resources (coal and wind) available to export, but transmission is severely limiting the ability to develop substantial new generation in North Dakota. In reviewing the MISO interconnection queue, ND had over 3,500 MWs of generation interconnection requests. The existing generation exceeds the amount of load in North Dakota and as a result relies on the transmission system to move the power out of North Dakota.

IV. TRANSMISSION PLANNING FOR BIG STONE

Q: Can you describe generally the transmission planning process that has been undertaken to accommodate the proposed second unit at Big Stone?

A: Transmission planning to determine the preferred way to accommodate a plant like a Big Stone Unit II has been under way for several years and will continue into the future, even beyond the time the proposed lines are constructed and placed into operation. Planning in this case is similar to planning in other situations as well.

The first step in any planning for additional generation is to conduct a screening study to identify possible ways to provide an interconnection for the proposed generating facility, and that is what was done here. The Big Stone Screening Study (May 2004) is

attached as Exhibit No. _____ (TR-1). Once the possible transmission options are narrowed to a manageable number of potential solutions, MISO requires an interconnection study to determine the impact of the new generating source on the existing grid. That was done here too, and the Interconnection Study (November 2004) is attached as Exhibit No. _____ (TR-2).

The next step is to conduct a Delivery Service Study. This is a study completed in response to requests for delivery of the electric power to be generated, and is designed to identify the impacts of the proposed project over a broader geographic basis. A Delivery Service Study identifies whether any transmission infrastructure is required to deliver the power to the intended consumers. We have recently finalized the study for the Big Stone project.

Q: Are additional studies performed after completion of the Delivery Service Study?

A: Yes, additional studies will continue to identify any transmission or equipment upgrades or other projects that might be required to optimize the system once the new transmission lines are in operation.

Of course, while all this planning is going on, planners must be constantly alert to other possible changes in the system, such as new generating facilities and additional transmission lines. With respect to the Big Stone Transmission Interconnection Project, the Co-owners have taken into account the proposed CapX 2020 projects and other possible developments in the region.

Q: In the transmission studies completed for the Big Stone II transmission project, did you look at the possibility of serving multiple needs?

A: Yes, we did. We not only considered what was necessary to provide an interconnection to the Big Stone Plant, but we also took into account what other functions these new transmission lines might serve and how these new lines would best fit into regional transmission planning.

V. INTERCONNECTION STUDY

Q: What is an interconnection study?

A: An interconnection study is a technical study to determine what impact a new source of electric generation would have on the existing transmission grid. An interconnection study is performed to determine what facilities are required to interconnect a proposed generator to the transmission grid, whether the existing grid can handle the additional power, and what new transmission infrastructure might be required to address the expected impacts of the new generation source. The generation interconnection process, which is governed by the Federal Energy Regulatory Commission (FERC) and administered by MISO, requires all new generation projects to undergo an interconnection study to determine the potential impacts.

Q: Why does MISO administer the interconnection process?

A: The Big Stone Plant is located in an area within MISO's jurisdiction and MISO administers its FERC-approved tariff on behalf of transmission owners.

Q: If the Interconnection Study is under the responsibility of MISO, why did Otter Tail take the lead in conducting the study?

A: It is common practice for MISO to contract with a transmission owner to perform the interconnection study. This is done for a couple of reasons. The first reason is related to the number of generation interconnection requests the MISO receives. The studies are complicated, time consuming, and MISO simply does not have enough internal resources to complete the studies. As a result, MISO looks to hire a contractor to perform the studies. The second reason MISO often asks the transmission-owning utility to conduct interconnection studies is the recognition that the utility staff are normally the most knowledgeable about the transmission system in their area.

Q: What was the main conclusion of the Big Stone Interconnection Study?

A: The main conclusion of the study is that one of two options would adequately handle the addition of Big Stone Unit II: 1) a new line from Big Stone to Morris, Minnesota, and a new line from Big Stone to Granite Falls, Minnesota, or 2) a new line from Big Stone to Willmar, Minnesota, and a new line from Big Stone to Granite Falls, Minnesota. In either case, a new line from Big Stone to Granite Falls is a part of the overall solution.

Q: And what is the status of the study?

A: The Interconnection Study was submitted to both the MISO and the MAPP DRS in mid-August. On September 18, 2006 the MAPP DRS conditionally approved the Big Stone Interconnection Study. MAPP DRS identified three conditions that needed

following up on: the first is addressing local stability, the second involves running additional transient stability simulation on the Minnesota-Wisconsin Stability Interface, and the third is simply to inform the MAPP DRS which alternative the Minnesota Public Utilities Commission prefers in its siting proceedings. We are taking steps to address these routine contingencies and expect to have final approval no later than the end of January 2007.

MISO is currently reviewing the Interconnection Study, and it is our understanding that the only outstanding issue necessary for MISO to approve the study is to address the local stability issue that was also identified by the MAPP DRS. We anticipate that the MISO will approve the interconnection study within the next two months.

VI. BIG STONE TRANSMISSION INTERCONNECTION PROJECT

Q: What have the Co-owners decided is the preferred transmission alternative?

A: The Big Stone Unit II Co-owners have requested that the Minnesota Public Utilities Commission issue a certificate of need to construct a new transmission line between the Big Stone Plant and Granite Falls, Minnesota, which will be designed capable of operating at 345 kV but which will most likely initially operate at 230kV; and to construct a new 230 kV line between the Big Stone Plant and Morris, Minnesota, which for the most part will actually be an upgrade of the existing Big Stone – Morris 115 kV line. This certificate of need application is pending.

Q: Are any additional studies required before the Co-owners can decide on the best way to proceed?

A: No. All of the necessary studies have been concluded to the point we deem is sufficient to make decisions in accordance with prudent utility practice. Transmission planning, of course, is an ongoing endeavor; while more information is always helpful, at some point a utility must decide on a course of action. The studies that have been done to date to analyze the Big Stone Unit II interconnection request provide enough information to allow us to confidently say that the proposed transmission lines will safely, economically, and reliably serve our customers.

Q: Please summarize the reasons for preferring the Morris Line to the Willmar area Line.

A: The Morris Line is preferred because it is shorter, and therefore less costly. It performs better from the standpoint of line losses, and the ability to utilize an existing line corridor minimizes the impact on the environment. In contrast, a new line from Big Stone to Willmar would require a new transmission line corridor for nearly the entire length.

Q: Have you identified any other regional benefits of the Big Stone Unit II project?

A: Yes we have. The North Dakota Export (NDEX) transmission constraint is a well known transmission limit in the region. Past operating experience with Big Stone Unit I

has demonstrated that generation at the Big Stone location has a positive impact on the NDEX constraint.

Q: Can you please explain how a generator in South Dakota can have a benefit to a constraint in North Dakota?

A: Yes. First, let me provide some background. The NDEX constraint actually includes more than North Dakota, it includes a portion of western Minnesota and eastern South Dakota. I have attached a map as Exhibit No. _____ (TR-3) that shows the transmission facilities that make up the NDEX boundary. One of the primary limiters for the NDEX constraint is a phenenmon known as transient stability. Transient stability is a complicated issue, but it is a result of having large amounts of generation that are remotely connected to large load centers through a long or relatively weak transmission system. North Dakota is a classic example of an area that has large amounts of generation (substantially more than what can be consumed in North Dakota) that is connected through a long transmission system to a major load center of Minneapolis and St. Paul. When a transmission line that connects the remote generators with the large load center trips out of service, the remaining transmission lines must be able to absorb the power that was on the transmission line that went out of service and the power must be redirected. In this situation, the voltages on the transmission system experience swings, meaning they go from high voltage conditions to low voltage conditions, and if the voltage swing is severe enough, the transmission system can break apart or separate from the rest of the transmission system which could result in wide-spread blackouts.

A significant benefit of locating generation at Big Stone is that it is located midway between the remote generators (western North Dakota) and the large load center (Minneapolis – ST Paul). As a result, Big Stone generation provides a stabilizing effect on the voltage in the region and as result can actually improve the NDEX stability problems.

In today's operation of the transmission system if Big Stone Unit I is off-line, transmission system operating guides require that NDEX transmission limit be reduced by 350 MWs.

Q: Have you done any analysis with Big Stone Unit II and its associated transmission facilities to determine the impact on NDEX stability?

A: Yes we have. A member of my staff, Jason Weiers completed an analysis which I have attached as Exhibit No. _____ (TR-4) to my testimony. This analysis looked at the impact on NDEX stability with and without Big Stone Unit II and its associated transmission.

Q: What were the results of that analysis?

A: The analysis indicates that there is an improvement in NDEX stability performance. It should also be noted that he performed his study with the assumption that the Granite Falls transmission line is sized at 230 kV. At 345 kV we expect we would see even additional improvement.

Q: Does improved stability mean there will be an increase in NDEX available for others?

A: We believe so. I should point out, however, that much more detailed studies will be necessary to confirm an increase, but the results do indicate there is good potential that transient stability will improve and result in an increase in NDEX capability.

VII. DELIVERY SERVICE STUDIES

Q: What is a Delivery Service Study?

A: A Delivery Service Study is a study designed to determine the impacts of delivering power from one point on the transmission system to another point on the transmission system. For example, in the case of the Big Stone Project, the Delivery Study looks at the effects on the transmission system caused by the delivery of the Big Stone generation's output to the loads served by the Co-owners. A Delivery Service Study results from the filing of a request with MISO for transmission service. The Study looks at the effects that delivery may cause over a broad geographic area and identifies possible infrastructure changes that might be required to serve the customers for whom the generation is intended. A Delivery Service Study is an optional study, but for the purposes of ensuring that the generation plant is capable of delivering its output to the generation project Co-owners, a Delivery Service Study is required.

Q: Is a Delivery Service Study required for the Big Stone Transmission Interconnection Project?

A: A delivery service study is not required for every generation project, but the participants in the Big Stone Unit II project have requested that one be completed. Each of the Co-owners has made numerous requests to MISO for delivery of various amounts

of electric power. These requests have been combined to represent the expected delivery from Big Stone Unit II to the participants' load centers, and Otter Tail is conducting one Delivery Service Study for MISO.

Q: What do the results of that study show?

A: The work with respect to identifying facility upgrades necessary to accommodate transmission delivery service has identified that only "change-out" of some existing facilities will be necessary (e.g., some improvements at existing substations and possibly re-conductoring existing lines, but at the same voltage level). Most importantly, the transmission delivery service study results are confirming that *even if* the costs associated with delivery service upgrades were included along with the costs associated with Big Stone Unit II interconnection facilities, the analysis with respect to the preferred interconnection facilities being proposed here (a line to Morris and a line to Granite Falls) would not change.

Q: Have you identified any specific upgrades that will be required?

A: Yes we have. At this point we believe that the following facilities will require upgrades that range from replacing substation equipment, raising transmission structures for obtaining higher line loadings and possibly reconductor existing transmission lines.

- Grant County - Morris 115 kV Line
- Grant County - Elbow Lake 115 kV Line
- Moorhead - Morris 230 kV Line

- Hankinson - Wahpeton 230 kV Line
- Kerkhoven - Kerkhoven Tap 115 kV Line
- Sheyenne - Fargo 230 kV Line

Q: Will these facility upgrades only benefit Big Stone generation?

A: No. Some of these facilities have shown up in load serving transmission studies and some have shown up generation interconnection and delivery studies. For example, the Hankinson – Wahpeton 230 kV line has been identified in generation interconnection studies for generators in North Dakota. Because the Big Stone project will require that these facilities be upgraded, it is essentially eliminating facility upgrades for other projects. This is another example of how regional transmission is.

VIII. PROPOSED FACILITY ADDITIONS

Q: What transmission facilities have been identified as necessary for adding Big Stone Unit II and what are the cost estimates for each:

A: I have attached a list of the facilities, Exhibit No. _____ (TR-5), which identifies their respective cost estimates. It should be noted, however, that since our latest formal estimates have been published, significant progress has been made in eliminating some of the costs associated with delivery service. Therefore, while we have not yet quantified the full amount of cost reductions, we expect the cost projections for transmission facilities to be lower than Exhibit 5 now shows. We will provide updated cost projections as they become available.

IX. SUMMARY

Q: In summary, in your opinion what justifies as prudent Otter Tail's and Montana-Dakota's investment in the identified transmission facilities for Big Stone Unit II?

A: Firstly, all facilities identified by the transmission studies are required for the Big Stone Unit II generation addition. Simply put, if those investments are not made, then the generation will not be allowed to interconnect and/or the output will not be deliverable to Otter Tail's and MDU's (and the other Big Stone II Co-owners') customers. Therefore, the transmission investments are prudent for all the reasons that the generator investments are prudent. Additionally, as explained throughout my testimony, the transmission investments are prudent to address other transmission needs and to enhance the operation of the regional transmission system.

Q: Does this conclude your testimony?

A: Yes, it does.

Exhibit No. _____ (TR-1)
138 pages

Preliminary

Transmission Screening Study

For the

Big Stone II Feasibility Study

Performed by:

Otter Tail Power Company

Delivery Planning Department

May 2004

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0.0 Executive Summary

During early 2004, a preliminary transmission study was completed to determine a transmission plan for integrating a second generating unit at Big Stone into the transmission system. The primary objective of this study was to determine the transmission costs associated with different output levels of a potential Big Stone II unit.

Through the past several months, economic analysis, TLTG analysis, loss analysis and constrained interface analysis have been completed for a variety of transmission alternatives during 2009 summer peak conditions.

A total of eleven different transmission alternatives have been studied to compare each alternatives effectiveness in delivering power from a potential Big Stone II plant to seven separate entities without detrimental impacts to the existing transmission system.

During the economic analysis, the eleven different transmission alternatives varied in cost from as low as $53 million to as high as $168 million. In general, alternatives that include 230 kV transmission have generally cheaper capital costs than alternatives that include 345 kV lines.

Incremental transfer capability analysis was completed. In this analysis, the generation was increased in 25 MW increments up to a total of 750 MW's. At any given output level, transmission system limitations are identified based on single contingency analysis. Through this analysis, it was demonstrated that the transmission system limitations are not significantly different for the lower capital cost alternatives and the higher capital cost alternatives. As a result, the increased upgrade costs associated with the lower capital cost alternatives do not exceed the investment needed for the higher capital cost alternatives.

Loss analysis indicated that those transmission alternatives that had the highest capital costs result in the most effective reduction in system losses where those transmission alternatives that had the lowest capital costs result in the largest incremental system losses as the size of Big Stone II increases.

When scheduling Big Stone II to all of the potential participants simultaneously, constrained interface analysis has shown that all of the transmission alternatives violate the North Dakota Export interface (NDEX). Due to this project requiring new transmission that will likely cross the NDEX interface, more transmission capacity will be introduced thus dismissing NDEX as a valid constraint. A few transmission alternatives that involve 345 kV transmission to the Twin Cities also caused a PTDF violation across the Minnesota – Wisconsin Stability Interface (MWSI), and Prairie Island – Byron constrained interfaces.

Additional study work will be required to determine the necessary transmission additions for the interconnection and delivery of generation to the Big Stone II participants. Below is a list of the additional analyses that will be required through the study process:

- Distribution Factor Analysis – generation-to-load redispatch with inclusion of OTDF interfaces

- Full ACCC Contingency Analysis (n-1) for summer peak, summer off-peak and winter peak conditions
- Select "n-2" contingency analysis for direct outlet facilities to the Big Stone Plant for summer peak, winter peak and summer off-peak conditions
- Transient Stability Analysis for summer peak, winter peak and summer off-peak conditions

These additional study requirements may trigger different study results than those contained within this study report. Variations in study models, origination of study models, as well as prior queued generation and delivery service requests all play into the final study results that will be obtained through the MISO study process.

1.0 Introduction

The purpose of this report is to document the results of a preliminary transmission study for adding a second generating unit at the Big Stone plant.

The current transmission system at Big Stone is not adequate to support the output from a second generating unit therefore the feasibility stage of this effort included a preliminary transmission screening study. The objective of this study is to give some insight of the required transmission for determining the optimal plant size for integrating the unit into the existing transmission system.

The area utilities that joined in this feasibility effort for Big Stone II involved the following utilities:

- Central Minnesota Municipal Power Agency (CMMPA)
- Great River Energy (GRE)
- Heartland Consumers Power District (HCPD)
- Hutchinson Utilities Commission (HUC)
- Missouri River Energy Services (MRES)
- Minnesota Municipal Power Agency (MMPA)
- Otter Tail Power Company (OTP)

A Steering Committee and Technical Studies Task Force were assembled to aid in the project's development. The Technical Studies Task Force provided the necessary information for each utility to OTP in order to develop base assumptions, build base case models, develop transmission alternatives, review study results, and provide guidance through the preliminary transmission screening study.

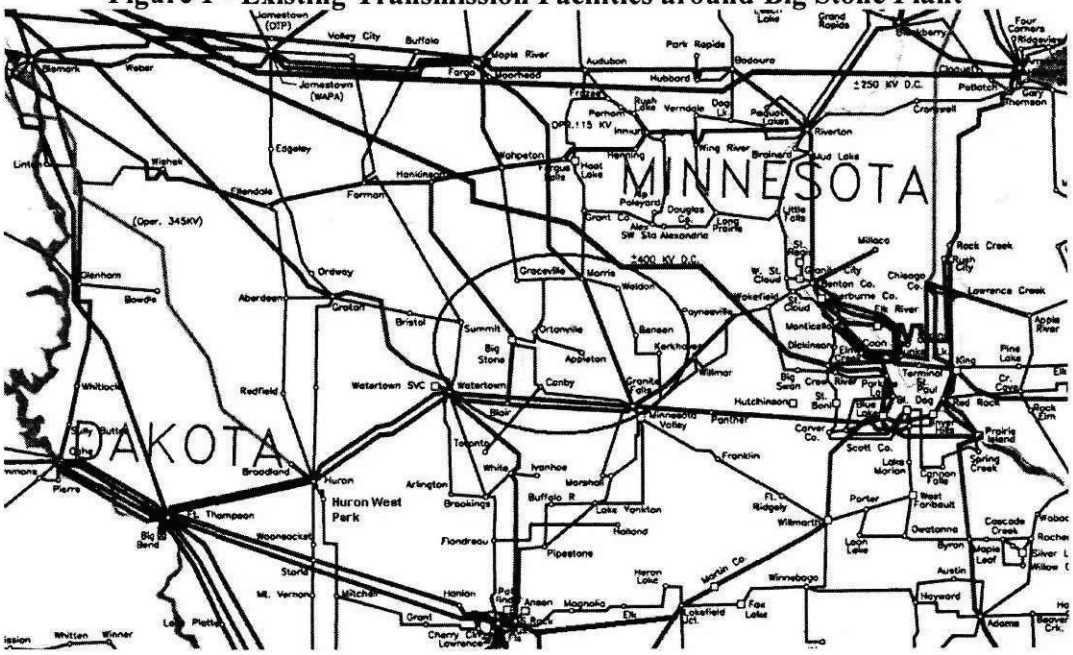
2.0 Existing Big Stone Facilities

The site of the proposed generator is adjacent to the existing Big Stone 1 unit located in northeastern South Dakota. The existing unit at Big Stone is co-owned by Otter Tail Power Company, Northwestern Energy, and Montana-Dakota Utilities. This unit was initially installed during May of 1975. Over the years, generation equipment within the plant has been upgraded to get its accredited generation level within the MAPP region to a net output of 475 MW.

The current transmission system supporting this unit includes two 230 kV lines and two 115 kV lines. The 230 kV lines go north and south of the Big Stone site. The north line is from Big Stone to Browns Valley and ultimately terminates at Hankinson, ND. The south line from Big Stone terminates at Blair, SD. The 115 kV lines from the plant also go north and south. The north 115 kV line terminates at Johnson Junction where it intersects the Graceville – Morris 115 kV line. This line serves loads in and around the vicinity of Ortonville and Appleton. The south 115 kV line terminates at Granite Falls. This line serves loads in and around the vicinity of

Canby and Toronto. Figure 1 is shown below and illustrates the outlet lines from Big Stone and Big Stone's relative location within the MAPP region.

Figure 1 - Existing Transmission Facilities around Big Stone Plant



3.0 Big Stone II Transmission Alternatives

The Technical Studies Task Force held a conference call on January 29, 2004 to discuss the assumptions in developing the base case models. During this conference call, the following assumptions were agreed upon:

- Start with 2009 Summer Peak models from the MAPP Reliability Study Group formed as part of the MISO Baseline Reliability Study
- Include all planned southwest Minnesota wind facilities
- Stress local transmission by including all existing peaking and wind generation in the study area
- Scheduling of the Big Stone II unit would be a total of 601 MW's as follows:
    - CMMPA = 76 MW's
    - GRE = 100 MW's
    - HCPD = 75 MW's
    - HUC = 50 MW's
    - MMPA = 100 MW's
    - MRES = 100 MW's
    - OTP = 100 MW's

During the conference call and based on input from others following that January 29th conference call, the following list of transmission alternatives were developed.

Figure 2 - Transmission Alternatives Developed for Big Stone II Screening Study

Alternative #	Description	Mileage
1	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate	90
2	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - Willmar - Blue Lake 345 kV Line	175
3	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - Willmar - West Waconia 345 kV Line with	158
	Dickinson - West Waconia - Wilmarth 345 kV Line	44
3b	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - Willmar - West Waconia 345 kV Line with	158
	Dickinson - West Waconia - Blue Lake 345 kV Line	64
4	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - Blair - White 345 kV Line with	69
	Ivanhoe - Lyon County 115 kV Line	35
5	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with	47
	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Blair - Lyon County 230 kV Line with	63
	Lyon County - Franklin 115 kV Line	40
6	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - 6 Mile Grove 230 kV Line with	46
	Morris - 6 Mile Grove 230 kV Line with	60
	Benson - 6 Mile Grove - Kerkhoven 115 kV Line	32
7	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - 6 Mile Grove - Willmar 230 kV Line with	102
	Morris - 6 Mile Grove 230 kV Line with	60
	Benson - 6 Mile Grove - Kerkhoven 115 kV Line	32
8	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with	156
	Morris - 6 Mile Grove 230 kV Line with	60
	Benson - 6 Mile Grove - Kerkhoven 115 kV Line	32
9	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with	156
	Morris - 6 Mile Grove 230 kV Line with	60
	Benson - 6 Mile Grove - Kerkhoven 115 kV Line with	32
	Dickinson - West Waconia - Wilmarth 345 kV Line	44
9b	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with	90
	Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with	156
	Morris - 6 Mile Grove 230 kV Line with	60
	Benson - 6 Mile Grove - Kerkhoven 115 kV Line with	32
	Dickinson - West Waconia - Blue Lake 345 kV Line	64

The preliminary study analysis focused on these eleven transmission alternatives. Geographic maps illustrating these conceptual transmission alternatives are shown in Appendix A.

4.0 Model Development

As mentioned previously, the 2009 summer peak model from the MAPP Reliability Study Group (RSG) was the base case model for the Big Stone II study work. This model was part of the 2003 NERC MMWG model series that had 2008 summer peak MAPP model updates inserted into it from the 2003 series MAPP model series.

In developing the 2009 summer peak base case, various updates were applied to the model. These updates included adding all of the wind generation in the Buffalo Ridge area of Southwest Minnesota. Input was obtained from Xcel Energy in placing the wind generation at realistic locations with the expected installed nameplate capacity at each site. A generation level of approximately 825 MW's was modeled with the expected transmission line upgrades and new projects associated with the 825 MW level. Appendix B includes a list of the specific Buffalo Ridge generation and transmission projects applied to the base summer peak model.

In addition to maximum wind generation, existing generation in the vicinity of Big Stone was turned on to maximum output to stress the transmission system. This generation included sites such as Anson, Marshall, Lake Preston, Lakefield Generating Station, and Pleasant Valley. For each corresponding generation increase, there was an equal generation reduction taken at peaking facilities located in the same control area. This practice was utilized so as to not impact the existing control area interchange schedules originally embedded within the models. Appendix B includes a list of the specific generation changes applied to the base summer peak model.

Once all of the generation and topology changes were applied to the base case model without the addition of Big Stone II, the following interface ties were calculated for the 2009 summer peak base case:

- MHEX = 1495.8 MW
- NDEX = 655.6 MW
- MWSI = 297.3 MW

Since this case was a summer peak model, high simultaneously transfers through the MAPP region were not modeled. High transfers through the MAPP region are the most stressed conditions for the transmission system; however they are most common during summer off-peak conditions. This preliminary study only investigated a summer peak case.

Once this summer peak base case was established, the eleven different transmission alternatives were added to the case to create eleven separate summer peak cases. These eleven summer peak cases were then taken individually and had the Big Stone II generator added to them and dispatched on the following basis:

- Scheduled Big Stone II at 601 MW's as follows:
    - CMMPA = 76 MW's
    - GRE = 100 MW's

- HCPD = 75 MW's
- HUC = 50 MW's
- MMPA = 100 MW's
- MRES = 100 MW's
- OTP = 100 MW's

The following sections of this report will discuss the various types of analysis that has been completed for this preliminary study and the relative performance of the various transmission alternatives.

5.0 Economic Analysis

A preliminary economic analysis was completed to assign capital costs to each alternative considered during the Big Stone II preliminary transmission study. The basis for assigning costs to each alternative was from the *1998 Update to the 1997 MAPP Regional Plan* published by the MAPP Transmission Planning Subcommittee (TPSC). This update to the 1997 plan included a spreadsheet for calculating costs of new transmission lines based on line length, number of terminals, size of transformers, and size of capacitor banks.

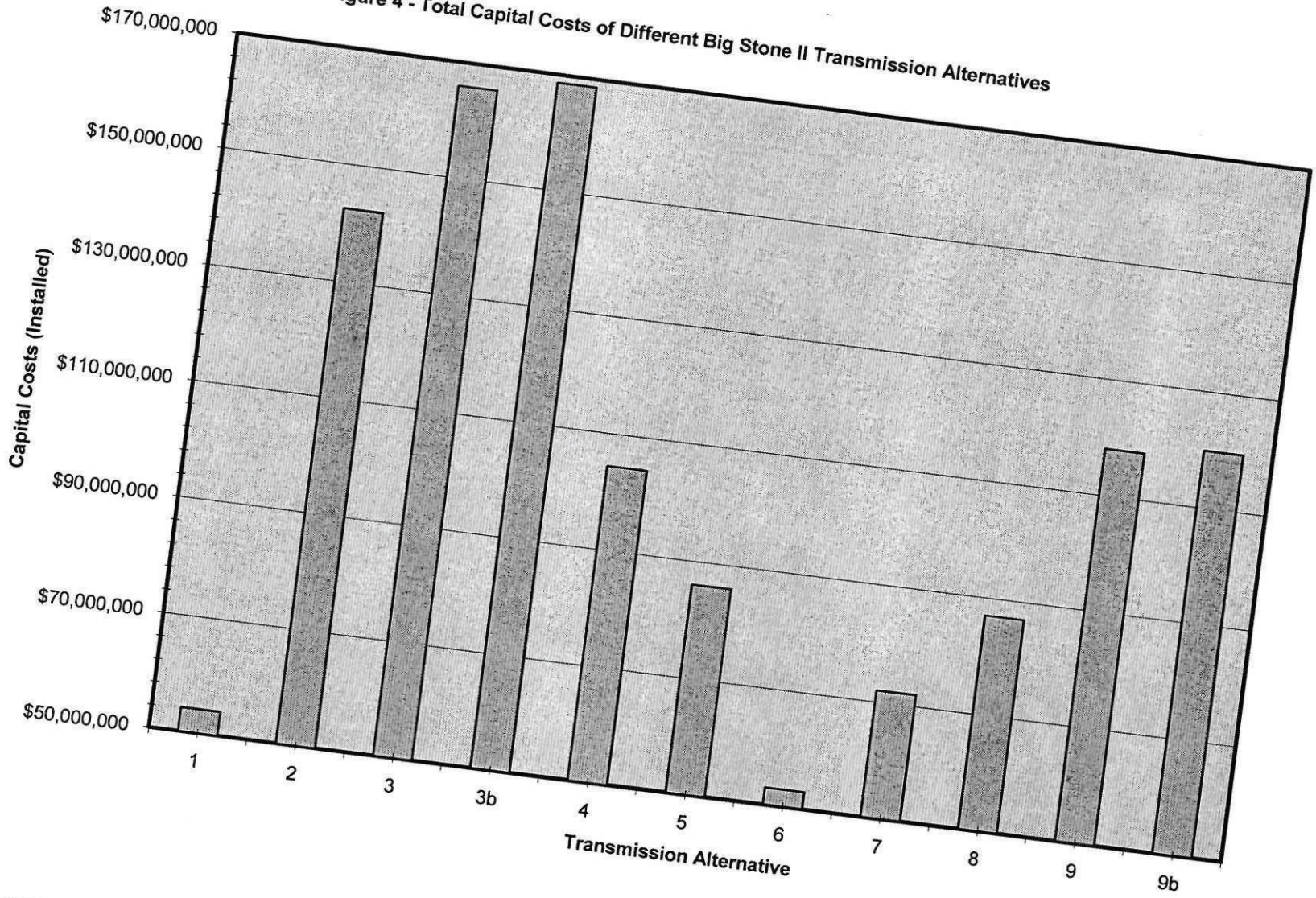
Since the costs derived from this spreadsheet were based on 1998 dollars, a 2% inflation rate was applied to estimate 2004 dollars. Figure 3 is shown below and displays the capital costs for each project. It is important to note that system losses or facility upgrades due to third party impacts are not factored into these capital costs.

Figure 3 – Capital Costs for the Big Stone II Transmission Alternatives

Alternative #	Description	Capital Cost
1	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate	$ 54,155,743.04
2	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - Blue Lake 345 kV Line	$ 142,379,306.96
3	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	$ 165,853,036.43
3b	*Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with* Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	$ 168,626,188.87
4	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Blair - White 345 kV Line with Ivanhoe - Lyon County 115 kV Line	$ 104,331,909.63
5	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Blair - Lyon County 230 kV Line with Lyon County - Franklin 115 kV Line	$ 86,005,023.96
6	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	$ 52,996,899.39
7	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	$ 72,006,521.02
8	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	$ 87,001,373.64
9	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	$ 118,047,419.21
9b	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	$ 119,799,727.94

These capital costs are shown graphically in Figure 4, which can be found on the following page. Detailed cost for each individual transmission alternative can be found in Appendix C.

Figure 4 - Total Capital Costs of Different Big Stone II Transmission Alternatives



As can be seen within figures 3 and 4, transmission alternative costs range between approximately $53 million to $168 million dollars. The least expensive transmission alternatives (1 and 6) are those alternatives that do not include any 345 kV transmission. All of the higher cost transmission alternatives (2, 3, 3b, 4, 9, and 9b) include some length of 345 kV line, which increases these transmission costs over those of the 230 kV transmission alternatives.

6.0 TLTG Analysis

The PSS/E activity TLTG (Transmission Interchange Limit Analysis) estimates the transmission interchange limits of a user-defined subsystem while applying single contingencies. Power transfer from a user-defined source to a user-defined sink is incremented to a specified limit while monitoring branch loadings. At any given transfer level, potential loading violations are reported in an output file for system intact and contingency conditions.

In the output file, each overloaded branch has a calculated power transfer distribution factor (PTDF) or a line outage distribution factor (LODF). During this analysis, any branch exceeding 100% of its emergency rating was recorded as a criteria violation. Overloaded branches were considered valid limiters if the PTDF or LODF quantities exceeded 2% of the transfer level.

For this particular study, the 2009 summer peak case was used with a defined source of the Big Stone II generator. The analysis assumed a 750 MW maximum transfer from Big Stone II to generation resources for each of the seven potential Big Stone II participants. Generation up to 750 MW's was analyzed to determine if there was a drastic increase in transmission upgrade costs beyond the base 601 MW generation level. The generator redispatch from Big Stone II to each party's respective generators is proportionally based on specified participation factors. As a 601 MW project, the following participation factors were used for TLTG analysis as determined by each participant's MW allocation.

Figure 5 - Specified Sinks for TLTG Analysis

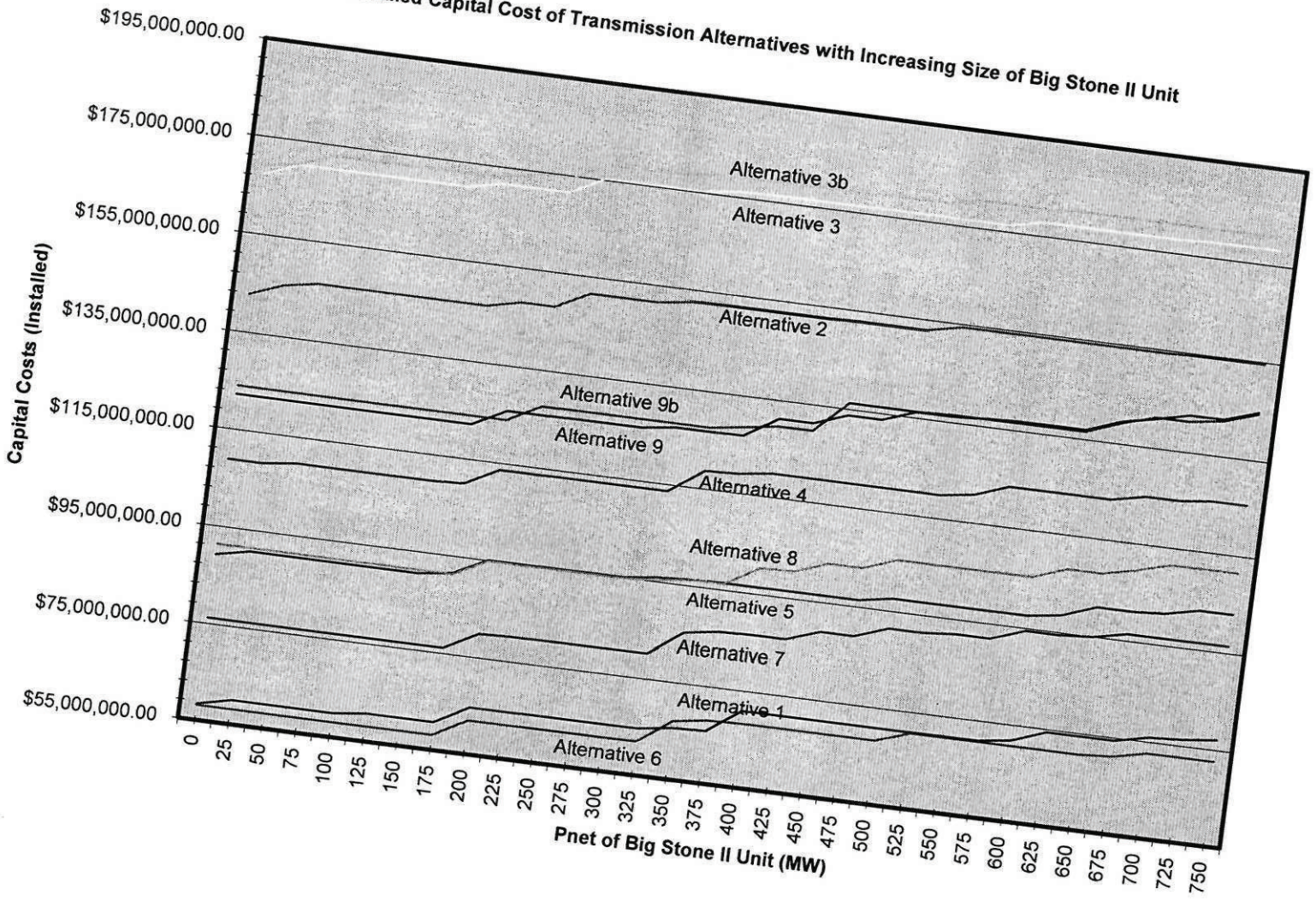
Big Stone II Participant	MW Allocation	TLTG Participation Factor
OTP	100 MW's	16.64%
MRES	100 MW's	16.64%
MMPA	100 MW's	16.64%
GRE	100 MW's	16.64%
HUC	50 MW's	8.32%
HCPD	75 MW's	12.48%
CMMPA	76 MW's	12.64%

Output tables generated by TLTG analysis were scrutinized to individually identify each constraint as it was identified during the analysis. For the list of overloaded facilities encountered during each TLTG simulation, a reconductor or rebuild cost was assigned to fixing each overload based on an upgrade or reconductor cost per mile. Likewise, transformer overloads were assumed to be changed out by a larger capacity transformer with an assigned cost based on the voltage level and MVA size of the transformer.

Incremental cost charts were created to graphically illustrate the expected cost of transmission with the increasing size of the Big Stone II unit. The base capital cost for each transmission alternative was assumed at a Big Stone II level of 0 MW's and increased incrementally for each existing transmission constraint encountered when scheduling the power out of Big Stone II to the seven potential Big Stone II participants.

The results from the TLTG analysis for the 2009 summer peak case with each transmission alternative are shown below in figure 6 while scheduling 750 MW's from Big Stone II to the respective participants of the project.

Figure 6 - Total Installed Capital Cost of Transmission Alternatives with Increasing Size of Big Stone II Unit



As can be seen from figure 6, transmission alternatives 6 and 1 are the least cost options. Recalling the capital cost quantities, alternatives 6 and 1 were also the lowest capital cost alternatives since they did not involve any 345 kV lines. Figure 6 indicates that even with all of the existing system constraints identified during TLTG analysis, these two transmission alternatives are still approximately $20 million dollars cheaper than the next cheapest alternative (7) when Big Stone II output is at 750 MW's. Noticing the slope of the lines contained within figure 6 indicates that each transmission alternative hits many of the same transmission constraints; however, these constraints are encountered at different generation levels of Big Stone II. Overall, it appears that those transmission alternatives involving a higher capital cost have a lower incremental cost as the size of Big Stone II is increased. At the 601 MW generation level, it appears that the ordering of transmission alternatives from the least capital cost to the greatest capital cost does not change from the ranking previously identified during the capital cost analysis.

Detailed lists of all the existing transmission constraints encountered during the TLTG analysis can be found in Appendix D.

7.0 Loss Analysis

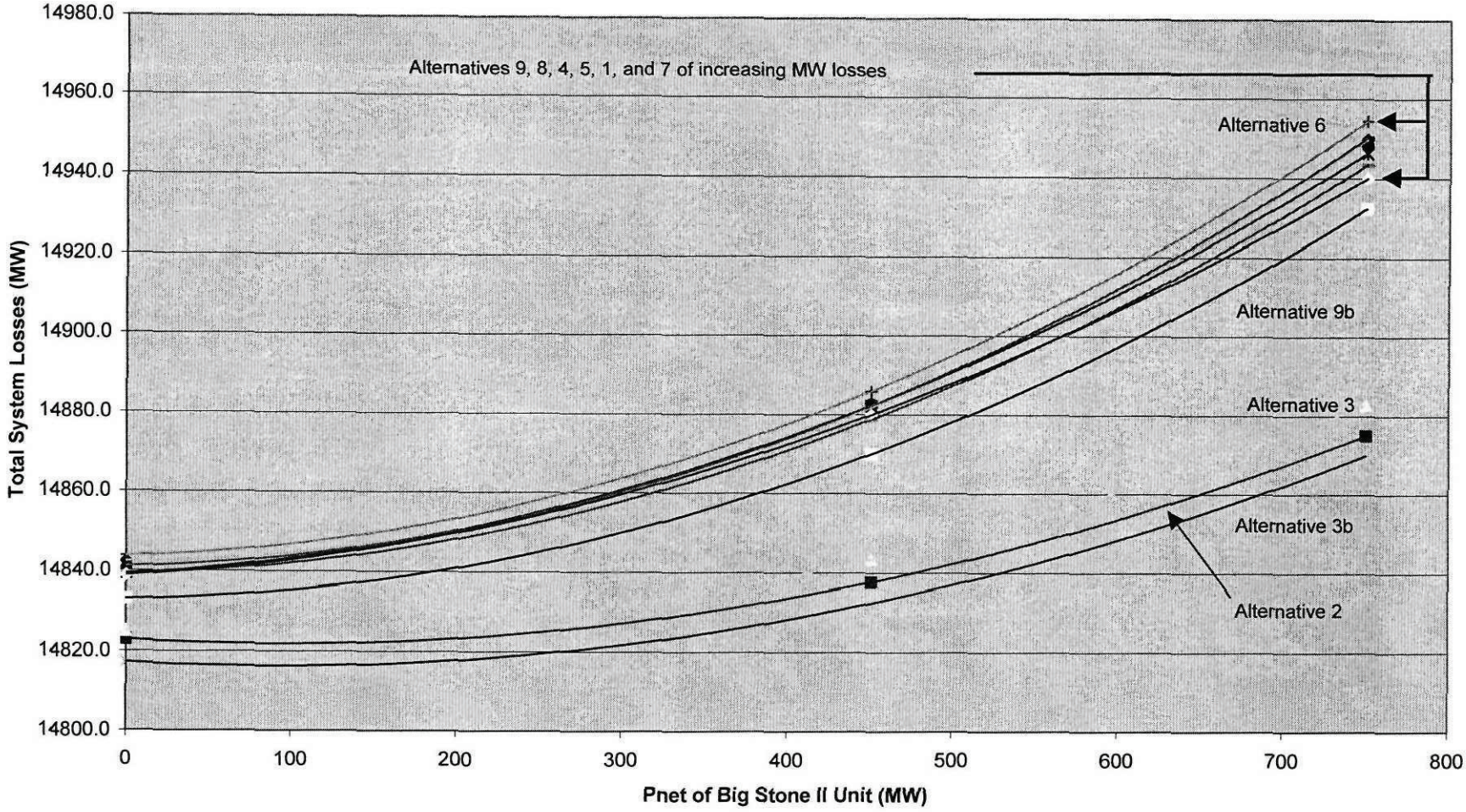
The 2009 summer peak, system intact case has been used to determine the losses associated with each of the eleven transmission alternatives. For this analysis, losses were identified at three generation levels and then plotted in Microsoft Excel and fitted with a trend line of order 2. These three generation levels were 0 MW without transmission (base case), 0 MW with transmission, 451 MW with transmission, and 750 MW with transmission. The following table shows the losses for each transmission alternative and how losses vary from one generation level to another.

Figure 7 - Total System Losses for Varying Levels of Output from Big Stone II

Alternative #	Description	Base Case 0 (Base Case)	Add Xmsn 0	Xmsn Case - Base Case	Pnet at 451	451 Case - Xmsn Case	Pnet at 750	750 Case - Xmsn Case
1	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate	14885.0	14842.4	-42.6	14881.9	39.5	14949.9	107.5
2	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - Blue Lake 345 kV Line	14885.0	14823.0	-62.0	14837.7	14.7	14875.0	52.0
3	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	14885.0	14825.1	-59.9	14843.5	18.4	14882.9	57.8
3b	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	14885.0	14817.3	-67.7	14832.4	15.1	14869.9	52.6
4	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Blair - White 345 kV Line with Ivanhoe - Lyon County 115 kV Line	14885.0	14839.3	-45.7	14882.3	43.0	14946.4	107.1
5	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Blair - Lyon County 230 kV Line with Lyon County - Franklin 115 kV Line	14885.0	14840.2	-44.8	14882.7	42.5	14948.3	108.1
6	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV	14885.0	14843.8	-41.2	14886.0	42.2	14954.5	110.7
7	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV	14885.0	14841.2	-43.8	14882.3	41.1	14950.3	109.1
8	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV	14885.0	14839.4	-45.6	14878.8	39.4	14943.5	104.1
9	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Dickinson - West Waconia - Wilmarth 345 kV Line	14885.0	14838.9	-46.1	14880.0	41.1	14940.0	101.1
9b	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Dickinson - West Waconia - Blue Lake 345 kV Line	14885.0	14833.1	-51.9	14870.0	36.9	14932.4	99.3

Plotting the total system losses as points on a graph and using a trend line of order 2 gives a relative idea of how each of the transmission alternatives compare to one another at increasing levels of Big Stone II generation. This graph can be found on the following page in figure 8.

Figure 8 - System Losses for Each Different Transmission Alternative



As can be seen from figures 7 and 8, the transmission alternatives that involve 345 kV lines result in the largest reduction in system losses with increasing output from Big Stone II. At the 750 MW generation level, transmission alternatives 2, 3, and 3b have decreased system losses over the base case without transmission, as well as the case that includes Big Stone II; whereas some transmission alternatives, such as 1, have a net increase of 65 MW's in losses over the base case, which corresponds to approximately 8.6% of the total output of Big Stone II when scheduled at 750 MW's.

In general, those transmission alternatives that had the highest capital costs result in the most effective reduction in system losses where those transmission alternatives that had the lowest capital costs result in the largest incremental system losses as the size of Big Stone II increases.

Appendix E contains specific loss data by control area for the 0 MW, 451 MW, and 601 MW generation levels of Big Stone II.

At the time of this preliminary loss analysis, an economic value was not placed on losses.

8.0 Technical Studies Task Force Meeting

The Technical Studies Task Force (TSTF) of Big Stone II participants met on March 16, 2004 at MMPA's offices. The following people were present at the meeting:

Joe Jubert	GRE	Brian Zavesky	MRES
Dave Kempf	GRE	Rick Gonzalez	Excel Engineering
Patrick Spethman	HUC	Steve Thompson	CMMPA
Don Nelson	HUC	Randy Porter	MMPA
Jason Weiers	OTP	John Knofczynski	HCPD (via phone)

The meeting focused on reviewing the TLTG analysis results and loss analysis results obtained to date. The group was in agreement with the study techniques employed in carrying out these types of analyses.

8.1 Construction Costs

The task force agreed that construction costs seem reasonable for transmission lines in rural areas, but should be inflated by 50% for line construction in the suburban areas. Furthermore, with the increased steel prices lately, the task force felt it was necessary to increase all termination costs by 10% for steel associated within the substation (bus work, bus supports, etc...). The task force also believed that a reconductor cost of $98,000 / mile may be a high so $75,000 was agreed upon when reconductoring existing lines identified during TLTG analysis.

8.2 Loss Analysis

The task force discussed some assumptions in assigning a dollar value to losses. The following parameters were agreed upon for a "first cut" loss analysis.

Capacity Costs = $400 / kW	Project Life = 35 years
Energy Costs = $30 / MWh	Loss Life = 20 years

Annual Interest Rate = 6.00% Levelized Fixed Charge Rate (LFCR) = 16%

8.3 Next Steps

General discussion among the task force members led to the following action items identified for future action:

1. Take a more in depth look at the loss analysis with capacity and energy quantities
2. Test a new 230 kV transmission option to West St. Cloud (called alternative "7b")
3. Look at less transmission out of the Big Stone Plant
    a. Do not include both 230 kV uprates for alternatives that include 345 kV lines
4. Determine the minimum amount of transmission necessary for a 300 MW plant
5. Alternatives that include 345 kV lines – Perform TLTG analysis without the 230 kV lines
6. Alternatives that include 230 kV lines – Perform TLTG analysis with only 1 230 kV line
7. Run TLTG analysis to a higher generation level the determine the transmission breakpoints
8. Create a 2009 summer off-peak case
9. Perform TLTG analysis on summer off-peak case
10. Perform Stability analysis on summer off-peak case
11. Perform "n-2" contingency analysis on summer off-peak case
12. Perform TLTG analysis with increasing generation on Buffalo Ridge (SW MN)

A future face-to-face task force meeting will be held once more study results become available.

8.4 Meeting Follow-Up

As a follow-up to the March 16 TSTF meeting, Rick Gonzalez of Excel Engineering provided an updated capital cost chart based on the loss assumptions that were discussed at the TSTF meeting. This chart was emailed out to the TSTF and is shown below in Figure 9.

Figure 9 - Capital Costs for Big Stone II Transmission Alternatives with Equivalent Installed Cost Based on One Set of Loss Value Assumptions (Performance at 750 MW unit size)

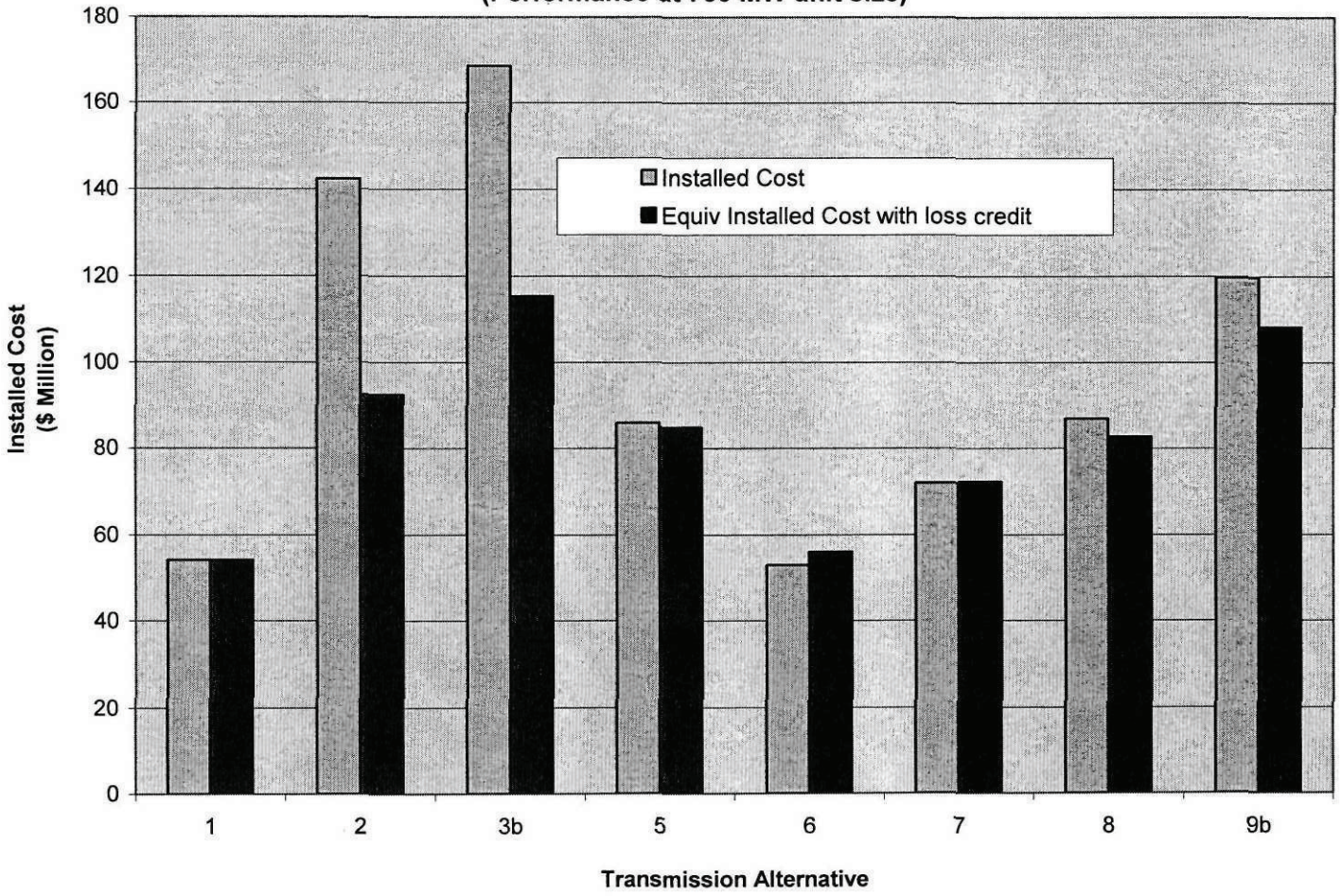


Figure 9 illustrates the equivalent installed capital cost of the remaining transmission alternatives with a loss credit based on the assumptions derived among the TSTF members with the losses normalized to alternative 1. Based on figure 9, the ranking of the transmission alternatives from lowest capital cost to highest capital cost do not vary when the losses are normalized to alternative 1. It is evident that the most expensive transmission alternatives are reduced to quantities closer to the cheaper transmission alternatives when including a value for losses. It is important to note that these equivalent capital costs for transmission are based on one set of loss assumptions that could vary from utility to utility based on their current business practices.

Other follow-up items identified during the Technical Studies Task Force meeting had not been completed due to time constraints and the timing of the Midwest ISO's involvement in this project.

9.0 Distribution Factor Analysis

Favorable study results from a generator interconnection study do not guarantee delivery of the power to a specific market. However, this preliminary study work did take a "first pass" look at one aspect of delivery (constrained interfaces) to give an idea of potential constraints that may be encountered during a subsequent delivery service study. This particular analysis considered a generation-to-generation redispatch to each of the potential Big Stone II participants.

Constrained interface analysis was performed to determine the power transfer distribution factors (PTDF) over a certain group of transmission line(s) that compose a constrained interface when adding the proposed 601 MW generation plant at Big Stone. The 2009 summer peak case was examined with a generation-to-generation PTDF. To calculate the generation-to-generation PTDF, each respective parties' identified generation was scaled down by their respective allocations to match their MW share of the Big Stone II project.

Distribution factors for this preliminary study were calculated based on the following equation:

$$\text{Distribution Factor} = \frac{\text{(MW flow after generation addition)} - \text{(MW flow before generation addition))}}{\text{(Amount of generation addition)}}$$

In order to calculate the distribution factors, two separate methods were used to compare the eleven separate transmission alternatives. The first methodology applied had each Big Stone II partner dispatched individually. This took each respective partner and redispatched power from Big Stone II to a specific generator identified by each participant's representative on the Technical Studies Task Force. The second methodology applied dispatched the entire Big Stone II project as a whole to all entities simultaneously. This methodology would have had the denominator of the distribution factor set at 601 MW's versus dispatching each participant individually and having the denominator based on each participant's share of the project.

PTDF's apply to a set of constrained interfaces and are applicable during system intact conditions and must not exceed 5% for MISO studies. OTDF's are applicable to a different set of constrained interfaces that are stressed during certain outages and must not exceed 3% for

MISO studies. A generation-to-generation redispatch as well as a generation to load redispatch is necessary in evaluating the potential impact of delivering the new generation to a specific market. For this preliminary study, only PTDF constrained interfaces were studied. Furthermore, a generation-to-generation redispatch was the only redispatch pattern tested during this simulation. Figure 10 illustrates the PTDF quantities obtained when dispatching all of the Big Stone II participants as a whole.

Figure 10 – PTDF Quantities when Dispatching all Big Stone II Participants Simultaneously

	Transmission Alternative										
Flowgate	1	2	3	3b	4	5	6	7	8	9	9b
ARN-HAZLTN	3.20%	1.00%	1.20%	0.90%	3.70%	3.10%	3.20%	3.20%	2.90%	2.70%	2.60%
COOPER_S	-1.40%	-1.10%	-1.20%	-1.20%	-1.10%	-1.50%	-1.50%	-1.60%	-1.50%	-1.60%	-1.60%
ECL-ARP	-2.10%	-0.20%	-0.40%	-0.10%	-2.60%	-2.10%	-2.20%	-2.10%	-1.90%	-1.70%	-1.60%
FT CAL_S	4.10%	4.20%	4.20%	4.10%	4.90%	4.10%	4.10%	4.00%	4.10%	4.00%	4.00%
GGS	-2.20%	-2.40%	-2.50%	-2.40%	-2.40%	-2.30%	-2.30%	-2.30%	-2.30%	-2.40%	-2.40%
GRIS_LNC	2.70%	1.90%	1.80%	1.80%	2.20%	2.60%	2.60%	2.50%	2.40%	2.30%	2.30%
LACYGNE_N	1.00%	0.70%	0.80%	0.80%	1.00%	1.00%	1.10%	1.10%	1.00%	1.00%	1.00%
LKM-WFB	-2.30%	-2.40%	-2.30%	-2.40%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%
MHEX_N	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%
MHEX_S	0.20%	0.20%	0.10%	0.10%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-0.40%	0.40%	0.30%	0.50%	-0.90%	-0.30%	-0.30%	-0.30%	-0.20%	0.00%	0.00%
MP_EXPORT	-0.30%	-0.70%	-0.70%	-0.80%	0.10%	-0.20%	-0.20%	-0.20%	-0.20%	-0.30%	-0.30%
MWSI	-0.30%	5.30%	4.40%	5.40%	-1.70%	-0.20%	-0.50%	-0.20%	0.30%	0.90%	1.30%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	77.50%	80.40%	80.20%	80.40%	77.60%	77.60%	77.00%	77.30%	77.40%	77.50%	77.60%
NI_WUMS	0.70%	-0.10%	0.00%	-0.20%	0.90%	0.70%	0.70%	0.70%	0.60%	0.50%	0.50%
PRI-BYN	1.80%	5.50%	4.80%	5.60%	0.80%	1.90%	1.70%	1.90%	2.20%	2.60%	2.90%
QUAD-ROCKC	0.70%	0.30%	0.30%	0.30%	0.80%	0.70%	0.80%	0.70%	0.60%	0.60%	0.60%
QUADCITY_W	1.30%	1.10%	1.20%	1.20%	1.10%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%
WNE_WKS	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.20%	-0.20%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	-7.10%	4.80%	-7.00%	4.90%	-10.30%	-7.20%	-7.40%	-7.00%	-6.10%	-7.60%	-3.40%

As can be seen from Figure 10, all of the transmission alternatives violate the NDEX constrained interface. Due to this project requiring new transmission that will likely cross the NDEX interface, more transmission capacity will be introduced thus dismissing NDEX as a valid constraint. Transmission alternatives 2 and 3b, which involve 345 kV transmission to the Twin Cities, also cause a PTDF violation across the Minnesota – Wisconsin Stability Interface (MWSI), and Prairie Island – Byron constrained interface. The Prairie Island – Byron 345 kV line is actually part of the MWSI constrained interface definition, therefore these two violations can actually be dismissed as only 1 valid violation. Transmission alternative 3 has PTDF quantities across MWSI and Prairie Island – Byron higher than 4%, which were flagged during this preliminary analysis due to the uncertainty of this study model and how it will ultimately compare with the actual model that MISO will use for the system impact study. Furthermore, the

Fort Calhoun South interface is also a concern since PTDF quantities are over 4% that may be bumped over 5% depending on which model MISO uses for the system impact study.

Compared with the scenario of dispatching each of the Big Stone II participants individually, the methodology of dispatching all of the participants simultaneously results in only 1 constrained interface (NDEX) being violated for the majority of transmission alternatives considered. Dispatching Big Stone II individually to the participants results in all the transmission alternatives violating 8 separate constrained interfaces. Dispatching the proposed generation to all of the Big Stone II participants simultaneously results in a power flow canceling effect, which reduces the number of interface violations from eight to one for a majority of the transmission alternatives considered.

Appendices F.1 and F.2 include power flows on each of the transmission lines that compose constrained interfaces that were obtained during the distribution factor analysis. Appendix F.1 includes those quantities derived when dispatching all Big Stone II participants at the same time. On the other hand, appendix F.2 includes the results of the distribution factor analysis when dispatching Big Stone II to all of the potential Big Stone II participants individually.

This preliminary study only considered a generation-to-generation redispatch to the Big Stone II participants under summer peak conditions. Under a full MISO system impact study, a generation-to-load redispatch would also be necessary in determining delivery constraints. MISO typically conducts this type of analysis for the in-service year and an out-year case to determine any delivery impacts to constrained interfaces.

10.0 Big Stone II Interconnection Study Meeting with MISO

Submitting the Big Stone II generation interconnection request within the MISO queue initiated a kick-off meeting of generation developers and interested transmission owners on April 15, 2004. The following section summarizes the discussions that occurred during that meeting.

10.1 Meeting Attendees

Walt Grivna	XEL	Mike Steckelberg	GRE
Stacie Hebert	OTP	Mark Rolfes	OTP
Todd Guerrero	L & V	John Knofczynski	HCPD
Jason Weiers	OTP	Steve Thompson	CMMPA
Del Gallagher	BEPC	Eric Laverty	MISO
Joe Jubert	GRE	Rick Gonzalez	Excel Eng.
Dave Rudolph	BEPC	Brian Zavesky	MRES
Randy Porter	MMPA		

10.2 Model Development

The group 1 study for the Buffalo Ridge area is completed. This study included approximately 950 MW's of new generation with minor system upgrades required beyond those facilities identified within Xcel Energy's Southwest MN Wind Study. These group 1 projects will be included in the base cases for Big Stone II (G392).

Other prior queued generation interconnection requests that will be included in the base cases are G267, which is a 200 MW project in southcentral MN between Franklin and McLeod. The base cases will also include a 205 MW generation addition at Anson (G370), which is located in Sioux Falls, SD.

The group 2 study is currently underway for the same general area of Buffalo Ridge. The projects within the group 2 study equal approximately 1950 MW's of new generation. Of this 1950 MW's, approximately 670 MW's of that is for a single generator at the Wilmarth 345 kV substation (Project G261). This 670 MW project is likely to go forward since a transmission plan has been identified to deliver this power. This large project will be included in the base cases.

To handle the uncertainty of the remaining group 2 projects (approximately 1300 MW's), three cases will be created for each planning horizon. These cases will be:

1. Big Stone II added with Group 2 Projects at 0 MW
2. Big Stone II added with Group 2 Projects at 650 MW's
3. Big Stone II added with Group 2 Projects at 1300 MW's

Those cases that include group 2 projects will be modeled at locations and delivered to an assumed market on a pro rata MW basis of the total group 2 projects. With these assumptions, prior queued OASIS requests may be somewhat accounted for if the group 2 projects are scheduled to the correct locations.

The base case models for this study will be from the group 2 study, which have already had intensive model review by those entities involved in that study. These models include 2007 Summer Peak and Summer Off-peak seasons. Although this plant is not scheduled to be in-service until 2010, a 2007 model will be sufficient for the interconnection study since a further out-year model will likely include speculative generators and more load serving issues. These base cases will be used for both steady state and dynamic (stability) analysis.

10.3 Generator Interconnection Alternatives

Based on past study work for Big Stone II, five generator interconnection alternatives were presented at the meeting. After discussion amongst the meeting participants, it was determined to proceed with alternatives 1 and 3 for the interconnection study. These alternatives include:

1. Big Stone – Ortonville – Johnson Jct. – Morris 115 kV to 230 kV upgrade with Big Stone – Canby – Granite Falls 115 kV to 230 kV upgrade
2. Big Stone – Canby – Granite Falls 115 kV to 230 kV upgrade with a new Big Stone – Willmar 230 kV line

If these alternatives do not seem to work from an interconnection standpoint, other alternatives may be developed later, which may include alternatives 2, 4, or 5 that had been presented at the meeting.

It was pointed out that we must be aware of the load serving benefit that some of these interconnection alternatives offer. The need for one alternative over another may be decided on the ability to accommodate load-serving needs in the region.

10.4 Study Requirements

This study will likely require approval from both the Midwest ISO and the MAPP Design and Review Subcommittee. Unfortunately, each of these approving authorities have different study requirements. The Big Stone II participants will need to decide what assumptions should be used for export levels over critical interfaces in order to meet the requirements of the appropriate approving authority. It was pointed out that assuming different export levels over the critical northern MAPP interfaces will result in different study results. It was suggested that the study should proceed through the MISO study process and perform further analysis on summer off-peak, high transfer conditions at a later date when MAPP DRS approval is sought.

10.5 Schedule

A brief discussion was held on the expected schedule of the interconnection study. MISO discussed the study process in which the thermal analysis will be completed first, with short circuit and stability analysis occurring after the completion of the thermal analysis. Upon completion of the thermal analysis on the two transmission alternatives, a meeting or conference call of the ad hoc study group will be held to discuss the study results. The expected timeframe of completing the thermal analysis on the two interconnection alternatives is July 1, 2004. This timeframe is tentative and may change depending on when OTP receives the study models from MISO.

11.0 Big Stone II Delivery Service Study Meeting with MISO

On Friday, April 2, 2004, the Big Stone II participants submitted delivery service requests to accompany the Big Stone II generation interconnection request. This effort resulted in 98 separate delivery service requests being submitted by the Big Stone II participants. The multitude of requests was a result of the uncertainty of the Big Stone II project at the time the delivery service requests were made. The exact size of the plant is not yet known nor is the exact MW share of each Big Stone II partner. To cover all possible avenues several Big Stone II participants submitted a variety of requests. A summary of all the delivery service requests submitted on April 2nd can be found in appendix G.

The multitude of delivery service requests made by the Big Stone II participants triggered MISO to hold a meeting of the Big Stone II participants on May 13, 2004 at the MISO St. Paul office to discuss options in performing the delivery service study. The following section summarizes the discussions and outcomes that occurred during the meeting.

11.1 Meeting Attendees

Randy Porter	MMPA	Ron Arness	MISO
Joe Jubert	GRE	Richard Dahl	MISO
Dave Kempf	GRE	Jeff Hynds	MISO
Todd Guerrero	L & V	Tim Rogelstad	OTP

Jason Weiers	OTP	Brian Zavesky	MRES (via phone)
Rick Gonzalez	Excel Eng.	Steve Thompson	CMMPA (via phone)
John Knofczynski	HCPD		

11.2 Outcomes of the Meeting

- MISO staff indicated they were pleased and supportive with the approach (having 98 transmission requests be grouped into one study) taken by the Big Stone II participants.
- All issues between MISO and the participants, as it relates to the system impact study agreement, have been resolved. MISO will send a final version to the participants next week and the participants will have the agreement executed by the end of May.
- The approach of the System Impact Study will be in phases and MISO is willing to break the deposits into different phases. Rather than having to put $200,000 down for a study in early June, the project will likely have a deposit in the $50,000 to $75,000 range.
- Phase I of the study will assume a project of 601 MW's allocated to each of the participants and delivered to the participants desired sink point. Transmission facilities to deliver the output under this scenario will be identified. Phase II of the study will look at sensitivities to changes of the sink points, as well as the changes in allocation to the project participants. Using this approach should minimize the study time by limiting the scenarios early on, and provide more time for the participants to determine the final allocations.
- MISO staff indicated they saw no reason why the OTP transmission planning department could not be the contractor for the study, and that they will likely select OTP without going through the formal bidding process.
- MISO wants to move the study along as soon as possible. They would like to have models available (which they will supply) in mid-June, and at that point the study can begin. It will be important that the system impact study is coordinated with the interconnection study results.

The meeting with MISO went well and MISO is willing to work toward a November 1, 2004 deadline for having a preliminary recommendation on the necessary transmission to deliver the output of the Big Stone II project.

12.0 Conclusion

This preliminary study work focused on eleven different transmission alternatives to compare each alternatives effectiveness in delivering power from a potential Big Stone II plant to seven separate entities without detrimental impacts to the existing transmission system.

During the economic analysis, the eleven different transmission alternatives varied in cost from as low as $53 million for alternatives 1 and 6 to as high as $168 million for alternatives 2, 3, and 3b. These costs are directly related to the proposed line lengths and voltage levels of the various transmission alternatives. Alternatives that include 230 kV transmission have generally cheaper capital costs than alternatives that include 345 kV lines.

TLTG analysis identified existing system limitations as the amount of power transfer from Big Stone II to the seven potential participants was increased. Based on the results of this analysis,

the upgrade costs for the lower capital cost alternatives (230 kV alternatives 1 and 6) are higher than those of the higher capital cost alternatives (345 kV alternatives 3 and 3b); however, the total cumulative upgrade costs associated with the lower capital cost alternatives does not exceed the investment needed for the higher capital cost alternatives.

Loss analysis indicated that those transmission alternatives that had the highest capital costs result in the most effective reduction in system losses where those transmission alternatives that had the lowest capital costs result in the largest incremental system losses as the size of Big Stone II increases. At the highest potential output level from Big Stone II, alternatives 2, 3, and 3b have decreased system losses over the base case without transmission as well as the case that includes Big Stone II; whereas alternative 1 has a net increase in system losses over the base case.

When scheduling Big Stone II to all of the potential participants simultaneously, constrained interface analysis has shown that all of the transmission alternatives violate the North Dakota Export interface (NDEX). Due to this project requiring new transmission that will likely cross the NDEX interface, more transmission capacity will be introduced thus dismissing NDEX as a valid constraint. Transmission alternatives 2 and 3b, which involve 345 kV transmission to the Twin Cities, also caused a PTDF violation across the Minnesota – Wisconsin Stability Interface (MWSI), and Prairie Island – Byron constrained interfaces. Furthermore, the Fort Calhoun South interface is also a concern since PTDF quantities are over 4%, which may be bumped over 5% due to the uncertainty of this study model and how it will actually compare with the actual model that MISO will use for the system impact study.

The following figure illustrates a summary of how the transmission alternatives are ranked according to each type of analysis performed during this preliminary study.

Figure 11 - Summary of Transmission Alternative Ranking for Various Types of Analysis
Completed During the Preliminary Study

Alternative #	Description	Capital Cost[1]	Losses[2]	DF Analysis[3]
1	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate	2	9	1
2	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - Blue Lake 345 kV Line	9	2	2
3	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	10	3	1
3b	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	11	1	2
4	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Blair - White 345 kV Line with Ivanhoe - Lyon County 115 kV Line	6	7	1
5	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Blair - Lyon County 230 kV Line with Lyon County - Franklin 115 kV Line	4	8	1
6	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	1	11	1
7	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	3	10	1
8	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	5	6	1
9	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with *Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with* Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	8	5	1
9b	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	7	4	1

[1] Number indicates the ranking of alternatives from least capital cost (1) to highest capital cost (11)

[2] Number indicates the ranking of alternatives from most reduction in system losses (1) to least reduction in system losses (11)

[3] Number indicates the number of constrained interfaces that were violated during a 2009 summer peak generation-to-generation redispatch

13.0 Remaining Work to Perform

During this preliminary screening study, economic analysis, loss analysis, distribution factor analysis, and TLTG analysis have been completed for a 2009 summer peak condition. The results obtained from these types of analyses do not include a full picture of what constraints may be encountered during the MISO interconnection and delivery service studies. Typical MISO study practices include looking at summer peak, summer off-peak, and winter peak conditions for the in-service year as well as an out-year case (beyond 2010). The MISO study process would include the following types of analysis which have not been completed as part of this preliminary study:

- Distribution Factor Analysis – generation-to-load redispatch with inclusion of OTDF interfaces
- Full ACCC Contingency Analysis (n-1) for summer peak, summer off-peak and winter peak conditions
- Select "n-2" contingency analysis for direct outlet facilities to the Big Stone Plant for summer peak, winter peak and summer off-peak conditions
- Transient Stability Analysis for summer peak, winter peak and summer off-peak conditions

These aspects of the MISO study process may trigger different study results than those contained within this study report. Variations in study models, origination of study models, as well as prior queued generation and delivery service requests all play into the final study results that will be obtained through the MISO study process.

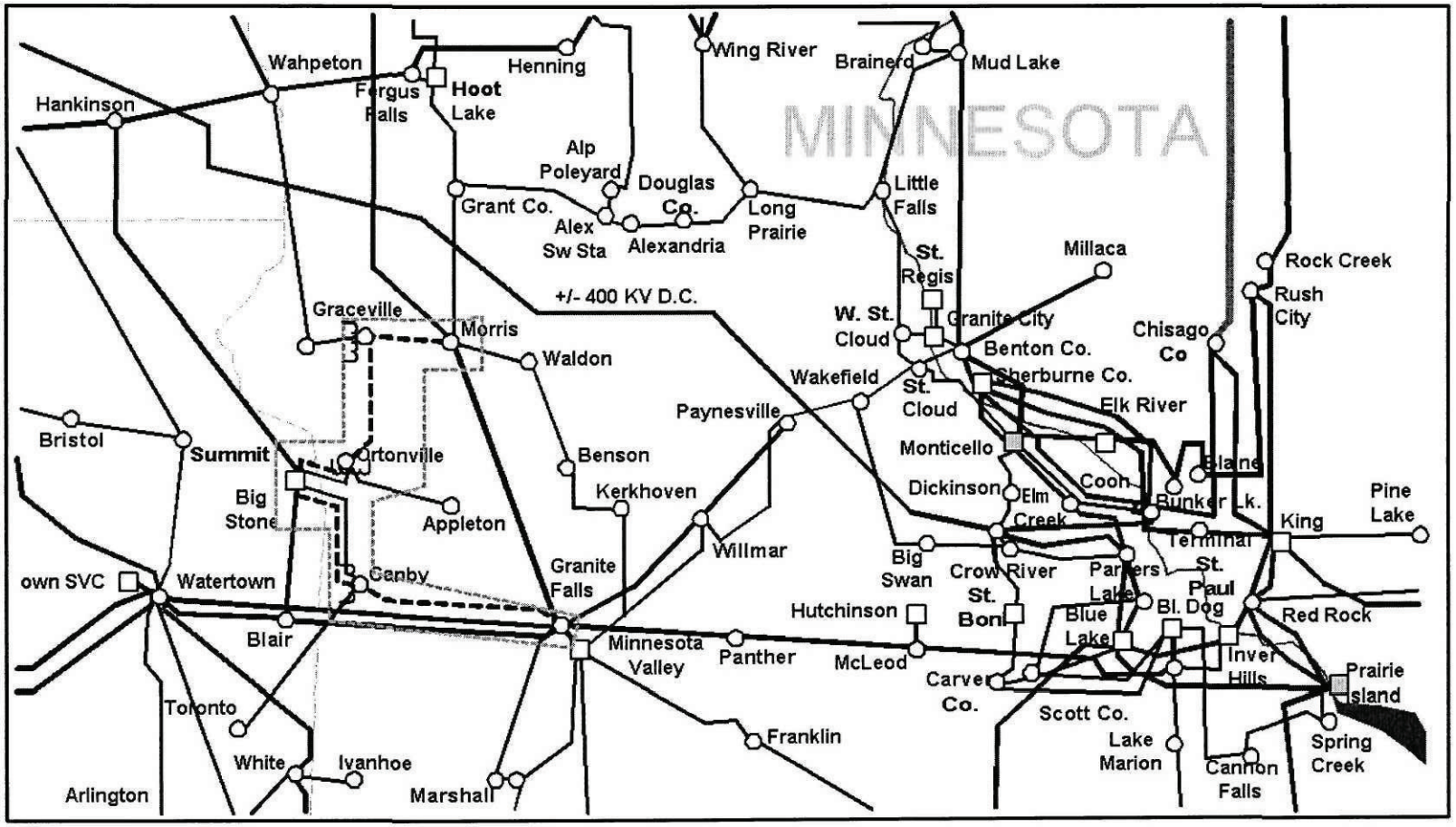
Although there is currently no criteria for voltage stability analysis (PV or VQ), the MISO study may include requirements to investigate what this proposed interconnection and delivery do to the existing voltage stability limits and performance of the existing transmission system.

Due to the lack of time before this study transitioned into the MISO study process, this preliminary study work has identified some potential issues that may arise during summer peak conditions. Additional issues may be identified during summer off-peak and winter peak during the additional types of analyses that had not been completed as part of this preliminary study.

APPENDIX A

Geographic Maps of
Proposed Transmission Alternatives

TRANSMISSION ALTERNATIVE 1

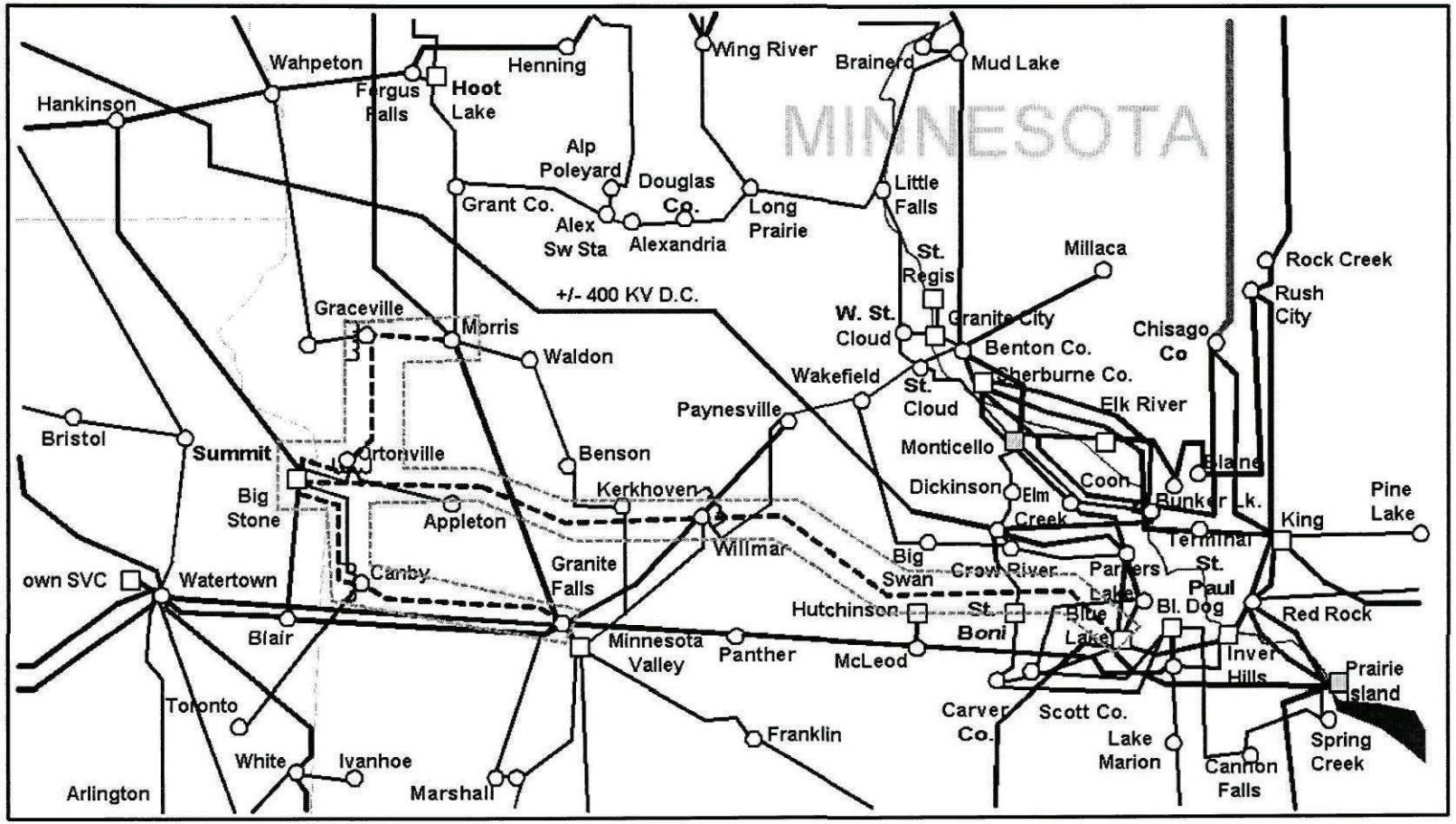


Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

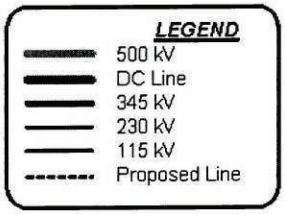
TRANSMISSION ALTERNATIVE 2



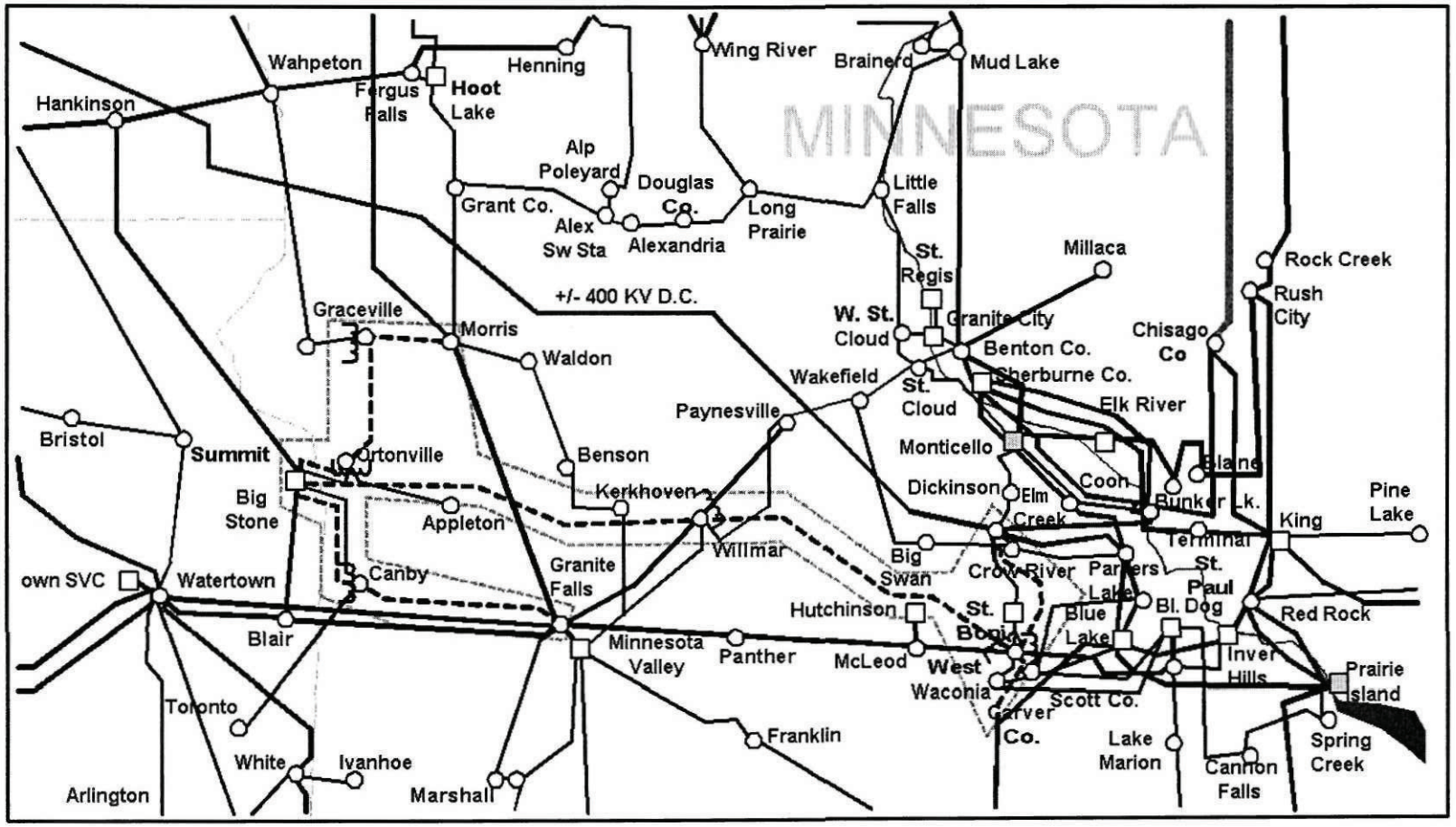
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with

Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

Big Stone - Willmar - Blue Lake 345 kV Line



TRANSMISSION ALTERNATIVE 3



Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with

Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

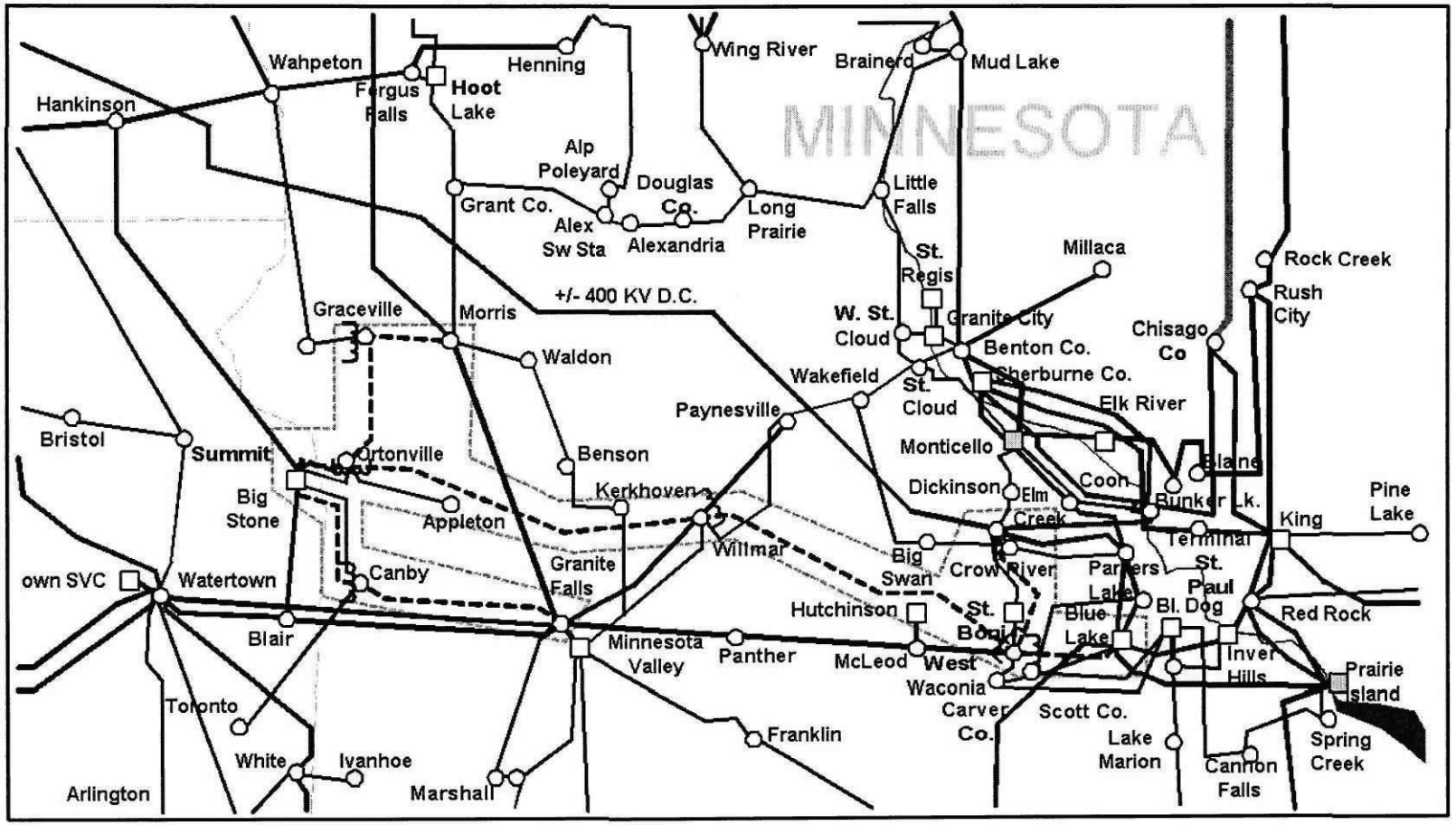
Big Stone - Willmar - Blue Lake 345 kV Line with

Dickinson - West Waconia - Wilmarth 345 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 3b



Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with

Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

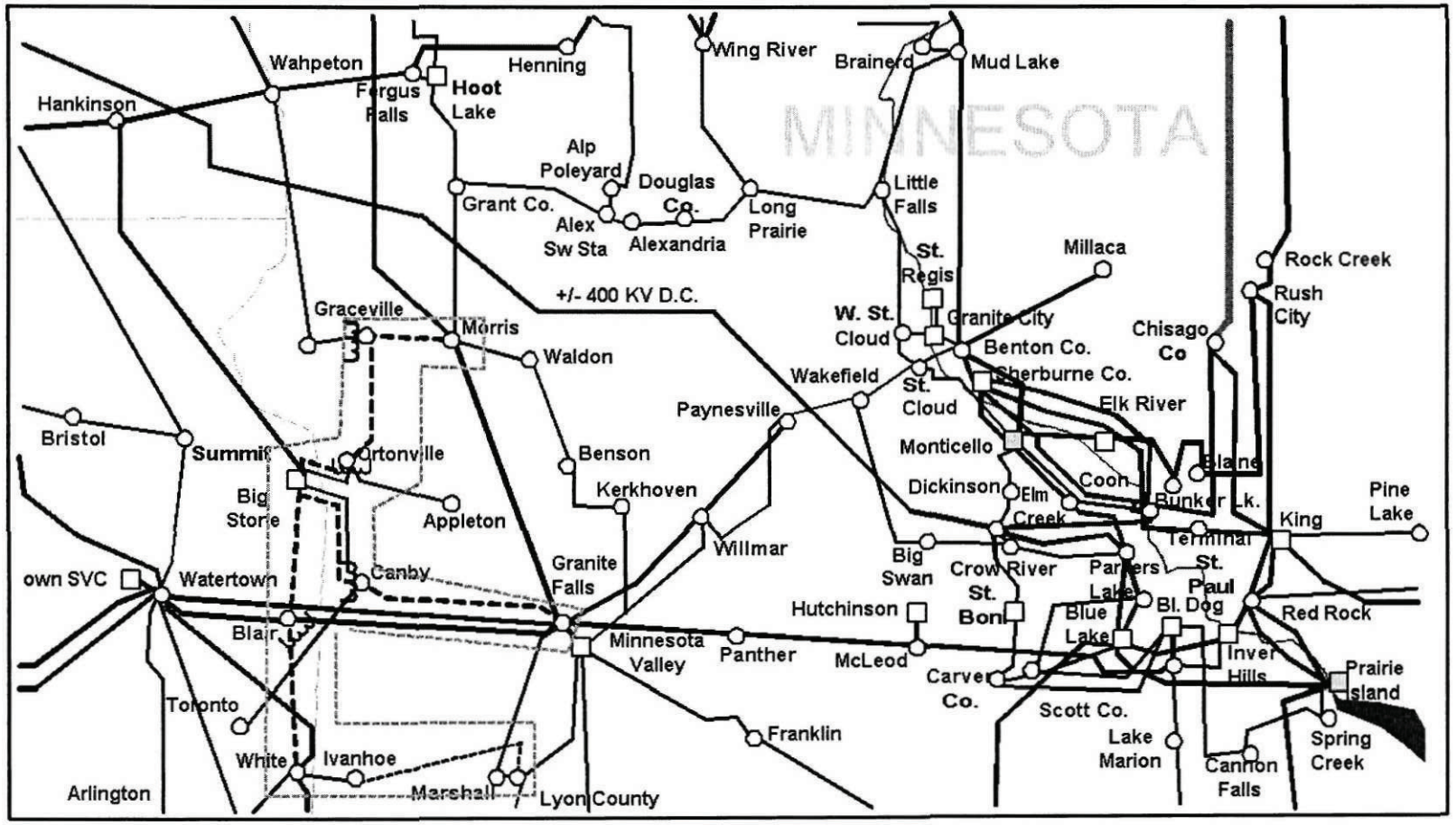
Big Stone - Willmar - West Waconia 345 kV Line with

Dickinson - West Waconia - Blue Lake 345 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 4



Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with

Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

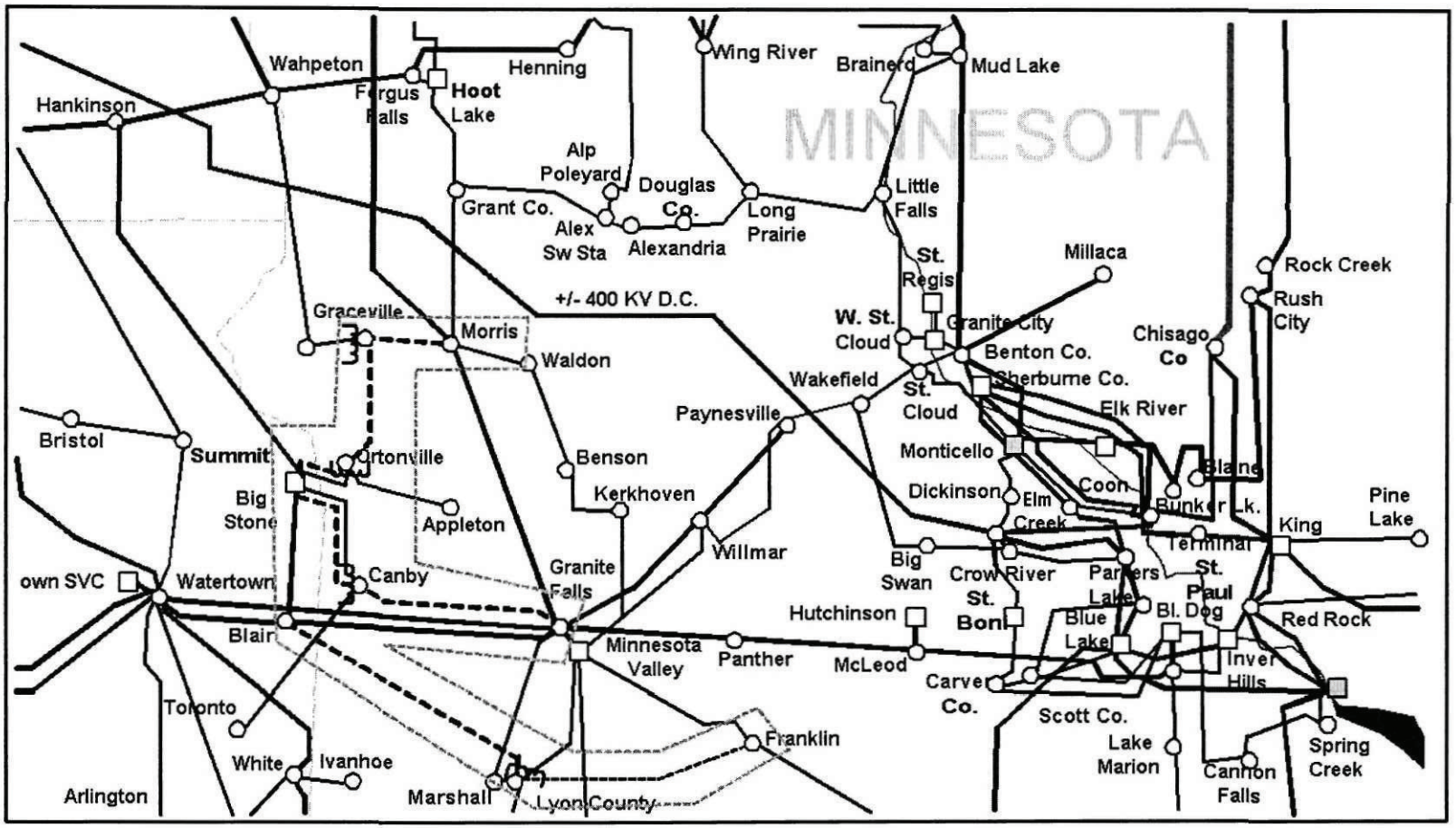
Big Stone - Blair - White 345 kV Line with

Ivanhoe - Lyon County 115 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 5



Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with

Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

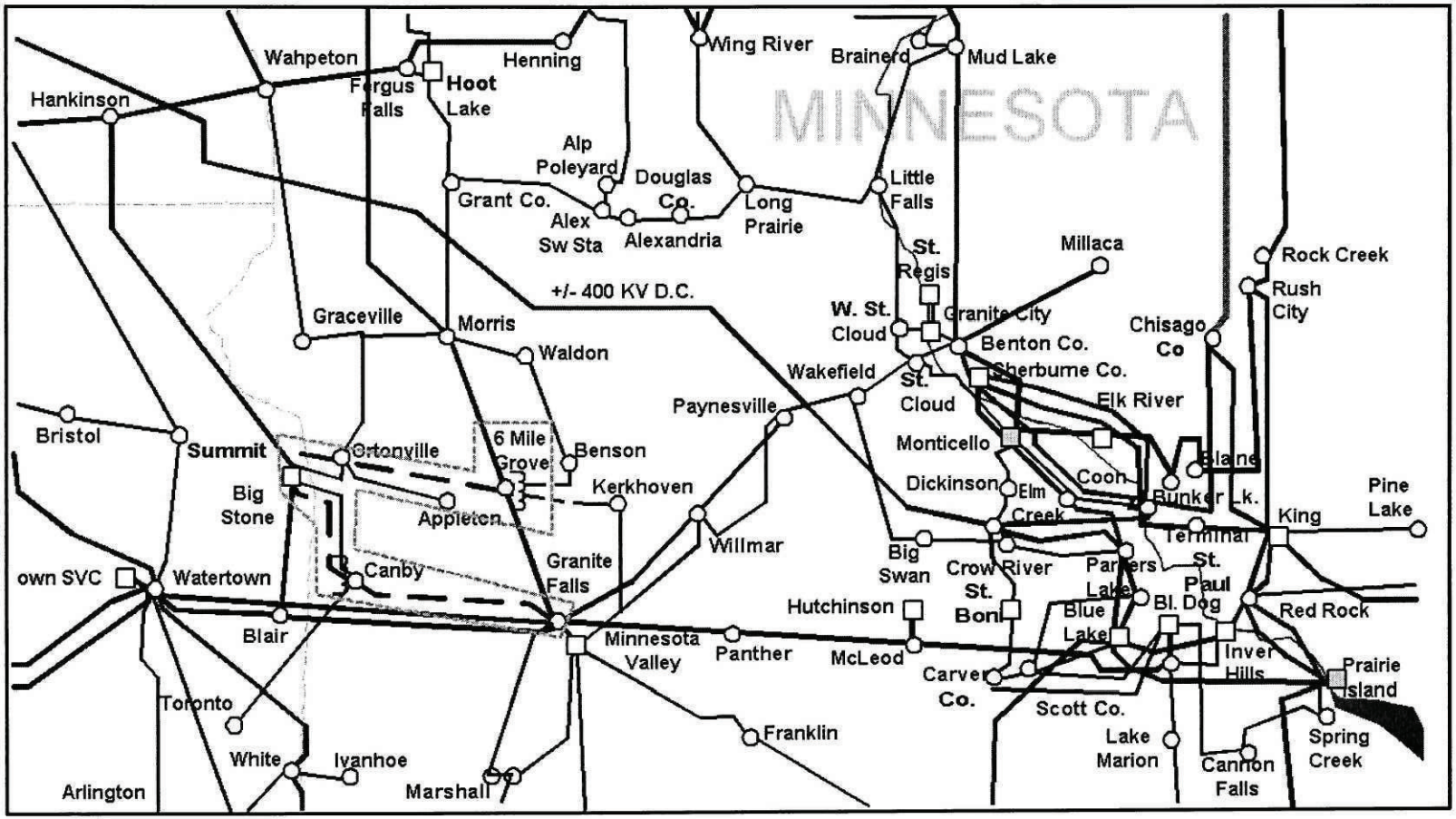
Blair - Lyon County 230 kV Line with

Lyon County - Franklin 115 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 6

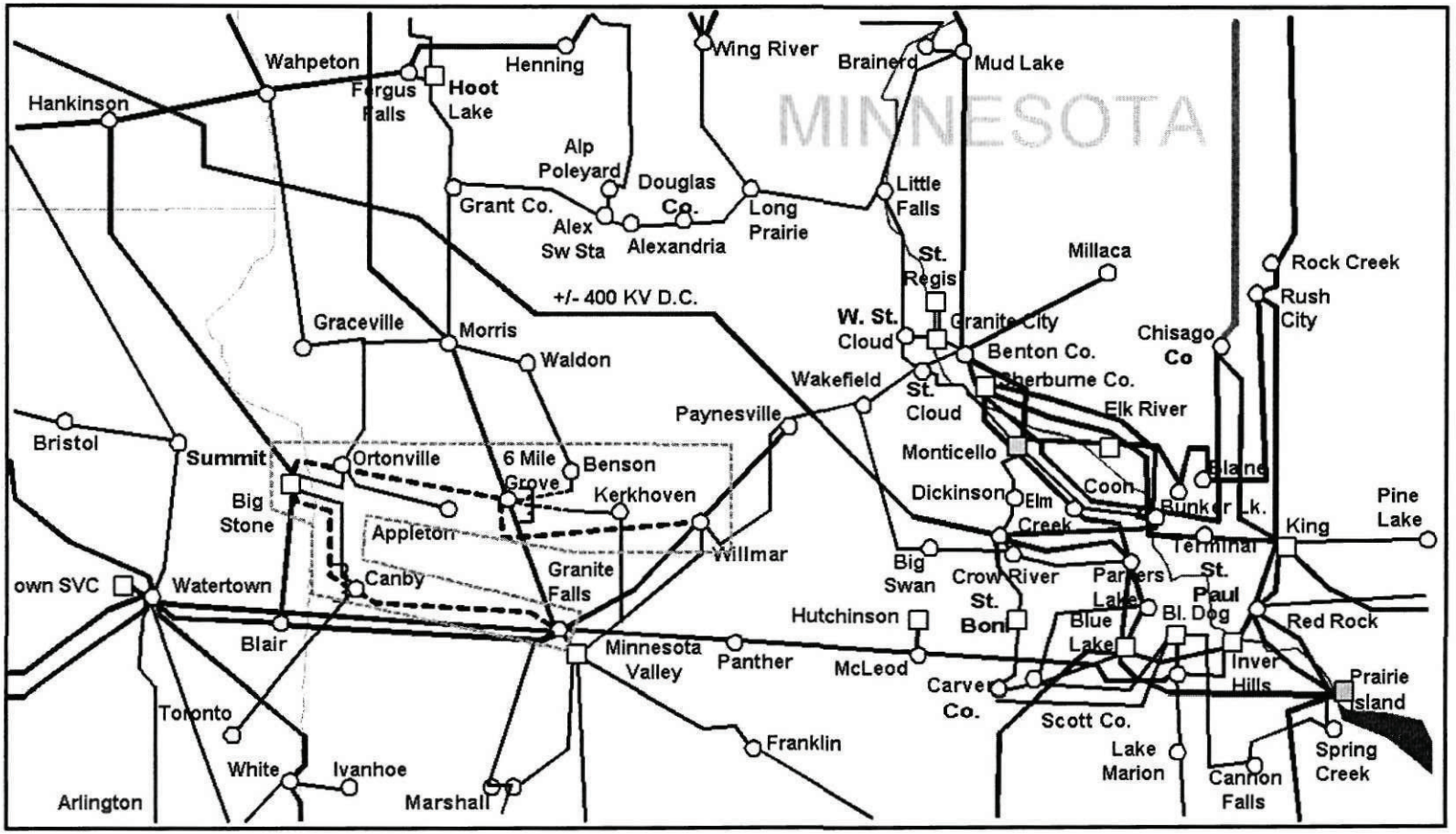


Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line adding a new 6 Mile Grove Substation along Morris - Granite Falls 230 kV line and extending Benson - Kerkhoven 115 kV line to 6 Mile Grove

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 7



Big Stone - Canby - Granite Falls 115 to 230 kV Uprate with

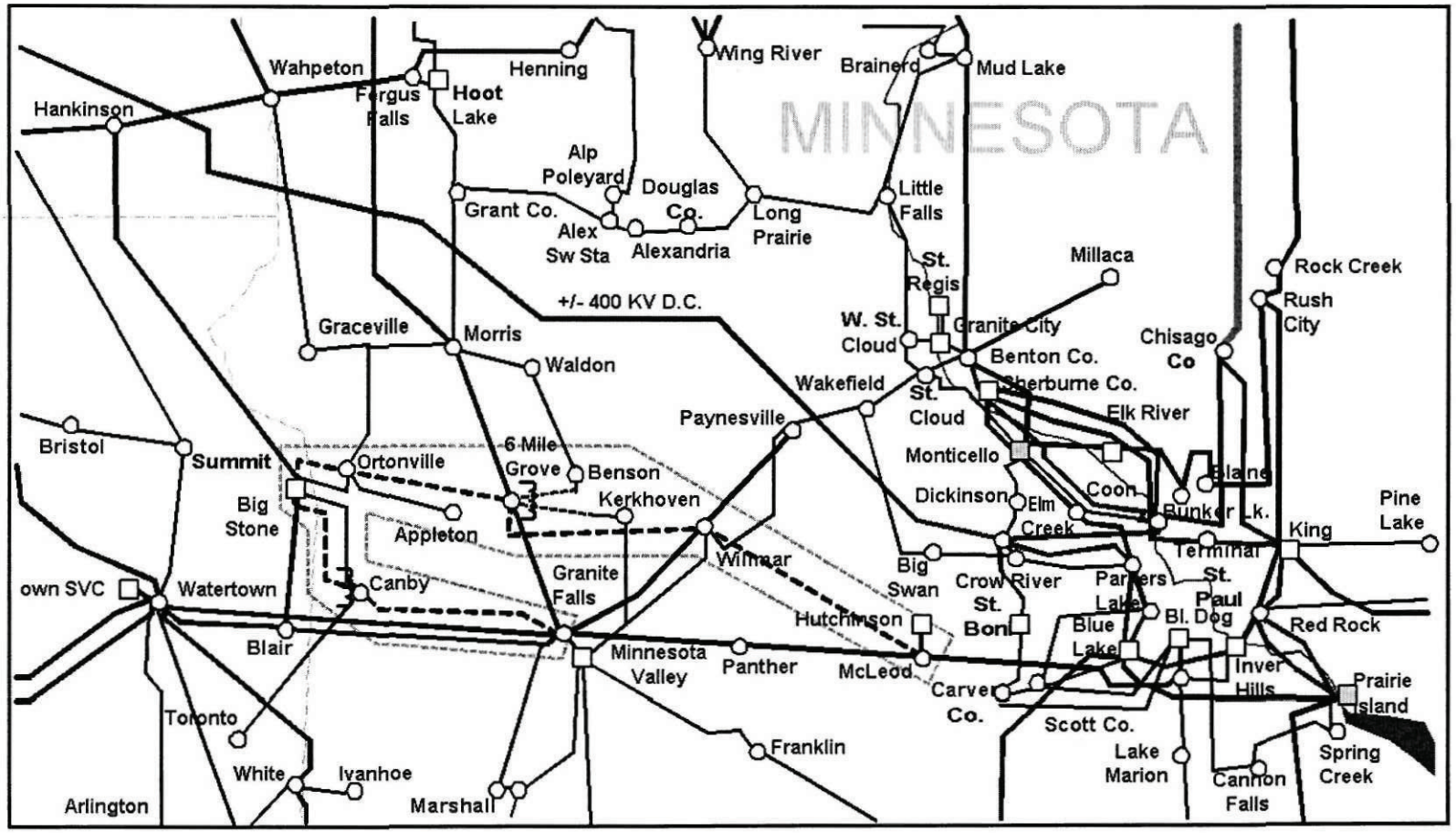
Big Stone - 6 Mile Grove - Willmar 230 kV Line with

Benson - Kerkhoven 115 kV line extension to 6 Mile Grove

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 8

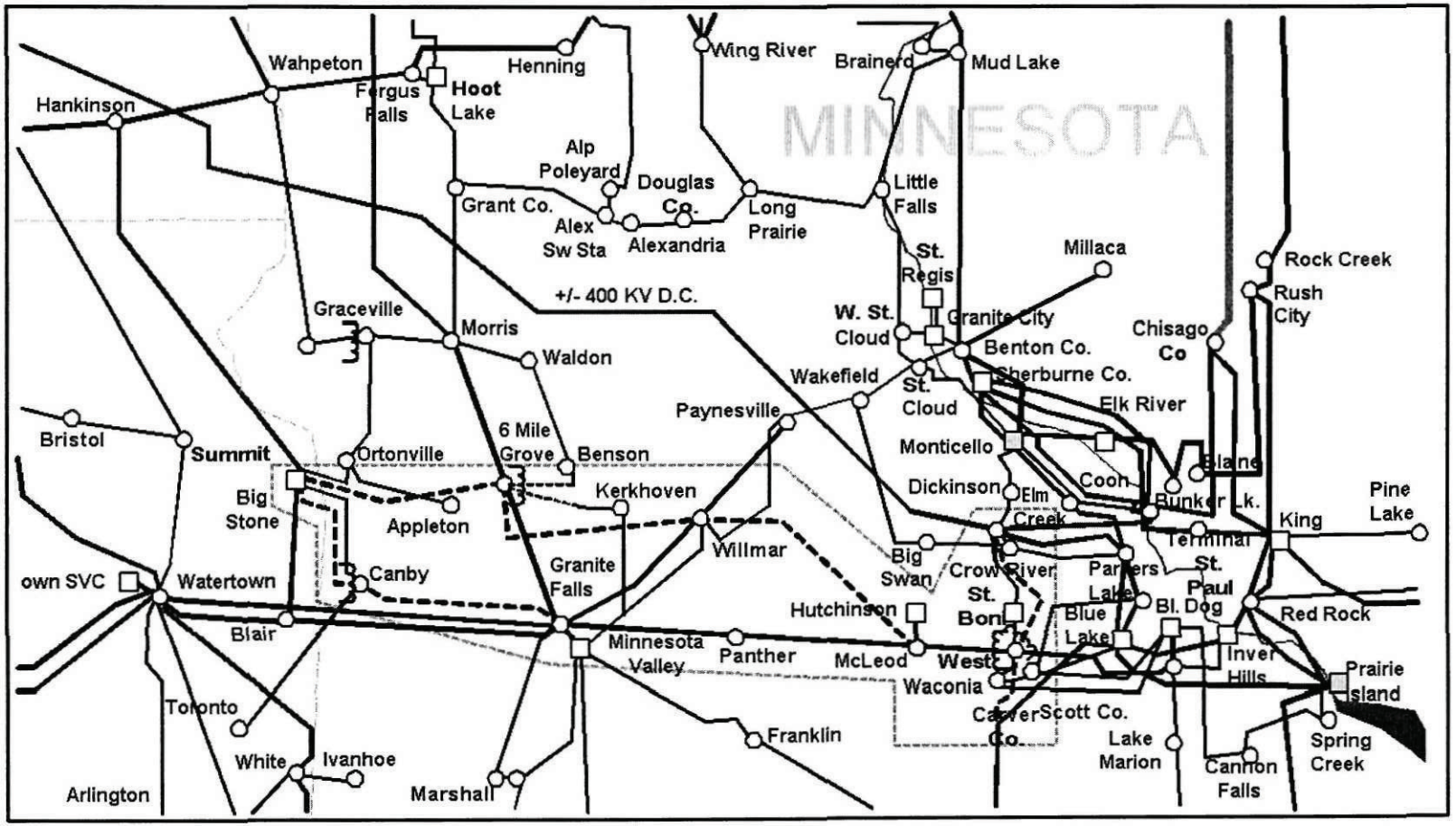


Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with
Benson - Kerkhoven 115 kV Line extension to 6 Mile Grove

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 9



Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with

Morris - 6 Mile Grove - Granite Falls 230 kV Line with

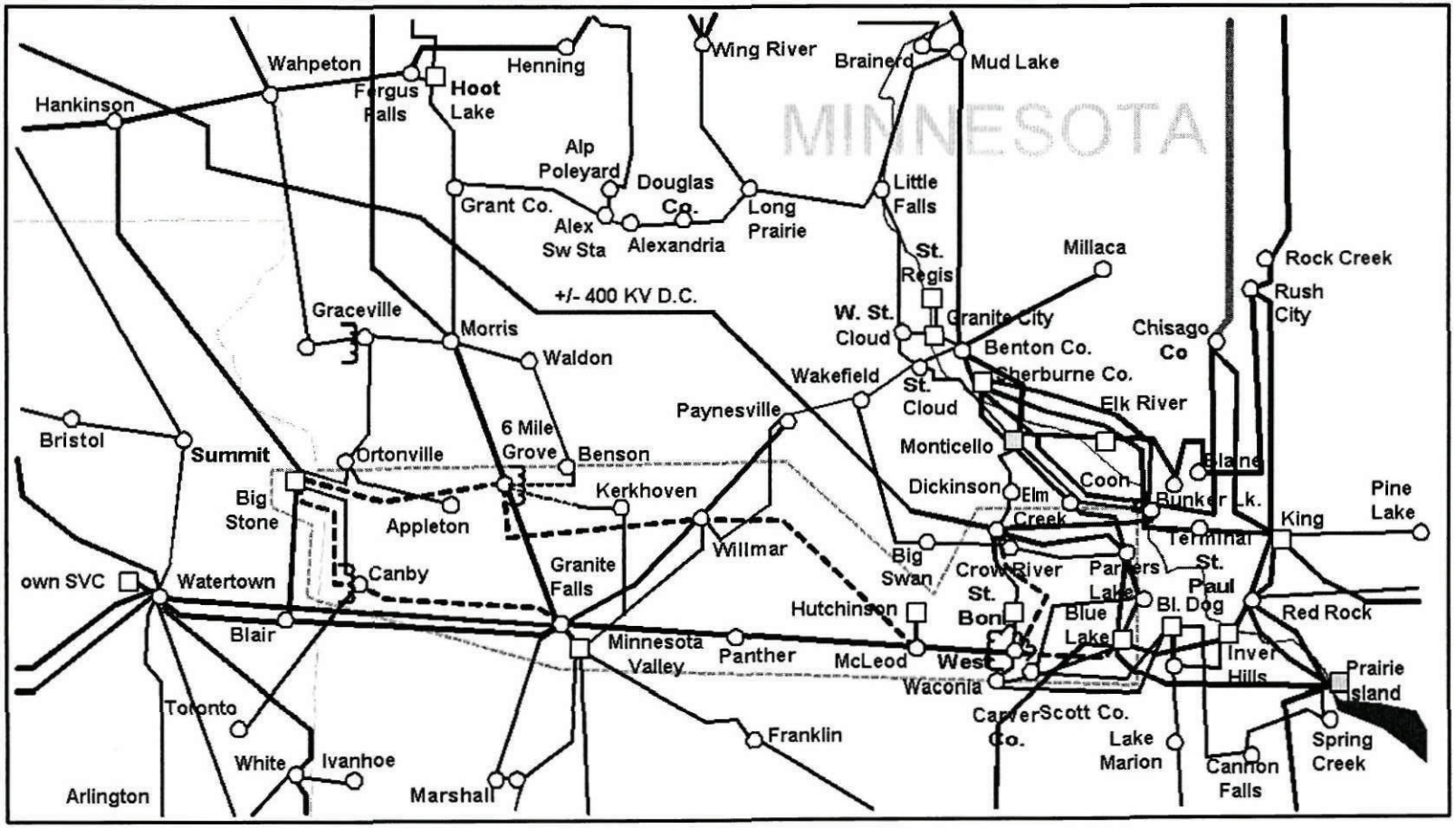
Benson - 6 Mile Grove - Kerkhoven 115 kV Line with

Dickinson - West Waconia - Wilmarth 345 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

TRANSMISSION ALTERNATIVE 9b



Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with

Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with

Morris - 6 Mile Grove - Granite Falls 230 kV Line with

Benson - 6 Mile Grove - Kerkhoven 115 kV Line with

Dickinson - West Waconia - Blue Lake 345 kV Line

LEGEND

- 500 kV
- DC Line
- 345 kV
- 230 kV
- 115 kV
- Proposed Line

APPENDIX B

Model Alterations to Create
Base Case 2009 Summer Peak Model

Model Alterations to Create Base Case

Generation Alterations in the Xcel Energy Control Area:

235 MW's at Buffalo Ridge
280 MW's at Chanarambie
200 MW's at Fenton
100 MW's at Yankee
10 MW's at Woodstock
Anson #2 at 112.5 MW's
Anson #4 at 94 MW's
Anson #5 at 94 MW's
Marshall at 17 MW's
Added Faribault Generation project
Removed Pathfinder generation (retired)

Offset this generation increase in Xcel Energy's Control Area by turning down:
Blue Lake
Wheaton
Inver Hills

Generation Alterations in the Great River Energy Control Area:
Lakefield #1 through #6 set at 92 MW's each
FibroMinn at 50 MW's

Offset this generation increase in Great River Energy's Control Area by turning down:
Dakota County Generation (Fake generator)

Generation Alterations in the Otter Tail Power Company Control Area:
Lake Preston at 20 MW's

Offset this generation increase in Otter Tail Power's Control Area by turning down:
Hoot Lake #2

Transmission Additions inserted into the model:
Added Lake Yankton SVC
Added Buffalo Ridge – Yankee – White 115 kV Line
Added Fox Lake – Lakefield 161 kV Line (2nd Circuit)
Added Nobles – Fenton – Chanarambie 115 kV Line
Added Split Rock – Nobles – Lakefield 345 kV Line
Removed Appleton – Canby – Dawson 115 kV Line

APPENDIX C

Detailed Capital Cost Information
For the Proposed Transmission Alternatives

Facility Choices and Price (1998 $)			Transmission Alternative 1		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile		$ -	$ -
230 kV	$245,000	mile	137	$ 33,565,000	$ 37,799,641.60
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile		$ -	$ -

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each		$ -	$ -
230 kV	$600,000	Each	17	$ 10,200,000	$ 11,486,856.68
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	3	$ 1,200,000	$ 1,351,394.90

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 48,088,750	$ 54,155,743.04
	Losses			$ -	$ -
	Total Cost			$ 48,088,750	$ 54,155,743.04

Alternative 1 - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1) = 3 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

Facility Choices and Price (1998 $)			Transmission Alternative 2		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	174	$ 63,336,000	$ 71,326,622.99
230 kV	$245,000	mile	137	$ 33,565,000	$ 37,799,641.60
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile		$ -	$ -

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	7	$ 6,300,000	$ 7,094,823.24
230 kV	$600,000	Each	21	$ 12,600,000	$ 14,189,646.48
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	3	$ 1,200,000	$ 1,351,394.90

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 126,428,750	$ 142,379,306.96
	Losses			$ -	$ -
	Total Cost			$ 126,428,750	$ 142,379,306.96

Alternative 2 - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - Blue Lake 345 kV Line

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - Willmar - Blue Lake 345 kV Line = 174 Miles

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); Willmar (2) = 4 230 kV Terminals
Big Stone (2); Willmar (3); Blue Lake (2) = 7 345 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1) = 3 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115)
Big Stone (1 - 345/230); Willmar (1 - 345/230)
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

Facility Choices and Price (1998 $)			Transmission Alternative 3		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	202	$ 73,528,000	$ 82,804,470.36
230 kV	$245,000	mile	137	$ 33,565,000	$ 37,799,641.60
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile		$ -	$ -

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	14	$ 12,600,000	$ 14,189,646.48
230 kV	$600,000	Each	23	$ 13,800,000	$ 15,541,041.39
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	3	$ 1,200,000	$ 1,351,394.90

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 147,272,750	$ 165,853,036.43
	Losses			$ -	$ -
	Total Cost			$ 147,272,750	$ 165,853,036.43

Alternative 3 - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Willmar - Carver County 345 kV Line with
Dickinson - Carver County - Wilmarth 345 kV Line

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - Willmar - Carver County 345 kV Line = 157 Miles
Dickinson - Carver County - Wilmarth 345 kV Line = 45 Miles

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); Willmar (2); Carver County (2) = 6 230 kV Terminals
Big Stone (2); Willmar (3); Carver County (2) = 7 345 kV Terminals
Dickinson (2); Carver County (2); Wilmarth (3) = 7 345 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1) = 3 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115
Big Stone (1 - 345/230); Willmar (1 - 345/230); Carver County (1 - 345/230
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

Facility Choices and Price (1998 $)			Transmission Alternative 3b		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	205	$ 74,620,000	$ 84,034,239.73
230 kV	$245,000	mile	137	$ 33,565,000	$ 37,799,641.60
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile		$ -	$ -

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	13	$ 11,700,000	$ 13,176,100.31
230 kV	$600,000	Each	23	$ 13,800,000	$ 15,541,041.39
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	4	$ 1,600,000	$ 1,801,859.87

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 149,735,230	$ 168,626,188.87
	Losses			$ -	$ -
	Total Cost			$ 149,735,230	$ 168,626,188.87

Alternative 3b - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Willmar - West Waconia 345 kV Line with
Dickinson - West Waconia - Blue Lake 345 kV Line

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - Willmar - West Waconia 345 kV Line = 157 Miles
Dickinson - West Waconia - Blue Lake 345 kV Line = 48 Miles*

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); Willmar (1); West Waconia (3) = 6 230 kV Terminals
Big Stone (2); Willmar (3); West Waconia (2) = 7 345 kV Terminals
Dickinson (2); West Waconia (2); Blue Lake (2) = 6 345 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1); West Waconia (1) = 4 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115)
Big Stone (1 - 345/230); Willmar (1 - 345/230); West Waconia (1 - 345/230)
West Waconia (1 - 230/115)
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 336 MVA (Similar to Xcel's Black Dog)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

*West Waconia to Blue Lake would actually be an uprate of the existing 230 kV Line to Black Dog

Facility Choices and Price (1998 $)			Transmission Alternative 4		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	36	$ 13,104,000	$ 14,757,232.34
345 kV	$273,000	mile	33	$ 9,009,000	$ 10,145,597.24
230 kV	$245,000	mile	137	$ 33,565,000	$ 37,799,641.60
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	34.5	$ 7,038,000	$ 7,925,931.11

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	7	$ 6,300,000	$ 7,094,823.24
230 kV	$600,000	Each	19	$ 11,400,000	$ 12,838,251.58
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	7	$ 2,800,000	$ 3,153,254.77

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 92,643,750	$ 104,331,909.63
	Losses			$ -	$ -
	Total Cost			$ 92,643,750	$ 104,331,909.63

Alternative 4 - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Blair - White 345 kV Line with
Ivanhoe - Lyon County 115 kV Line

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - Blair 345 kV Line = 33 Miles*
Blair - White 345 kV Line = 36 Miles
Ivanhoe - Lyon County 115 kV Line = 34.5 Miles

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2) = 2 230 kV Terminals
Big Stone (2); Blair (3); White (2) = 7 345 kV Terminals
Ivanhoe (2); Lyon County (2) = 4 115 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1) = 3 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115)
Big Stone (1 - 345/230); Blair (1 - 345/230)
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

*Big Stone to Blair would actually be an uprate of the existing 230 kV Line assumed to be 75% of new line cost

Facility Choices and Price (1998 $)			Transmission Alternative 5		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile		$ -	$ -
230 kV	$245,000	mile	201	$ 49,245,000	$ 55,457,868.34
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	40	$ 8,160,000	$ 9,189,485.34

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each		$ -	$ -
230 kV	$600,000	Each	20	$ 12,000,000	$ 13,513,949.03
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	7	$ 2,800,000	$ 3,153,254.77

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 76,370,000	$ 86,005,023.96
	Losses			$ -	$ -
	Total Cost			$ 76,370,000	$ 86,005,023.96

Alternative 5 - Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Blair - Lyon County 230 kV Line with
Lyon County - Franklin 115 kV Line

Line Costs: Big Stone - Highway 12 - Ortonville - Johnson Jct. - Morris 230 kV Line = 47 Miles
Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Blair - Lyon County 230 kV Line = 64 Miles
Lyon County - Franklin 115 kV Line = 40 Miles

# of Terminals: Big Stone (2); Ortonville (3); Johnson Jct. (3); Morris (2) = 10 230 kV Terminals
Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Blair (1); Lyon County (2) = 3 230 kV Terminals
Lyon County (2); Franklin (2) = 4 115 kV Terminals
Ortonville (1); Canby (1); Johnson Jct. (1) = 3 115 kV Terminals

Xfmr Costs: Ortonville (1 - 230/115); Johnson Jct. (1 - 230/115); Canby (1 - 230/115)
Lyon County (1 - 230/115)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)

Facility Choices and Price (1998 $)			Transmission Alternative 6		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile		$ -	$ -
230 kV	$245,000	mile	136	$ 33,320,000	$ 37,523,731.81
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	7	$ 1,428,000	$ 1,608,159.93

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each		$ -	$ -
230 kV	$600,000	Each	13	$ 7,800,000	$ 8,784,066.87
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	4	$ 1,600,000	$ 1,801,859.87

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 47,059,730	$ 52,996,899.39
	Losses			$ -	$ -
	Total Cost			$ 47,059,730	$ 52,996,899.39

Alternative 6 - Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line

Line Costs: Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - 6 Mile Grove 230 kV Line = 46 Miles
Benson - 6 Mile Grove - Kerkhoven 115 kV Line = 7 Miles*

# of Terminals: Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); 6 Mile Grove (4) = 6 230 kV Terminals
6 Mile Grove (3); Canby (1) = 4 115 kV Terminals

Xfmr Costs: Canby (1 - 230/115); 6 Mile Grove (1 - 230/115)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)
230/115 kV Xfmr = 336 MVA (Obtained from GRE)

*Benson to Kerkhoven 115 kV Line already exists - would only need to add 7 miles for the new 6 Mile Grove Sub

Facility Choices and Price (1998 $)			Transmission Alternative 7		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile		$ -	$ -
230 kV	$245,000	mile	200	$ 49,000,000	$ 55,181,958.54
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	7	$ 1,428,000	$ 1,608,159.93

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each		$ -	$ -
230 kV	$600,000	Each	15	$ 9,000,000	$ 10,135,461.77
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	4	$ 1,600,000	$ 1,801,859.87

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 63,939,730	$ 72,006,521.02
	Losses			$ -	$ -
	Total Cost			$ 63,939,730	$ 72,006,521.02

Alternative 7 - Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line

Line Costs: Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - 6 Mile Grove - Willmar 230 kV Line = 103 Miles
Benson - 6 Mile Grove - Kerkhoven 115 kV Line = 7 Miles*

# of Terminals: Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); 6 Mile Grove (5); Willmar (1) = 8 230 kV Terminals
6 Mile Grove (3); Canby (1) = 4 115 kV Terminals

Xfmr Costs: Canby (1 - 230/115); 6 Mile Grove (1 - 230/115)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)
230/115 kV Xfmr = 336 MVA (Obtained from GRE)

*Benson to Kerkhoven 115 kV Line already exists - would only need to add 7 miles for the new 6 Mile Grove Sub

Facility Choices and Price (1998 $)			Transmission Alternative 8		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile		$ -	$ -
230 kV	$245,000	mile	247	$ 60,515,000	$ 68,149,718.80
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	7	$ 1,428,000	$ 1,608,159.93

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each		$ -	$ -
230 kV	$600,000	Each	18	$ 10,800,000	$ 12,162,554.13
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	4	$ 1,600,000	$ 1,801,859.87

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA		$ -	$ -
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 77,254,730	$ 87,001,373.64
	Losses			$ -	$ -
	Total Cost			$ 77,254,730	$ 87,001,373.64

Alternative 8 - Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line

Line Costs: Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line = 157 Miles
*Benson - 6 Mile Grove - Kerkhoven 115 kV Line = 7 Miles**

# of Terminals: Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); 6 Mile Grove (5); Willmar (2); McLeod (2) = 11 230 kV Terminals
6 Mile Grove (3); Canby (1) = 4 115 kV Terminals

Xfmr Costs: Canby (1 - 230/115); 6 Mile Grove (1 - 230/115)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)
230/115 kV Xfmr = 336 MVA (Obtained from GRE)

*Benson to Kerkhoven 115 kV Line already exists - would only need to add 7 miles for the new 6 Mile Grove Sub

Facility Choices and Price (1998 $)			Transmission Alternative 9		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	44	$ 16,016,000	$ 18,036,617.31
230 kV	$245,000	mile	247	$ 60,515,000	$ 68,149,718.80
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	7	$ 1,428,000	$ 1,608,159.93

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	8	$ 7,200,000	$ 8,108,369.42
230 kV	$600,000	Each	20	$ 12,000,000	$ 13,513,949.03
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	4	$ 1,600,000	$ 1,801,859.87

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 104,822,730	$ 118,047,419.21
	Losses			$ -	$ -
	Total Cost			$ 104,822,730	$ 118,047,419.21

Alternative 9 - Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - Carver County - Wilmarth 345 kV Line

Line Costs: Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line = 157 Miles
Benson - 6 Mile Grove - Kerkhoven 115 kV Line = 7 Miles*
Dickinson - Carver County - Wilmarth 345 kV Line = 44 Miles

# of Terminals: Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); 6 Mile Grove (5); Willmar (2); McLeod (2) = 11 230 kV Terminals
6 Mile Grove (3); Canby (1) = 4 115 kV Terminals
Dickinson (2); Carver County (3); Wilmarth (3) = 8 345 kV Terminals
Carver County (2) = 2 230 kV Terminals

Xfmr Costs: Canby (1 - 230/115); 6 Mile Grove (1 - 230/115); Carver County (1 - 345/230)
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)
230/115 kV Xfmr = 336 MVA (Obtained from GRE)

*Benson to Kerkhoven 115 kV Line already exists - would only need to add 7 miles for the new 6 Mile Grove Sub

Facility Choices and Price (1998 $)			Transmission Alternative 9b		2% Inflation Rate
Facility	Unit Cost (1998$)	Unit	Quantity	Cost	Conversion to 2004 Dollars
Lines:					
500 kV	$515,000	mile		$ -	$ -
345 kV	$364,000	mile	48	$ 17,472,000	$ 19,676,309.79
230 kV	$245,000	mile	247	$ 60,515,000	$ 68,149,718.80
161 kV	$229,000	mile		$ -	$ -
115 kV	$204,000	mile	7	$ 1,428,000	$ 1,608,159.93

Complete Line Terminal [breaker(s), bay,disconnects, relaying, etc]					2% Inflation Rate for Conversion to 2004 Dollars
500 kV	$1,800,000	Each		$ -	$ -
345 kV	$900,000	Each	7	$ 6,300,000	$ 7,094,823.24
230 kV	$600,000	Each	21	$ 12,600,000	$ 14,189,646.48
161 kV	$450,000	Each		$ -	$ -
115 kV	$400,000	Each	5	$ 2,000,000	$ 2,252,324.84

Auto Transformers:					2004 Dollars
500 kV HV	Formula Based	MVA		$ -	$ -
345 kV HV	Formula Based	MVA	336	$ 3,152,000	$ 3,549,663.95
230 kV HV	Formula Based	MVA	125	$ 1,041,250	$ 1,172,616.62
230 kV HV	Formula Based	MVA	336	$ 1,870,480	$ 2,106,464.28
161 kV HV	Formula Based	MVA		$ -	$ -

Capacitors:					2004 Dollars
345 kV	Formula Based	KVAR		$ -	$ -
230 kV	Formula Based	KVAR		$ -	$ -
161 kV	Formula Based	KVAR		$ -	$ -
115 kV	Formula Based	KVAR		$ -	$ -
	Facilities Cost			$ 106,378,730	$ 119,799,727.94
	Losses			$ -	$ -
	Total Cost			$ 106,378,730	$ 119,799,727.94

Alternative 9b - Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line

Line Costs: Big Stone - Marietta - Burr Jct. - Canby - Granite Falls 230 kV Line = 90 Miles
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line = 157 Miles
Benson - 6 Mile Grove - Kerkhoven 115 kV Line = 7 Miles*
Dickinson - West Waconia - Blue Lake 345 kV Line = 48 Miles**

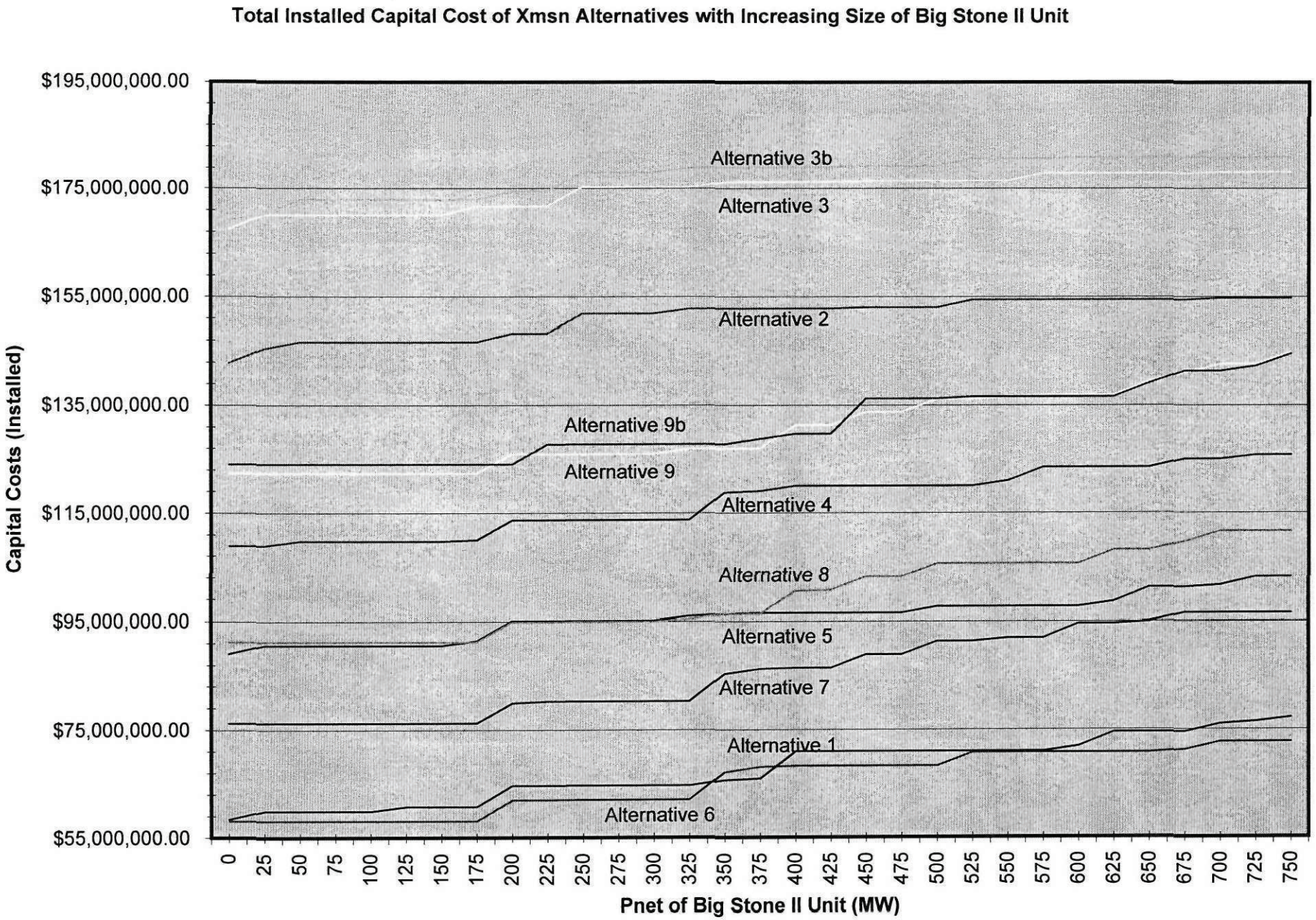
# of Terminals: Big Stone (2); Canby (3); Granite Falls (2) = 7 230 kV Terminals
Big Stone (2); 6 Mile Grove (5); Willmar (2); McLeod (2) = 11 230 kV Terminals
6 Mile Grove (3); Canby (1); West Waconia (1) = 5 115 kV Terminals
Dickinson (2); West Waconia (3); Blue Lake (2) = 7 345 kV Terminals
West Waconia (3) = 3 230 kV Terminals

Xfmr Costs: Canby (1 - 230/115); 6 Mile Grove (1 - 230/115); West Waconia (1 - 345/230)
West Waconia (1 - 230/115)
345/230 kV Xfmr = 336 MVA (Similar to Xcel's Red Rock)
230/115 kV Xfmr = 125 MVA (Similar to Rugby)
230/115 kV Xfmr = 336 MVA (Similar to Xcel's Black Dog)
230/115 kV Xfmr = 336 MVA (Obtained from GRE)

*Benson to Kerkhoven 115 kV Line already exists - would only need to add 7 miles for the new 6 Mile Grove Sub
**West Waconia to Blue Lake would actually be an uprate of the existing 230 kV Line to Black Dog

APPENDIX D

Transmission Constraints Identified During TLTG Analysis


Total Installed Capital Cost of Xmsn Alternatives with Increasing Size of Big Stone II Unit
$195,000,000.00
$175,000,000.00
$155,000,000.00
$135,000,000.00
$115,000,000.00
$95,000,000.00
$75,000,000.00
$55,000,000.00
Capital Costs (Installed)
Alternative 3b
Alternative 3
Alternative 2
Alternative 9b
Alternative 9
Alternative 4
Alternative 8
Alternative 5
Alternative 7
Alternative 1
Alternative 6
0
25
50
75
100
125
150
175
200
225
250
275
300
325
350
375
400
425
450
475
500
525
550
575
600
625
650
675
700
725
750
Pnet of Big Stone II Unit (MW)

Alternative 1
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
BGSII = 451 MW	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ -
150.5	63216 ORTONVL7 115	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA	$951,325.70	$ 951,325.70	$ 951,325.70
150.5	63320 ORTNVLE4 230	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA		$ -	$ 951,325.70
165.1	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$3,499,325.70
245.1	63314 BIGSTON4 230	63320 ORTNVLE4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	5.2	$49,000/mi	$ 254,800.00	$3,754,125.70
245.5	63320 ORTNVLE4 230	63337 JHNSNJT4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	25	$49,000/mi	$ 1,225,000.00	$4,979,125.70
274.9	60190 BLK DOG7 115	60258 WILSON 7 115	310	60190 [BLK DOG7 115]	60258 [WILSON 7 115]	Reconductor	4.5	$98,000/mi	$ 441,000.00	$5,420,125.70
297.5	*63337 JHNSNJT4 230*	*66554 MORRIS 4 230*	*429*	*63314 [BIGSTON4 230]*	*63325 [BROWNSV4 230]*	*Use Beefy Cond.**	*15.5*	*$49,000/mi*	$ 759,500.00	$6,179,625.70

*Must use conductor larger than 954 ACSR - 1272 ACSR?

Alternative 2
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Willmar - Blue Lake 345 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
72.4	63314 BIGSTON4 230	63361 BIGSTN3 345	420	60101 [FORBES 2 500]	61550 [FORB1JCT 230]	Use Larger Xfmr	400 MVA	$1,405,450.70	$ 1,405,450.70	$1,405,450.70
				61550 [FORB1JCT 230]	61624 [FORBES 4 230]					
				61550 [FORB1JCT 230]	61551 [FORB1TR934.5]					
				60101 [FORBES 2 500]	61552 [FORB2JCT 230]					
				61552 [FORB2JCT 230]	61624 [FORBES 4 230]					
				61552 [FORB2JCT 230]	61553 [FORB2TR934.5]					
				60101 [FORBES 2 500]	60198 [CHIS-N 2 500]					
				67564 [DORSEY 2 500]	60173 [ROSEAUN2 500]					
				60173 [ROSEAUN2 500]	60174 [ROSEAUS2 500]					
				60174 [ROSEAUS2 500]	60101 [FORBES 2 500]					
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$1,405,450.70
261.2	60150 MNVLTAP4 230	66550 GRANITF4 230	350	60192 [BLUE LK3 345]	63057 [WLLMAR3 345]	Reconductor	3	$98,000/mi	$ 294,000.00	$1,699,450.70

Alternative 3
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Willmar - Carver County 345 kV Line with
Dickinson - Carver County - Wilmarth 345 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
135.8	63314 BIGSTON4 230	63361 BIGSTN3 345	336	BASE CASE		Use Larger Xfmr	400 MVA	$1,405,450.70	$ 1,405,450.70	$1,405,450.70
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$1,405,450.70
238.7	60150 MNVLTAP4 230	66550 GRANITF4 230	350	60055 [CRVRCO4 345]	63057 [WLLMAR3 345]	Reconductor	3	$98,000/mi	$ 294,000.00	$1,699,450.70

Alternative 3b
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Willmar - West Waconia 345 kV Line with
Dickinson - West Waconia - Blue Lake 345 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
86	63314 BIGSTON4 230	63361 BIGSTN3 345	420	60101 [FORBES 2 500]	61550 [FORB1JCT 230]	Use Larger Xfmr	400 MVA	$1,405,450.70	$ 1,405,450.70	$ 1,405,450.70
				61550 [FORB1JCT 230]	61624 [FORBES 4 230]					
				61550 [FORB1JCT 230]	61551 [FORB1TR934.5]					
				60101 [FORBES 2 500]	61552 [FORB2JCT 230]					
				61552 [FORB2JCT 230]	61624 [FORBES 4 230]					
				61552 [FORB2JCT 230]	61553 [FORB2TR934.5]					
				60101 [FORBES 2 500]	60198 [CHIS-N 2 500]					
				67564 [DORSEY 2 500]	60173 [ROSEAUN2 500]					
				60173 [ROSEAUN2 500]	60174 [ROSEAUS2 500]					
				60174 [ROSEAUS2 500]	60101 [FORBES 2 500]					
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ 1,405,450.70
167.5	60150 MNVLTAP4 230	66550 GRANITF4 230	350	60055 [WWCNIA3 345]	63057 [WLLMAR3 345]	Reconductor	3	$98,000/mi	$ 294,000.00	$ 1,699,450.70

Alternative 4
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - Blair - White 345 kV Line with
Ivanhoe - Lyon County 115 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from Big Stone II Unit	Facility Overloaded		Applicable MVA Rating	Outage		Remedy	Miles/Qty	Cost	Installed Cost	
	From Bus	To Bus		From Bus	To Bus				Incremental	Cumulative
104.6	63216 ORTONVL7 115	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA	$951,325.70	$ 951,325.70	$ 951,325.70
104.6	63320 ORTNVLE4 230	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA		$ -	$ 951,325.70
133.7	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$ 3,499,325.70
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ 3,499,325.70
222.9	63314 BIGSTON4 230	63320 ORTNVLE4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	5.2	$49,000/mi	$ 254,800.00	$ 3,754,125.70
224.3	63320 ORTNVLE4 230	63337 JHNSNJT4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	25	$49,000/mi	$ 1,225,000.00	$ 4,979,125.70
281.3	63337 JHNSNJT4 230	66554 MORRIS 4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	15.5	$49,000/mi	$ 759,500.00	$ 5,738,625.70

*Must use conductor larger than 954 ACSR - 1272 ACSR?

Alternative 5
Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Blair - Lyon County 230 kV Line with
Lyon County - Franklin 115 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
42.3	60287 NOBLES 7 115	60369 FENTON 7 115	310	60283 [YANKEE 7 115]	66538 [WHITE 7 115]	Reconductor	12	$98,000/mi	$ 1,176,000.00	$1,176,000.00
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$1,176,000.00
175.7	63320 ORTNVLE4 230	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA	$951,325.70	$ 951,325.70	$2,127,325.70
175.7	63216 ORTONVL7 115	63321 ORTNVLEY 230	156	63314 [BIGSTON4 230]	63320 [ORTNVLE4 230]	Use Larger Xfmr	200 MVA		$ -	$2,127,325.70
192.9	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$4,675,325.70
242.7	60190 BLK DOG7 115	60258 WILSON 7 115	310	60190 [BLK DOG7 115]	60258 [WILSON 7 115]	Reconductor	4.5	$98,000/mi	$ 441,000.00	$5,116,325.70
273.3	63314 BIGSTON4 230	63320 ORTNVLE4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	5.2	$49,000/mi	$ 254,800.00	$5,371,125.70
273.6	63320 ORTNVLE4 230	63337 JHNSNJT4 230	429	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	25	$49,000/mi	$ 1,225,000.00	$6,596,125.70

*Must use conductor larger than 954 ACSR - 1272 ACSR?

Alternative 6
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove 230 kV Line with
Benson - 6 Mile Grove - Kerkhoven 115 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		*Applicable* MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
81.2	62003 JOHNJCT7 115	63216 ORTONVL7 115	106.2	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	25	$98,000/mi	$ 2,450,000.00	$ 2,450,000.00
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ 2,450,000.00
148	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Coyote Reduction	26		$ -	$ 2,450,000.00
222.5	60190 BLK DOG7 115	60258 WILSON 7 115	310	60190 [BLK DOG7 115]	60258 [WILSON 7 115]	Reconductor	4.5	$98,000/mi	$ 441,000.00	$ 2,891,000.00
265.4	62003 JOHNJCT7 115	66555 MORRIS 7 115	107.8	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	15.5	$98,000/mi	$ 1,519,000.00	$ 4,410,000.00

Alternative 7
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove - Willmar 230 kV Line with
Benson - 6 Mile Grove - Kerkhoven 115 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
53.2	62003 JOHNJCT7 115	63216 ORTONVL7 115	106.2	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	25	$98,000/mi	$2,450,000.00	$ 2,450,000.00
106.4	60156 PYNSVIL7 115	60760 PAYNES 869.0	65	60156 [PYNSVIL7 115]	60162 [WAKEFLD7 115]	New Parallel Xfmr	52 MVA	$603,334.76	$ 603,334.76	$ 3,053,334.76
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA			$ 3,053,334.76
160.5	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$2,548,000.00	$ 5,601,334.76
208.9	60190 BLK DOG7 115	60258 WILSON 7 115	310	60190 [BLK DOG7 115]	60258 [WILSON 7 115]	Reconductor	4.5	$98,000/mi	$ 441,000.00	$ 6,042,334.76
235.8	62003 JOHNJCT7 115	66555 MORRIS 7 115	107.8	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	15.5	$98,000/mi	$1,519,000.00	$ 7,561,334.76

Alternative 8
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with
Benson - 6 Mile Grove - Kerkhoven 115 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
41.9	62003 JOHNJCT7 115	63216 ORTONVL7 115	106.2	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	25	$98,000/mi	$ 2,450,000.00	$ 2,450,000.00
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA			$ 2,450,000.00
177.5	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$ 4,998,000.00
222.9	62003 JOHNJCT7 115	66555 MORRIS 7 115	107.8	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	15.5	$98,000/mi	$ 1,519,000.00	$ 6,517,000.00
235.1	60150 MNVLTAP4 230	66550 GRANITF4 230	350	63050 [WILLMAR4 230]	66550 [GRANITF4 230]	Reconductor	3	$98,000/mi	$ 294,000.00	$ 6,811,000.00
245.5	63054 PANTHER4 230	60742 PANTHER869.0	87.5	62980 [MCLEOD 4 230]	63054 [PANTHER4 230]	New Parallel Xfmr	70 MVA	$929,196.61	$ 929,196.61	$ 7,740,196.61
249.5	62982 HUTCHMN7 115	62986 HUTCHMN869.0	83.3	60189 [BLK DOG4 230]	60190 [BLK DOG7 115]	New Parallel Xfmr	83.3 MVA	$729,243.77	$ 729,243.77	$ 8,469,440.38

Alternative 9
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with
Benson - 6 Mile Grove - Kerkhoven 115 kV Line with
Dickinson - Carver County - Wilmarth 345 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
39.2	62003 JOHNJCT7 115	63216 ORTONVL7 115	106.2	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	25	$98,000/mi	$ 2,450,000.00	$ 2,450,000.00
100.5	60190 BLK DOG7 115	60258 WILSON 7 115	310	60190 [BLK DOG7 115]	60258 [WILSON 7 115]	Reconductor	4.5	$98,000/mi	$ 441,000.00	$ 2,891,000.00
135.1	60150 MNVLTAP4 230	66550 GRANITF4 230	350	60101 [FORBES 2 500]	61550 [FORB1JCT 230]	Reconductor	3	$98,000/mi	$ 294,000.00	$ 3,185,000.00
				61550 [FORB1JCT 230]	61624 [FORBES 4 230]					
				61550 [FORB1JCT 230]	61551 [FORB1TR934.5]					
				60101 [FORBES 2 500]	61552 [FORB2JCT 230]					
				61552 [FORB2JCT 230]	61624 [FORBES 4 230]					
				61552 [FORB2JCT 230]	61553 [FORB2TR934.5]					
				60101 [FORBES 2 500]	60198 [CHIS-N 2 500]					
				67564 [DORSEY 2 500]	60173 [ROSEAUN2 500]					
				60173 [ROSEAUN2 500]	60174 [ROSEAUS2 500]					
				60174 [ROSEAUS2 500]	60101 [FORBES 2 500]					
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ 3,185,000.00
148	60050 WLMRTHTP 345	60055 CRVRCO4 345	792	63030 [DICKNSN3 345]	60270 [MPLEGV13 345]	Use Beefy Cond.**	19.5	2-1272 ACSR	$ -	$ 3,185,000.00
				60270 [MPLEGV13 345]	60233 [PARKERS3 345]					
				63030 [DICKNSN3 345]	60202 [COON CK3 345]					
				63030 [DICKNSN3 345]	62925 [DICKNSN7 115]					
198.5	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$ 5,733,000.00
220.2	62003 JOHNJCT7 115	66555 MORRIS 7 115	107.8	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	15.5	$98,000/mi	$ 1,519,000.00	$ 7,252,000.00
236.9	63054 PANTHER4 230	60742 PANTHER869.0	87.5	62980 [MCLEOD 4 230]	63054 [PANTHER4 230]	New Parallel Xfmr	70 MVA	$929,196.61	$ 929,196.61	$ 8,181,196.61
241.9	62982 HUTCHMN7 115	62986 HUTCHMN869.0	83.3	60053 [CARVRCO4 230]	62980 [MCLEOD 4 230]	New Parallel Xfmr	83.3 MVA	$729,243.77	$ 729,243.77	$ 8,910,440.38
297.7	63314 BIGSTON4 230	63320 6MI GRV4 230	430	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	45.6	$49,000/mi	$ 2,234,400.00	$ 11,144,840.38

*Must use conductor larger than 954 ACSR - 1272 ACSR?
**Must use conductor larger than 2-1272 ACSR

Alternative 9b
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with
Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with
Benson - 6 Mile Grove - Kerkhoven 115 kV Line with
Dickinson - West Waconia - Blue Lake 345 kV Line

BGSII at 451 MW to 5 Original Partners

Scheduling 300 MW (total of 851 MW) to GRE and City of Hutchinson

Incremental MW increase from	Facility Overloaded		Applicable MVA	Outage					Installed Cost	
Big Stone II Unit	From Bus	To Bus	Rating	From Bus	To Bus	Remedy	Miles/Qty	Cost	Incremental	Cumulative
81.8	60150 MNVLTAP4 230	66550 GRANITF4 230	350	60101 [FORBES 2 500] 61550 [FORB1JCT 230] 61550 [FORB1JCT 230] 60101 [FORBES 2 500] 61552 [FORB2JCT 230] 61552 [FORB2JCT 230] 60101 [FORBES 2 500] 67564 [DORSEY 2 500] 60173 [ROSEAUN2 500] 60174 [ROSEAUS2 500]	61550 [FORB1JCT 230] 61624 [FORBES 4 230] 61551 [FORB1TR934.5] 61552 [FORB2JCT 230] 61624 [FORBES 4 230] 61553 [FORB2TR934.5] 60198 [CHIS-N 2 500] 60173 [ROSEAUN2 500] 60174 [ROSEAUS2 500] 60101 [FORBES 2 500]	Reconductor	3	$98,000/mi	$ 294,000.00	$ 294,000.00
139.5	63314 BIGSTON4 230	66666 BIGSTN2G22.0	590	BASE CASE		Use Larger Xfmr	750 MVA		$ -	$ 294,000.00
195.2	60055 WSTWCNA 345	60192 BLUE LK3 345	792	63030 [DICKNSN3 345] 60270 [MPLEGV13 345] 63030 [DICKNSN3 345] 63030 [DICKNSN3 345]	60270 [MPLEGV13 345] 60233 [PARKERS3 345] 60202 [COON CK3 345] 62925 [DICKNSN7 115]	Use Beefy Cond.**	24	2-1272 ACSR	$ -	$ 294,000.00
199.1	63327 HANKSON4 230	63329 WAHPETN4 230	385	63369 [JAMESTN3 345]	66791 [CENTER 3 345]	Reconductor	26	$98,000/mi	$ 2,548,000.00	$ 2,842,000.00
222.3	62003 JOHNJCT7 115	66555 MORRIS 7 115	107.8	63314 [BIGSTON4 230]	63320 [6MI GRV4 230]	Reconductor	15.5	$98,000/mi	$ 1,519,000.00	$ 4,361,000.00
226.4	62982 HUTCHMN7 115	62986 HUTCHMN869.0	83.3	60053 [WSTWCNA4 230]	62980 [MCLEOD 4 230]	New Parallel Xfmr	83.3 MVA	$729,243.77	$ 729,243.77	$ 5,090,243.77
285.9	63054 PANTHER4 230	60742 PANTHER869.0	87.5	62980 [MCLEOD 4 230]	63054 [PANTHER4 230]	New Parallel Xfmr	70 MVA	$929,196.61	$ 929,196.61	$ 6,019,440.38
294.3	63314 BIGSTON4 230	63320 6MI GRV4 230	430	63314 [BIGSTON4 230]	63325 [BROWNSV4 230]	Use Beefy Cond.*	45.6	$49,000/mi	$ 2,234,400.00	$ 8,253,840.38

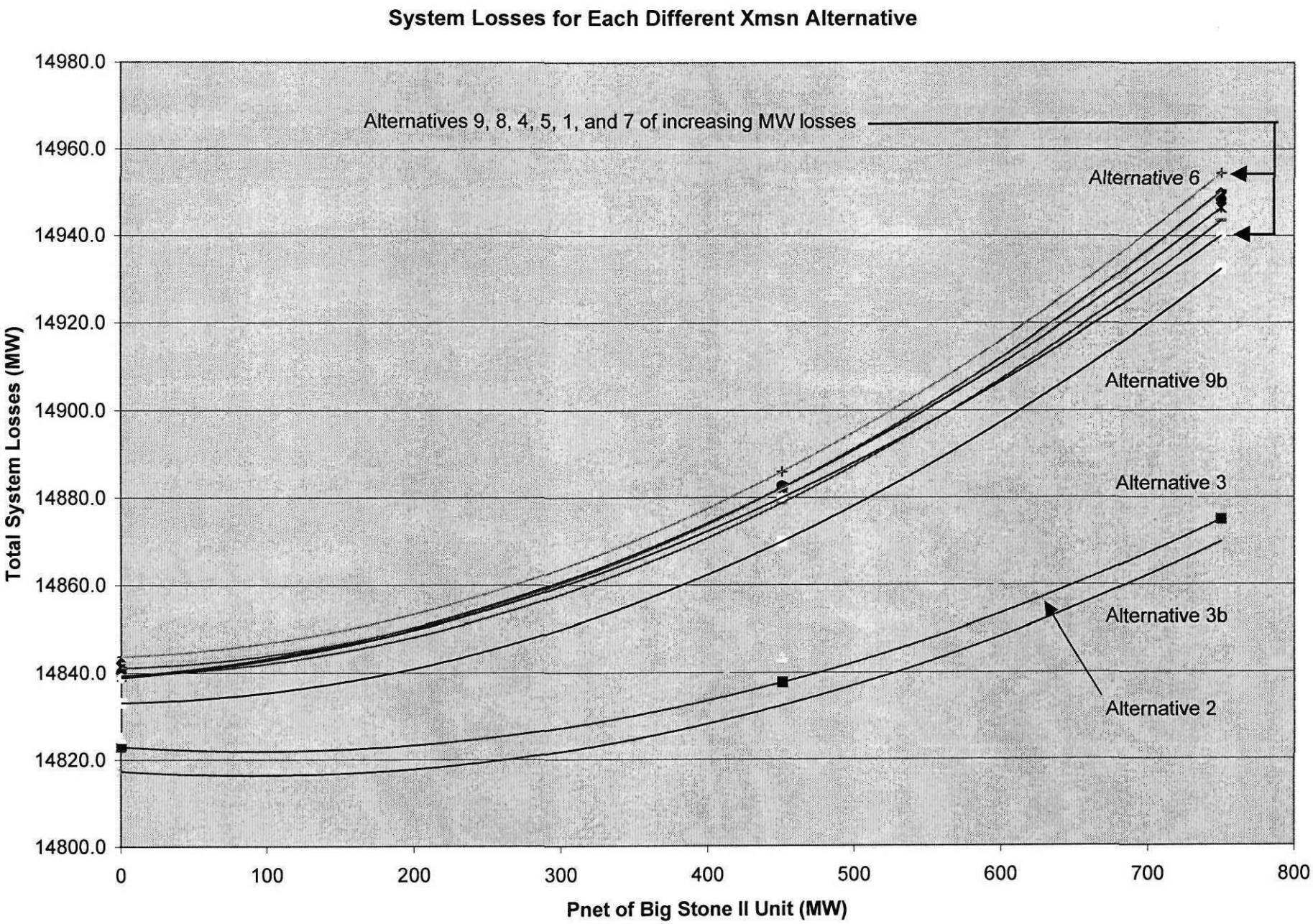
*Must use conductor larger than 954 ACSR - 1272 ACSR?
**Must use conductor larger than 2-1272 ACSR

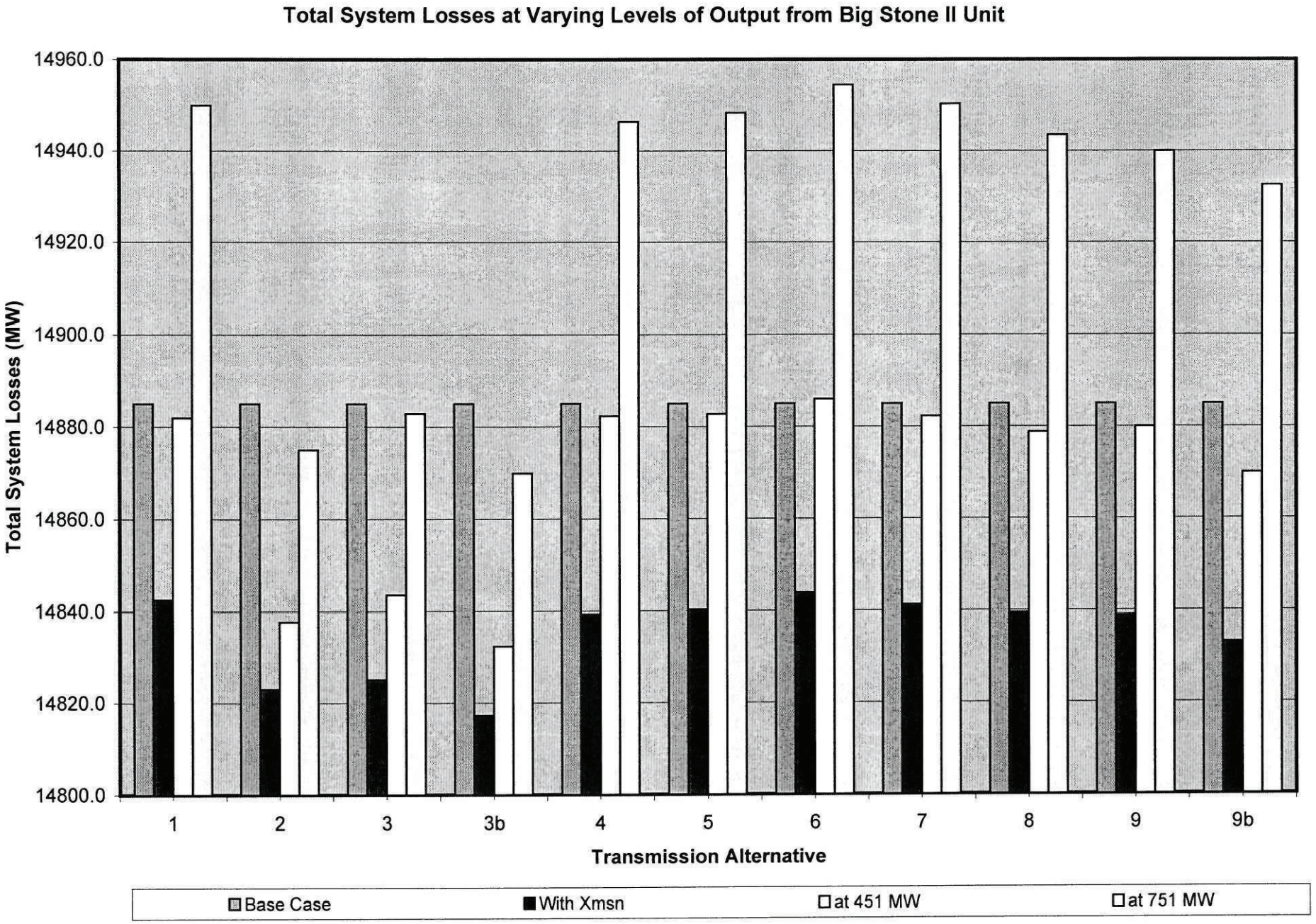
APPENDIX E

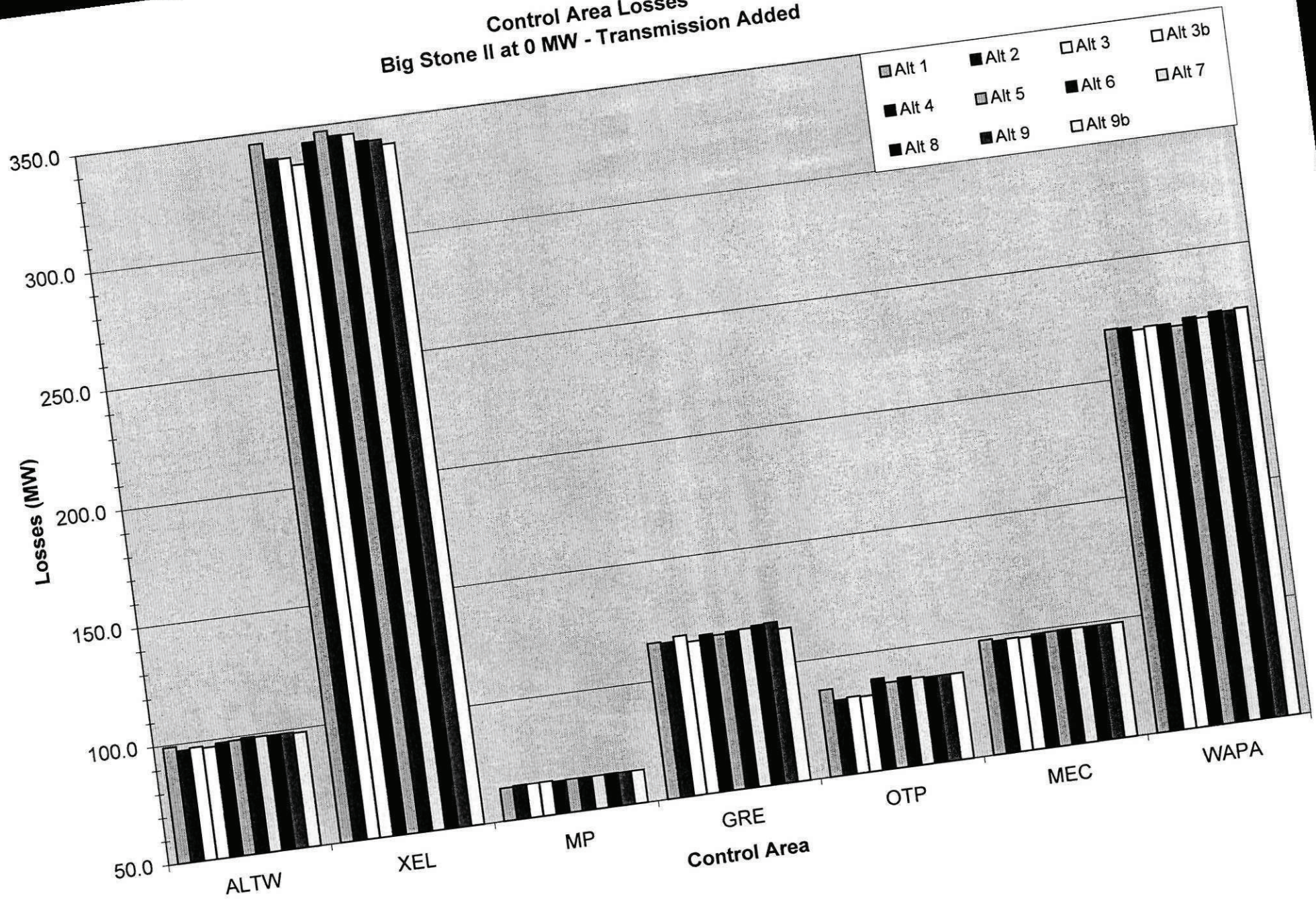
Loss Analysis
Broken Down by Control Area

Transmission Alternatives Studied for Preliminary Big Stone II Transmission Study

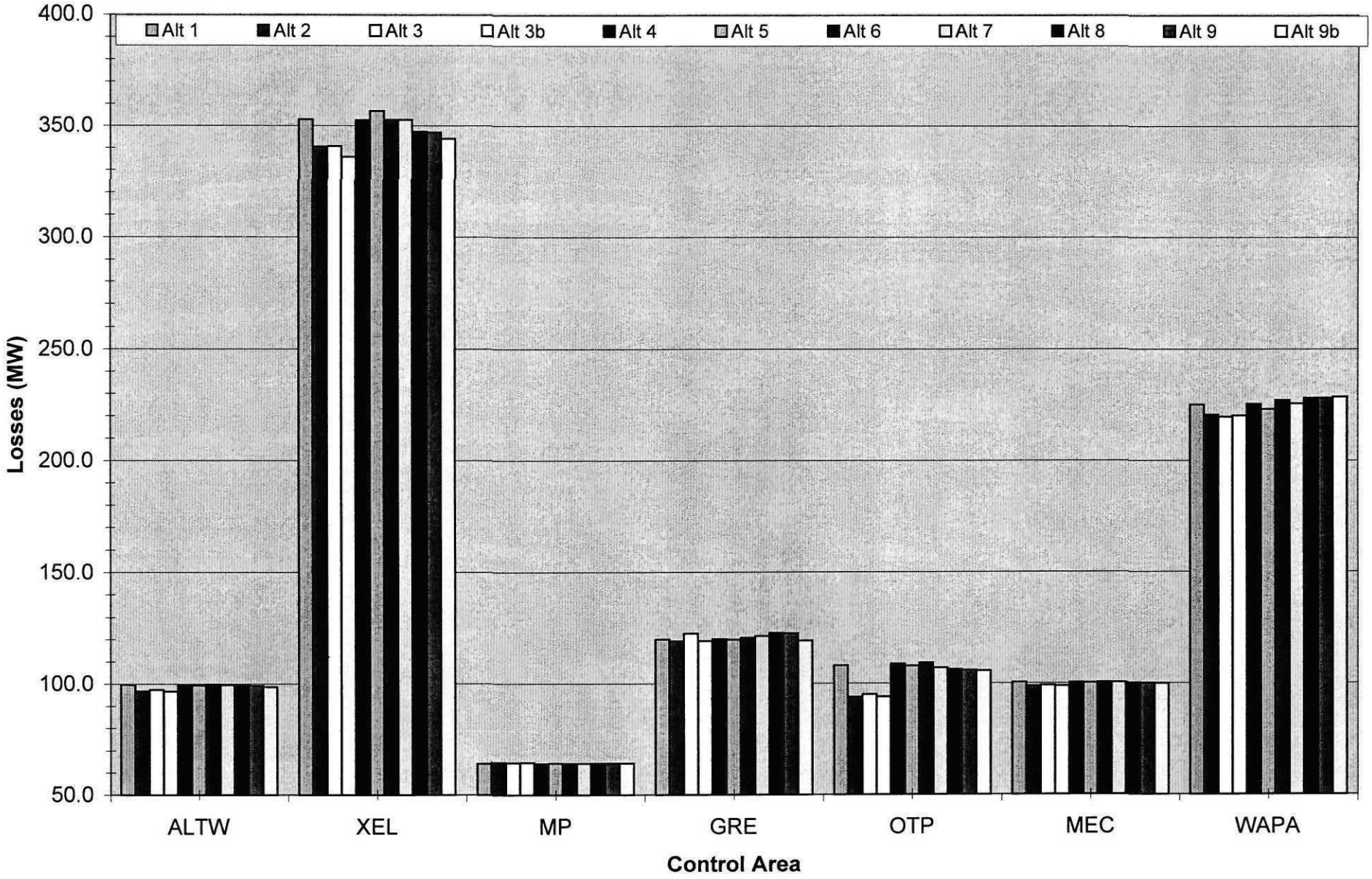
Alternative #	Description	Base Case 0 (Base Case)	Add Xmsn 0	Xmsn Case - Base Case	Pnet at 451	451 Case - Xmsn Case	Pnet at 750	750 Case - Xmsn Case
1	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate	14885.0	14842.4	-42.6	14881.9	39.5	14949.9	107.5
2	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - Blue Lake 345 kV Line	14885.0	14823.0	-62.0	14837.7	14.7	14875.0	52.0
3	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	14885.0	14825.1	-59.9	14843.5	18.4	14882.9	57.8
3b	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Willmar - West Waconia 345 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	14885.0	14817.3	-67.7	14832.4	15.1	14869.9	52.6
4	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - Blair - White 345 kV Line with Ivanhoe - Lyon County 115 kV Line	14885.0	14839.3	-45.7	14882.3	43.0	14946.4	107.1
5	Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Blair - Lyon County 230 kV Line with Lyon County - Franklin 115 kV Line	14885.0	14840.2	-44.8	14882.7	42.5	14948.3	108.1
6	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	14885.0	14843.8	-41.2	14886.0	42.2	14954.5	110.7
7	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	14885.0	14841.2	-43.8	14882.3	41.1	14950.3	109.1
8	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line	14885.0	14839.4	-45.6	14878.8	39.4	14943.5	104.1
9	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Wilmarth 345 kV Line	14885.0	14838.9	-46.1	14880.0	41.1	14940.0	101.1
9b	Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate with Big Stone - 6 Mile Grove - Willmar - McLeod 230 kV Line with Morris - 6 Mile Grove 230 kV Line with Benson - 6 Mile Grove - Kerkhoven 115 kV Line with Dickinson - West Waconia - Blue Lake 345 kV Line	14885.0	14833.1	-51.9	14870.0	36.9	14932.4	99.3

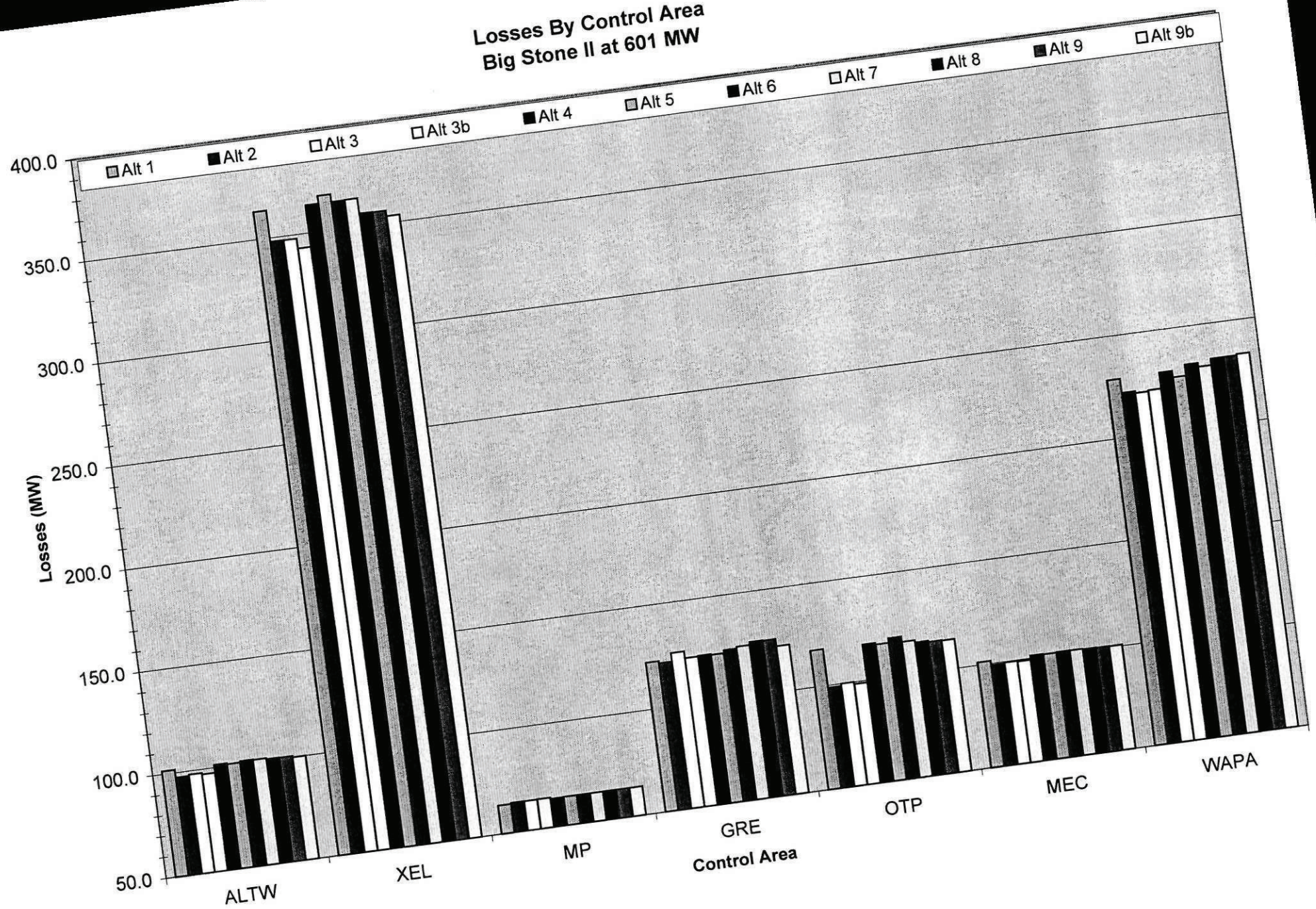

System Losses for Each Different Xmsn Alternative
Alternatives 9, 8, 4, 5, 1, and 7 of increasing MW losses
Alternative 6
Alternative 9b
Alternative 3
Alternative 3b
Alternative 2
Total System Losses (MW)
14980.0
14960.0
14940.0
14920.0
14900.0
14880.0
14860.0
14840.0
14820.0
14800.0
0
100
200
300
400
500
600
700
800
Pnet of Big Stone II Unit (MW)


Total System Losses at Varying Levels of Output from Big Stone II Unit
14960.0
14940.0
14920.0
14900.0
14880.0
14860.0
14840.0
14820.0
14800.0
Total System Losses (MW)
1
2
3
3b
4
5
6
7
8
9
9b
Transmission Alternative
Base Case
With Xmsn
at 451 MW
at 751 MW


Control Area Losses
Big Stone II at 0 MW - Transmission Added
Alt 1
Alt 2
Alt 3
Alt 3b
Alt 4
Alt 5
Alt 6
Alt 7
Alt 8
Alt 9
Alt 9b
350.0
300.0
250.0
200.0
150.0
100.0
50.0
Losses (MW)
ALTW
XEL
MP
GRE
OTP
MEC
WAPA
Control Area

Control Area Losses
Big Stone II at 451 MW




Losses By Control Area
Big Stone II at 601 MW
Alt 1
Alt 2
Alt 3
Alt 3b
Alt 4
Alt 5
Alt 6
Alt 7
Alt 8
Alt 9
Alt 9b
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
Losses (MW)
ALTW
XEL
MP
GRE
OTP
MEC
WAPA
Control Area

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				1				
			Base Case	Alternative 1				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	99.1	99.7	0.6	101.5	2.4
600	XEL	Xcel Energy	344.9	345.5	353.0	7.5	363.8	18.3
608	MP	Minnesota Power	64.2	64.0	63.9	-0.1	63.8	-0.2
610	MP-West	Minnesota Power West	8.1	8.0	8.7	0.7	9.2	1.2
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.0	0.1	1.0	0.1
618	GRE	Great River Energy	115.5	116.0	120.0	4.0	122.7	6.7
626	OTP	Otter Tail Power Company	95.1	86.9	108.0	21.1	117.8	30.9
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.6	100.4	1.8	101.4	2.8
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.8	-0.5	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	221.3	225.0	3.7	228.7	7.4
667	MHEB	Manitoba Hydro	278.3	278.3	277.5	-0.8	277.0	-1.3
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.8	73.3	-0.5	73.7	-0.1
		Total System Losses =	14852.7	14843.7	14882.1	38.4	14917.5	73.8
	MAPP	**MAPP System Losses =**	1543.0	1534.9	1569.3	34.4	1597.8	62.9

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				2				
			Base Case	Alternative 2				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	97.2	96.7	-0.5	97.7	0.5
600	XEL	Xcel Energy	344.9	338.3	340.5	2.2	348.2	9.9
608	MP	Minnesota Power	64.2	64.4	64.5	0.1	64.3	-0.1
610	MP-West	Minnesota Power West	8.1	7.7	7.9	0.2	8.1	0.4
613	SMMPA	Southern MN Municipal Power Agency	0.8	1.0	1.1	0.1	1.1	0.1
618	GRE	Great River Energy	115.5	115.4	119.1	3.7	121.7	6.3
626	OTP	Otter Tail Power Company	95.1	81.9	93.9	12.0	98.9	17.0
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	97.5	98.7	1.2	99.2	1.7
640	NPPD	Nebraska Public Power District	109.5	109.4	106.9	-2.5	107.0	-2.4
645	OPPD	Omaha Public Power District	28.3	28.5	28.0	-0.5	27.9	-0.6
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.1	-0.1
652	WAPA	Western Area Power Administration	222.2	221.1	220.4	-0.7	221.8	0.7
667	MHEB	Manitoba Hydro	278.3	279.0	278.5	-0.5	278.1	-0.9
672	SPC	Sasketchewan Power Company	91.3	91.3	91.3	0.0	91.3	0.0
680	DPC	Dairyland Power Cooperative	73.3	73.4	72.6	-0.8	72.9	-0.5
		Total System Losses =	14852.7	14824.1	14838.6	14.5	14859.5	35.4
	MAPP	**MAPP System Losses =**	1543.0	1521.5	1535.9	14.4	1553.0	31.5

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				3				
			Base Case	Alternative 3				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	97.8	97.3	-0.5	98.3	0.5
600	XEL	Xcel Energy	344.9	338.0	340.8	2.8	348.1	10.1
608	MP	Minnesota Power	64.2	64.3	64.4	0.1	64.2	-0.1
610	MP-West	Minnesota Power West	8.1	7.7	8.0	0.3	8.2	0.5
613	SMMPA	Southern MN Municipal Power Agency	0.8	1.0	1.1	0.1	1.1	0.1
618	GRE	Great River Energy	115.5	117.5	122.6	5.1	125.8	8.3
626	OTP	Otter Tail Power Company	95.1	82.5	95.0	12.5	100.1	17.6
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	97.8	99.0	1.2	99.6	1.8
640	NPPD	Nebraska Public Power District	109.5	109.4	106.9	-2.5	107.0	-2.4
645	OPPD	Omaha Public Power District	28.3	28.4	27.9	-0.5	27.9	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.1	-0.1
652	WAPA	Western Area Power Administration	222.2	219.6	219.5	-0.1	220.9	1.3
667	MHEB	Manitoba Hydro	278.3	278.8	278.3	-0.5	278.0	-0.8
672	SPC	Sasketchewan Power Company	91.3	91.3	91.3	0.0	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.4	72.6	-0.8	72.9	-0.5
		Total System Losses =	14852.7	14826.2	14843.8	17.6	14865.9	39.7
	MAPP	**MAPP System Losses =**	1543.0	1522.3	1539.9	17.6	1557.5	35.2

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				3b				
			Base Case	Alternative 3b				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	97.1	96.6	-0.5	97.6	0.5
600	XEL	Xcel Energy	344.9	334.6	336.0	1.4	343.1	8.5
608	MP	Minnesota Power	64.2	64.4	64.5	0.1	64.3	-0.1
610	MP-West	Minnesota Power West	8.1	7.6	7.9	0.3	8.1	0.5
613	SMMPA	Southern MN Municipal Power Agency	0.8	1.0	1.1	0.1	1.1	0.1
618	GRE	Great River Energy	115.5	114.5	119.2	4.7	122.4	7.9
626	OTP	Otter Tail Power Company	95.1	82.1	94.0	11.9	99.0	16.9
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	97.5	98.7	1.2	99.3	1.8
640	NPPD	Nebraska Public Power District	109.5	109.4	106.9	-2.5	106.9	-2.5
645	OPPD	Omaha Public Power District	28.3	28.4	28.0	-0.4	27.9	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.1	-0.1
652	WAPA	Western Area Power Administration	222.2	220.6	220.0	-0.6	221.4	0.8
667	MHEB	Manitoba Hydro	278.3	278.9	278.4	-0.5	278.1	-0.8
672	SPC	Sasketchewan Power Company	91.3	91.3	91.3	0.0	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.5	72.7	-0.8	72.9	-0.6
		Total System Losses =	14852.7	14818.5	14832.7	14.2	14854.4	35.9
	MAPP	**MAPP System Losses =**	1543.0	1516.4	1531.2	14.8	1548.2	31.8

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				4				
			Base Case	Alternative 4				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.3	99.5	1.2	101.4	3.1
600	XEL	Xcel Energy	344.9	343.5	352.7	9.2	363.9	20.4
608	MP	Minnesota Power	64.2	63.9	63.9	0.0	63.7	-0.2
610	MP-West	Minnesota Power West	8.1	8.1	8.7	0.6	9.3	1.2
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.0	0.1	1.0	0.1
618	GRE	Great River Energy	115.5	116.6	120.1	3.5	122.7	6.1
626	OTP	Otter Tail Power Company	95.1	88.6	108.7	20.1	117.5	28.9
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.2	100.3	2.1	101.3	3.1
640	NPPD	Nebraska Public Power District	109.5	109.5	107.0	-2.5	107.1	-2.4
645	OPPD	Omaha Public Power District	28.3	28.4	27.8	-0.6	27.8	-0.6
650	LES	Lincoln Electric System	12.2	12.2	12.2	0.0	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	220.4	225.3	4.9	229.3	8.9
667	MHEB	Manitoba Hydro	278.3	278.2	277.5	-0.7	277.0	-1.2
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.5	73.2	-0.3	73.7	0.2
		Total System Losses =	14852.7	14840.4	14882.4	42.0	14917.8	77.4
	MAPP	**MAPP System Losses =**	1543.0	1533.7	1570.0	36.3	1598.1	64.4

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				5				
			Base Case	Alternative 5				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.6	99.3	0.7	100.9	2.3
600	XEL	Xcel Energy	344.9	347.4	356.7	9.3	367.8	20.4
608	MP	Minnesota Power	64.2	64.1	64.1	0.0	63.8	-0.3
610	MP-West	Minnesota Power West	8.1	8.0	8.6	0.6	9.1	1.1
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.0	0.1	1.0	0.1
618	GRE	Great River Energy	115.5	115.8	119.9	4.1	122.3	6.5
626	OTP	Otter Tail Power Company	95.1	86.4	107.8	21.4	116.7	30.3
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.4	100.2	1.8	101.1	2.7
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.2	-2.2
645	OPPD	Omaha Public Power District	28.3	28.3	27.8	-0.5	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	219.2	223.0	3.8	226.1	6.9
667	MHEB	Manitoba Hydro	278.3	278.3	277.5	-0.8	277.1	-1.2
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.7	73.3	-0.4	73.7	0.0
		Total System Losses =	14852.7	14841.1	14882.7	41.6	14916.0	74.9
	MAPP	**MAPP System Losses =**	1543.0	1533.8	1570.6	36.8	1597.5	63.7

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				6				
			Base Case	Alternative 6				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	99.1	99.8	0.7	101.5	2.4
600	XEL	Xcel Energy	344.9	345.0	352.8	7.8	363.9	18.9
608	MP	Minnesota Power	64.2	64.1	64.0	-0.1	63.8	-0.3
610	MP-West	Minnesota Power West	8.1	7.9	8.4	0.5	8.9	1.0
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.0	0.1	1.0	0.1
618	GRE	Great River Energy	115.5	116.5	120.8	4.3	123.8	7.3
626	OTP	Otter Tail Power Company	95.1	87.7	109.1	21.4	118.8	31.1
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.6	100.4	1.8	101.3	2.7
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.8	-0.5	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	222.0	226.9	4.9	231.4	9.4
667	MHEB	Manitoba Hydro	278.3	278.4	277.7	-0.7	277.2	-1.2
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.8	73.3	-0.5	73.8	0.0
		Total System Losses =	14852.7	14845.1	14886.2	41.1	14923.0	77.9
	MAPP	**MAPP System Losses =**	1543.0	1536.5	1572.9	36.4	1602.6	66.1

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				7				
			Base Case	Alternative 7				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.9	99.6	0.7	101.3	2.4
600	XEL	Xcel Energy	344.9	344.7	352.8	8.1	364.1	19.4
608	MP	Minnesota Power	64.2	64.1	64.0	-0.1	63.8	-0.3
610	MP-West	Minnesota Power West	8.1	7.8	8.3	0.5	8.7	0.9
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.0	0.1	1.0	0.1
618	GRE	Great River Energy	115.5	116.8	121.5	4.7	124.6	7.8
626	OTP	Otter Tail Power Company	95.1	86.7	107.0	20.3	116.2	29.5
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.5	100.3	1.8	101.2	2.7
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.8	-0.5	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	221.2	225.5	4.3	229.6	8.4
667	MHEB	Manitoba Hydro	278.3	278.4	277.7	-0.7	277.2	-1.2
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.7	73.3	-0.4	73.7	0.0
		Total System Losses =	14852.7	14842.2	14882.3	40.1	14918.4	76.2
	MAPP	**MAPP System Losses =**	1543.0	1534.4	1569.9	35.5	1598.8	64.4

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				8				
			Base Case	Alternative 8				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.7	99.2	0.5	100.8	2.1
600	XEL	Xcel Energy	344.9	341.2	347.4	6.2	356.5	15.3
608	MP	Minnesota Power	64.2	64.2	64.1	-0.1	63.9	-0.3
610	MP-West	Minnesota Power West	8.1	7.8	8.2	0.4	8.6	0.8
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.1	0.2	1.0	0.1
618	GRE	Great River Energy	115.5	117.6	122.9	5.3	126.0	8.4
626	OTP	Otter Tail Power Company	95.1	86.4	106.3	19.9	115.1	28.7
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.3	100.1	1.8	101.0	2.7
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.9	-0.4	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.1	-0.1
652	WAPA	Western Area Power Administration	222.2	223.1	228.1	5.0	232.7	9.6
667	MHEB	Manitoba Hydro	278.3	278.5	277.8	-0.7	277.4	-1.1
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.7	73.2	-0.5	73.6	-0.1
		Total System Losses =	14852.7	14840.6	14879.1	38.5	14912.2	71.6
	MAPP	**MAPP System Losses =**	1543.0	1533.3	1567.8	34.5	1594.4	61.1

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				9				
			Base Case	Alternative 9				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.8	99.1	0.3	100.7	1.9
600	XEL	Xcel Energy	344.9	340.9	347.0	6.1	356.3	15.4
608	MP	Minnesota Power	64.2	64.1	64.1	0.0	63.9	-0.2
610	MP-West	Minnesota Power West	8.1	7.8	8.2	0.4	8.6	0.8
613	SMMPA	Southern MN Municipal Power Agency	0.8	0.9	1.1	0.2	1.0	0.1
618	GRE	Great River Energy	115.5	117.9	122.7	4.8	125.8	7.9
626	OTP	Otter Tail Power Company	95.1	86.4	105.8	19.4	114.4	28.0
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.4	100.0	1.6	100.8	2.4
640	NPPD	Nebraska Public Power District	109.5	109.4	107.0	-2.4	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.9	-0.4	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.2	0.0
652	WAPA	Western Area Power Administration	222.2	222.5	228.1	5.6	232.7	10.2
667	MHEB	Manitoba Hydro	278.3	278.5	277.9	-0.6	277.5	-1.0
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.6	73.1	-0.5	73.5	-0.1
		Total System Losses =	14852.7	14840.1	14877.3	37.2	14910.5	70.4
	MAPP	**MAPP System Losses =**	1543.0	1532.6	1566.6	34.0	1593.2	60.6

Big Stone II Preliminary Transmission Study

Losses by Control Area for Varying Levels of Big Stone II

				9b				
			Base Case	Alternative 9b				
Control Area	Abbreviation	Company	No Xmsn	0 MW	451 MW	△ MW	601 MW	△ MW
331	ALTW	Alliant Energy - West	99.6	98.3	98.6	0.3	100.1	1.8
600	XEL	Xcel Energy	344.9	338.6	344.1	5.5	353.4	14.8
608	MP	Minnesota Power	64.2	64.1	64.1	0.0	63.9	-0.2
610	MP-West	Minnesota Power West	8.1	7.8	8.2	0.4	8.6	0.8
613	SMMPA	Southern MN Municipal Power Agency	0.8	1.0	1.1	0.1	1.0	0.0
618	GRE	Great River Energy	115.5	114.8	119.3	4.5	122.2	7.4
626	OTP	Otter Tail Power Company	95.1	86.4	105.6	19.2	114.2	27.8
633	MPW	Muscatine Power and Water	0.4	0.4	0.4	0.0	0.4	0.0
635	MEC	Mid-American Energy Council	98.9	98.3	99.9	1.6	100.7	2.4
640	NPPD	Nebraska Public Power District	109.5	109.4	106.9	-2.5	107.1	-2.3
645	OPPD	Omaha Public Power District	28.3	28.3	27.9	-0.4	27.8	-0.5
650	LES	Lincoln Electric System	12.2	12.2	12.1	-0.1	12.1	-0.1
652	WAPA	Western Area Power Administration	222.2	223.2	228.6	5.4	233.3	10.1
667	MHEB	Manitoba Hydro	278.3	278.5	277.9	-0.6	277.5	-1.0
672	SPC	Sasketchewan Power Company	91.3	91.3	91.2	-0.1	91.2	-0.1
680	DPC	Dairyland Power Cooperative	73.3	73.8	73.3	-0.5	73.7	-0.1
		Total System Losses =	14852.7	14834.7	14870.0	35.3	14903.4	68.7
	MAPP	**MAPP System Losses =**	1543.0	1528.1	1560.6	32.5	1587.1	59.0

APPENDIX F.1

Flows on Individual Transmission Lines
For Constrained Interface Analysis

Distribution Factor Analysis

2009 Summer Peak

Generation to Generation Dispatch

Sceduling Big Stone II to all 7 Entities Together

	Transmission Alternative										
Flowgate	1	2	3	3b	4	5	6	7	8	9	9b
ARN-HAZLTN	3.20%	1.00%	1.20%	0.90%	3.70%	3.10%	3.20%	3.20%	2.90%	2.70%	2.60%
COOPER_S	-1.40%	-1.10%	-1.20%	-1.20%	-1.10%	-1.50%	-1.50%	-1.60%	-1.50%	-1.60%	-1.60%
ECL-ARP	-2.10%	-0.20%	-0.40%	-0.10%	-2.60%	-2.10%	-2.20%	-2.10%	-1.90%	-1.70%	-1.60%
FT CAL_S	4.10%	4.20%	4.20%	4.10%	4.90%	4.10%	4.10%	4.00%	4.10%	4.00%	4.00%
GGS	-2.20%	-2.40%	-2.50%	-2.40%	-2.40%	-2.30%	-2.30%	-2.30%	-2.30%	-2.40%	-2.40%
GRIS_LNC	2.70%	1.90%	1.80%	1.80%	2.20%	2.60%	2.60%	2.50%	2.40%	2.30%	2.30%
LACYGNE_N	1.00%	0.70%	0.80%	0.80%	1.00%	1.00%	1.10%	1.10%	1.00%	1.00%	1.00%
LKM-WFB	-2.30%	-2.40%	-2.30%	-2.40%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%	-2.30%
MHEX_N	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%
MHEX_S	0.20%	0.20%	0.10%	0.10%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-0.40%	0.40%	0.30%	0.50%	-0.90%	-0.30%	-0.30%	-0.30%	-0.20%	0.00%	0.00%
MP_EXPORT	-0.30%	-0.70%	-0.70%	-0.80%	0.10%	-0.20%	-0.20%	-0.20%	-0.20%	-0.30%	-0.30%
MWSI	-0.30%	5.30%	4.40%	5.40%	-1.70%	-0.20%	-0.50%	-0.20%	0.30%	0.90%	1.30%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	77.50%	80.40%	80.20%	80.40%	77.60%	77.60%	77.00%	77.30%	77.40%	77.50%	77.60%
NI_WUMS	0.70%	-0.10%	0.00%	-0.20%	0.90%	0.70%	0.70%	0.70%	0.60%	0.50%	0.50%
PRI-BYN	1.80%	5.50%	4.80%	5.60%	0.80%	1.90%	1.70%	1.90%	2.20%	2.60%	2.90%
QUAD-ROCKC	0.70%	0.30%	0.30%	0.30%	0.80%	0.70%	0.80%	0.70%	0.60%	0.60%	0.60%
QUADCITY_W	1.30%	1.10%	1.20%	1.20%	1.10%	1.40%	1.40%	1.40%	1.40%	1.40%	1.40%
WNE_WKS	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.10%	-0.20%	-0.20%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	-7.10%	4.80%	-7.00%	4.90%	-10.30%	-7.20%	-7.40%	-7.00%	-6.10%	-7.60%	-3.40%

Distribution Factor Analysis

2009 Summer Peak

Scheduling 601 MW's from Big Stone II to 7 Entities

Base Transaction for DF Calculation = 601 MW

Interface Definition		Transmission Alternative 1			Transmission Alternative 2			Transmission Alternative 3			Transmission Alternative 3b			Transmission Alternative 4			Transmission Alternative 5			Transmission Alternative 6			Transmission Alternative 7			Transmission Alternative 8			Transmission Alternative 9			Transmission Alternative 9b		
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference	Base Case with Xmsn	BGSII Case at 601 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	384.9	404	5.00%	371.9	377.6	1.60%	375.6	383	2.00%	371.8	377.5	1.50%	381.2	403.5	5.80%	382.6	401.6	4.90%	384.8	404.3	5.10%	383.7	402.8	5.00%	382.2	399.8	4.60%	382.3	398.5	4.20%	380.6	396.3	4.10%
	SUBTOTALS FOR: ARN-HAZLTN	384.9	404	5.00%	371.9	377.6	1.60%	375.6	383	2.00%	371.8	377.5	1.50%	381.2	403.5	5.80%	382.6	401.6	4.90%	384.8	404.3	5.10%	383.7	402.8	5.00%	382.2	399.8	4.60%	382.3	398.5	4.20%	380.6	396.3	4.10%
		Difference =	19.1	3.20%	Difference =	5.8	1.00%	Difference =	7.4	1.20%	Difference =	5.7	0.90%	Difference =	22.3	3.70%	Difference =	18.9	3.10%	Difference =	19.5	3.20%	Difference =	19.1	3.20%	Difference =	17.6	2.90%	Difference =	16.2	2.70%	Difference =	15.8	2.60%
64786 COOPER 3	59196 ST JOE 3	54.3	48.9	-10.00%	52.4	48.1	-8.20%	53.3	48.8	-8.50%	53.6	49	-8.60%	53.1	48.6	-8.40%	54	48.1	-10.80%	54.2	48.3	-10.90%	54.3	48.3	-11.10%	53.8	48.2	-10.50%	53.8	47.7	-11.30%	54.6	48.6	-11.10%
64786 COOPER 3	99039 7FAIRPT	63.4	60.4	-4.70%	61.9	59.6	-3.80%	62.6	60.1	-3.90%	62.6	60.2	-4.00%	62.5	60.2	-3.70%	63.1	59.8	-5.20%	63.2	59.8	-5.20%	63.3	59.9	-5.40%	63	59.8	-5.00%	63	59.5	-5.50%	63.5	60.1	-5.40%
	SUBTOTALS FOR: COOPER_S	117.7	109.3	-7.10%	114.3	107.7	-5.80%	115.9	108.9	-6.00%	116.4	109.3	-6.10%	115.6	108.8	-5.80%	117	108	-7.80%	117.4	108.2	-7.80%	117.6	108.2	-8.00%	116.8	108.1	-7.50%	116.8	107.2	-8.20%	118.2	108.7	-8.00%
		Difference =	-8.4	-1.40%	Difference =	-6.6	-1.10%	Difference =	-7	-1.20%	Difference =	-7.2	-1.20%	Difference =	-6.8	-1.10%	Difference =	-9.1	-1.50%	Difference =	-9.2	-1.50%	Difference =	-9.4	-1.60%	Difference =	-8.6	-1.50%	Difference =	-9.5	-1.60%	Difference =	-9.5	-1.60%
60304 EAU CL 3	92464 ARP 345	92.3	79.6	-13.80%	103.2	101.8	-1.30%	100.8	98.5	-2.30%	102.5	101.7	-0.80%	86.2	79.9	-16.10%	93.9	81.3	-13.40%	92.4	79.2	-14.20%	93.4	80.7	-13.60%	94.7	83.3	-12.10%	95	84.8	-10.80%	94.7	85	-10.30%
	SUBTOTALS FOR: ECL-ARP	92.3	79.6	-13.80%	103.2	101.8	-1.30%	100.8	98.5	-2.30%	102.5	101.7	-0.80%	86.2	79.9	-16.10%	93.9	81.3	-13.40%	92.4	79.2	-14.20%	93.4	80.7	-13.60%	94.7	83.3	-12.10%	95	84.8	-10.80%	94.7	85	-10.30%
		Difference =	-12.8	-2.10%	Difference =	-1.3	-0.20%	Difference =	-2.3	-0.40%	Difference =	-0.8	-0.10%	Difference =	-15.3	-2.60%	Difference =	-12.6	-2.10%	Difference =	-13.2	-2.20%	Difference =	-12.7	-2.10%	Difference =	-11.4	-1.90%	Difference =	-10.2	-1.70%	Difference =	-9.7	-1.60%
65351 S3451 3	65354 S3454 3	82.2	90.3	9.80%	81.8	90.5	10.70%	82	90.9	10.90%	82.4	90.9	10.40%	80.2	90.3	12.50%	81.9	90	9.80%	82.3	90.3	9.70%	82.4	90.4	9.90%	82	90.1	9.80%	82.8	90.8	9.70%			
65351 S3451 3	65359 S3459 3	30.2	44.1	45.90%	28	41.6	48.60%	28.8	42.6	47.90%	28.9	42.3	46.30%	27.6	44	58.30%	29.6	43.3	46.30%	30.2	43.8	45.50%	30.2	43.9	45.20%	29.8	43.6	46.10%	29.8	43	45.40%	30.4	43.7	43.80%
65451 S1251 5	65487 S1287 5	39.7	42.4	6.80%	39.2	41.8	6.70%	39.4	42	6.60%	39.4	42	6.60%	39.2	42.3	7.90%	39.6	42.3	6.70%	39.7	42.3	6.70%	39.7	42.3	6.70%	39.5	42.1	6.60%	39.7	42.3	6.50%			
	SUBTOTALS FOR: FT CAL_S	152.1	176.7	16.20%	148.9	173.9	16.70%	150.1	175.5	16.90%	150.6	175.2	16.30%	147.2	178.5	19.90%	151.1	175.5	16.10%	152.2	176.8	16.00%	152.3	176.6	16.00%	151.7	176.3	16.20%	151.1	175.2	16.00%	152.9	178.8	15.60%
		Difference =	24.6	4.10%	Difference =	24.9	4.30%	Difference =	25.4	4.30%	Difference =	24.5	4.10%	Difference =	29.3	4.90%	Difference =	24.4	4.10%	Difference =	24.5	4.10%	Difference =	24.3	4.00%	Difference =	24.6	4.10%	Difference =	24.1	4.00%	Difference =	23.9	4.00%
64832 GENTLMN4	64909 N PLATT4	157.4	156.1	-0.80%	157.4	156	-0.90%	157.4	156	-0.90%	157.4	156	-0.90%	157.5	156.1	-0.90%	157.4	156.1	-0.80%	157.4	156.1	-0.80%	157.4	156.1	-0.80%	157.4	156	-0.80%	157.4	156.1	-0.80%	157.4	156	-0.80%
64832 GENTLMN4	64908 N PLATT4	157.9	156.5	-0.80%	157.9	156.5	-0.90%	157.9	156.5	-0.90%	157.8	156.5	-0.90%	157.9	156.6	-0.90%	157.9	156.6	-0.80%	157.9	156.5	-0.80%	157.8	156.5	-0.80%	157.8	156.5	-0.80%	157.8	156.5	-0.80%	157.8	156.5	-0.80%
64832 GENTLMN4	64909 N PLATT4	162.4	161	-0.80%	162.4	161	-0.90%	162.4	161	-0.90%	162.4	161	-0.90%	162.5	161.1	-0.90%	162.4	161.1	-0.80%	162.4	161	-0.80%	162.4	161	-0.80%	162.4	161	-0.80%	162.4	161	-0.80%	162.4	161	-0.80%
64831 GENTLMN3	64984 SWEET W3	273.8	269.7	-1.50%	273.6	269.2	-1.60%	273.7	269.2	-1.60%	273.6	269.1	-1.60%	274.1	269.8	-1.60%	273.8	269.7	-1.50%	273.8	269.7	-1.50%	273.8	269.7	-1.50%	273.8	269.6	-1.50%	273.8	269.6	-1.50%	273.7	269.5	-1.50%
64831 GENTLMN3	64984 SWEET W3	328.2	323.2	-1.50%	327.9	322.6	-1.60%	328	322.8	-1.60%	327.8	322.5	-1.60%	328.5	323.3	-1.60%	328.2	323.2	-1.50%	328.1	323.2	-1.50%	328.1	323.1	-1.50%	328.1	323	-1.50%	328.1	323.1	-1.50%	327.9	322.9	-1.50%
64831 GENTLMN3	64943 REDWLO3	277.2	276.8	-0.10%	275.3	274.7	-0.20%	276.1	275.3	-0.30%	275.9	275.1	-0.30%	277.1	276.8	-0.20%	276.9	276.3	-0.20%	277	276.4	-0.20%	277	276.3	-0.30%	276.8	276	-0.20%	276.8	275.7	-0.40%	276.9	275.9	-0.40%
	SUBTOTALS FOR: GGS	1356.8	1343.5	-1.00%	1354.5	1339.9	-1.10%	1355.3	1340.8	-1.10%	1354.9	1340.1	-1.10%	1357.5	1343.3	-1.00%	1356.6	1343	-1.00%	1356.8	1342.8	-1.00%	1356.4	1342.6	-1.00%	1356.1	1342.2	-1.00%	1356.3	1342	-1.00%	1356	1341.6	-1.00%
		Difference =	-13.3	-2.20%	Difference =	-14.6	-2.40%	Difference =	-14.5	-2.50%	Difference =	-14.7	-2.40%	Difference =	-14.2	-2.40%	Difference =	-13.6	-2.30%	Difference =	-14.4	-2.30%	Difference =	-13.8	-2.30%	Difference =	-13.9	-2.30%	Difference =	-14.2	-2.40%	Difference =	-14.4	-2.40%
64833 PAULINE3	64902 MOORE 3	55.9	60.5	8.40%	53.5	56.6	5.90%	54.3	57.4	5.70%	53.7	56.8	5.80%	56.2	60.3	7.30%	55.6	60	8.00%	55.7	60.2	8.00%	55.5	59.8	7.80%	55.2	58.5	7.70%	55.4	59.3	7.10%	55.1	59	7.10%
64838 GR ISLD4	64780 COLMB WW	99.8	95.6	-4.20%	100.1	95.8	-4.30%	100	95.6	-4.40%	99.9	95.6	-4.30%	100.8	95.7	-5.10%	100	95.8	-4.20%	99.8	95.6	-4.20%	99.7	95.5	-4.20%	99.8	95.8	-4.30%	99.8	95.7	-4.20%	99.6	95.5	-4.20%
66571 GR ISLD3	64896 MCCOOL 3	145.8	161.4	10.70%	140.3	152.6	8.80%	142.2	154.3	8.50%	141	153.1	8.60%	146.6	160.9	9.70%	145.1	160.2	10.40%	145.4	160.6	10.40%	145	160	10.30%	144.3	159	10.20%	144.7	158.5	9.60%	144.2	158.1	9.60%
	SUBTOTALS FOR: GRIS_LNC	301.5	317.6	5.30%	293.9	305	3.80%	296.5	307.3	3.60%	294.6	305.6	3.70%	303.7	316.9	4.40%	300.7	316.1	5.10%	300.9	316.3	5.10%	300.2	315.4	5.10%	299.3	314	4.90%	300	313.5	4.50%	299	312.6	4.50%
		Difference =	16.1	2.70%	Difference =	11.1	1.90%	Difference =	10.8	1.80%	Difference =	11	1.80%	Difference =	13.3	2.20%	Difference =	15.4	2.60%	Difference =	15.4	2.60%	Difference =	15.2	2.50%	Difference =	14.7	2.40%	Difference =	13.6	2.30%	Difference =	13.6	2.30%
57981 LACYGNE7	57985 W.GRDNR7	577.8	581	0.60%	578.1	580.8	0.40%	577.8	580.4	0.50%	577.6	580.2	0.50%	578.1	581.1	0.50%	577.8	581.2	0.60%	577.8	581.3	0.60%	577.7	581.2	0.60%	577.9	581.1	0.60%	577.8	581.3	0.60%	577.6	580.9	0.60%
57981 LACYGNE7	57968 STILWEL7	720.5	723.4	0.40%	720.5	722.4	0.30%	720.4	722.4	0.30%	720.2	722.2	0.30%	720.7	723.4	0.40%	720.5	723.5	0.40%	720.6	723.5	0.40%	720.5	723.5	0.40%	720.6	723.3	0.40%	720.5	723.4	0.40%	720.3	723.1	0.40%
	SUBTOTALS FOR: LACYGNE_N	1298.3	1304.4	0.50%	1298.5	1303	0.30%	1298.2	1302.9	0.40%	1297.8	1302.4	0.40%	1298.8	1304.5	0.40%	1298.4	1304.7	0.50%	1298.4	1304.8	0.50%	1298.2	1304.7	0.50%	1298.4	1304.5	0.50%	1298.4	1304.7	0.50%	1297.9	1304.1	0.50%
		Difference =	6.1	1.00%	Difference =	4.5	0.70%	Difference =	4.7	0.80%	Difference =	4.6	0.80%	Difference =	5.7	1.00%	Difference =	6.3	1.00%	Difference =	6.4	1.10%	Difference =	6.5	1.10%	Difference =	6.1	1.00%	Difference =	6.3	1.00%	Difference =	6.2	1.00%
62234 LKMARN 7	60276 AIRLAKE7	53.7	40	-25.80%	52.9	38.4	-27.40%	53.1	39	-26.50%	53.6	39.1	-27.00%	53.5	40	-25.30%	53.9	40.2	-25.50%	53.8	40	-25.50%	53.7	40	-25.60%	53.6	39.8	-25.80%	53.4	39.5	-25.90%	54.4	40.5	-25.80%
	SUBTOTALS FOR: LKM-WFB	53.7	40	-25.80%	52.9	38.4	-27.40%	53.1	39	-26.50%	53.6	39.1	-27.00%	53.5	40	-25.30%	53.9	40.2	-25.50%	53.8	40	-25.50%	53.7	40	-25.60%	53.6	39.8	-25.80%	53.4	39.5	-25.90%	54.4	40.5	-25.80%
		Difference =	-13.8	-2.30%	Difference =	-14.5	-2.40%	Difference =	-14.1	-2.30%	Difference =	-14.5	-2.40%	Difference =	-13.5	-2.30%	Difference =	-13.7	-2.30%	Difference =	-13.8	-2.30%	Difference =	-13.8	-2.30%	Difference =	-13.8	-2.30%	Difference =	-13.8	-2.30%	Difference =	-13.9	-2.30%
60175 ROSEAU 4	67578 RICHER 4	-144.2	-146.8	1.80%	-142.9	-144.6	1.20%	-143.2	-144.9	1.20%	-143	-144.7	1.20%	-144.3	-146.8	1.70%	-144	-146.6	1.80%	-144	-146.5	1.70%	-143.8	-146.2	1.70%	-143.7	-146	1.60%	-143.7	-145.8	1.50%	-143.7	-145.8	1.50%
60173 ROSEAUN2	67564 DORSEY 2	-1139	-1174.4	3.10%	-1120.2	-1141.8	1.90%	-1125.4	-1147	1.90%	-1122.4	-1143.1	1.80%	1141.3	-1174.6	2.90%	-1137.2	-1171.6	3.00%	1136.8	-1170.1	2.90%	1134.4	-1167.2	2.90%	1132.4	-1163.4	2.70%	-1132.8	1161.4	2.50%	-1132.7	-1160.9	2.50%
66752 DRAYTON4	67557 LETELER4	-234.2	-213.3	-8.90%	-245.1	-232.6	-5.10%	-242.1	-229.8	-5.20%	-243.9	-231.8	-5.00%	-232.1	-213	-8.30%	-235.1	-214.8	-8.60%	-235.8	-216.5	-8.20%	-237.1	-218.4	-7.90%	-238.5	-220.7	-7.50%	-238.2	-221.7	-6.90%	-236.4	-222	-6.80%
63379 RUGBY 4	67523 GLENBOR4	42.4	59	39.00%	53.8	44	30.20%	53.1	45.4	28.50%	52.8	44.5	28.10%	42.8	53.8	37.90%	41.4	57.6	39.90%	41.7	57.7	38.20%	40.8	56.4	38%	39	54.7	37.40%	40	53.7	34.20%	40	53.6	33.90%
	SUBTOTALS FOR: MHEX_N	-1474.9	-1475.5	0.00%	-1474.4	-1475	0.00%	-1474.7	-1475.1	0.00%	-1474.5	-1475	0.00%	1475	-1475.6	0.00%	-1474.8	-1475.4	0.00%	1474.8	-1475.4	0.00%	1474.8	-1475.4	0.00%	1474.8	-1475.3	0.00%	-1474.7	-1475.2	0.00%	-1474.8	-1475.1	0.00%
		Difference =	-0.7	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.5	-0.10%	Difference =	-0.5	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.5	-0.10%	Difference =	-0.5	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.5	-0.10%	Difference =	-0.3	-0.10%
67578 RICHER 4	60175 ROSEAU 4	146.6	149.3	1.90%	145.3	147.1	1.20%	145.6	147.4	1.20%	145.4	147.1	1.20%	148.7	149.3	1.80%	146.5	149.1	1.80%	146.4	149	1.80%	146.3	148.8	1.70%	146.1	148.5	1.70%	146.1	148.4	1.50%	146.1	148.3	1.50%
67564 DORSEY 2	60173 ROSEAUN2	1155.8	1192.3	3.20%	1136.4	1158.7	2.00%	1141.8	1164	1.90%	1138.7	1160	1.90%	1158.1	1192.5	3.00%	1153.9	1189.3	3.10%	1153.5	1187.8	3.00%	1151.4	1184.8	2.90%	1149	1180.9	2.80%	1149.4	1178.8	2.60%	1149.3	1178.3	2.50%
67557 LETELER4	66752 DRAYTON4	238.5	216.9	-9.10%	249.9	236.9	-5.20%	246.8	233.8	-5.30%	248.6	236.1	-5.10%	236.4	216.5	-8.40%	239.5	218.5	-8.80%	240.2	220.2	-8.30%	241.6	222.2	-8.00%	243.1	224.5	-7.60%	242.7	225.6	-7.00%	242.9	225.9	-7.00%
67523 GLENBOR4	63379 RUGBY 4	-42.1	-58.2	38.50%	-33.6	-43.6	29.80%	-35.8	-45.9	28.20%	-34.5	-44.1	27.80%	-42.2	-58.1	37.50%	-41.1	-56.9	38.40%	-41.4	-57	37.70%	-40.5	-55.7	37.50%	-39.5	-54	36.90%	-39.6	-53.1	33.80%	-39.7	-53	33.50%
	SUBTOTALS FOR: MHEX_S	1498.8	1500.2	0.10%	1498.1	1499	0.10%	1498.4	1498.3	0.10%	1498.2	1499.1	0.10%	1499	1500.3	0.10%	1498.8	1500	0.10%	1498.6	1500	0.10%	1498.6	1500	0.10%	1498.6	1499.7	0.10%	1498.6	1499.7	0.10%	1498.6	1499.5	0.10%
		Difference =	1.4	0.20%	Difference =	0.9	0.20%	Difference =	0.9	0.10%	Difference =	0.9	0.10%	Difference =	1.3	0.20%	Difference =	1.2	0.20%	Difference =	1.2	0.20%	Difference =	1.2	0.20%	Difference =	1.2	0.20%	Difference =	1.1	0.20%	Difference =	0.9	0.10%
66613 AUBURNT4	67525 RESTON 4	42.2	41.5	-1.70%	42.8	42.2	-1.00%	42.5	42.1	-1.10%	42.6	42.1	-1.00%	42.2	41.5	-1.60%	42.3	41.6	-1.60%	42.3	41.7	-1.50%	42.4	41.7	-1.50%	42.4	41.8	-1.50%	42.3	41.8	-1.40%	42.3	41.7	-1.60%
66615 YORKTON4	67514 ROBLIN 4	-90.5	-90.2	-0.40%	-90.7	-90.5	-0.20%	-90.8	-90.4	-0.20%	-90.7	-90.5	-0.20%	-90.5	-90.2	-0.30%	-90.5	-90.2	-0.30%	-90.5	-90.2	-0.30%	-90.6	-90.3	-0.30%	-90.6	-90.3	-0.30%	-90.6	-90.3	-0.30%	-90.6	-90.4	-0.20%
66630 EBCAMPB4	67515 RALL 4	-6.3	-5.9	-6.30%	-6.3	-5.9	-6.40%	-6.4	-6	-6.50%	-6.5	-6.2	-3.50%	-6.3	-5.9	-6.00%	-6.3	-5.8	-6.00%	-6.3	-5.9	-6.00%	-6.4	-6	-5.70%	-6.4	-6	-5.50%	-6.3	-6	-5.10%	-6.4	-6.1	-4.40%
	SUBTOTALS FOR: MH_SPC_E	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.8	0.30%
		Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	-0.2	0.00%
67525 RESTON 4	66613 AUBURNT4	-42.1	-41.4	-1.70%	-42.4	-42	-1.00%	-42.3	-41.9	-1.10%	-42.4	-42	-1.00%	-42	-41.4	-1.60%	-42.1	-41.4	-1.60%	-42.1	-41.4	-1.60%	-42.1	-41.4	-1.60%	-42.1	-41.5	-1.50%	-42.2	-41.8	-1.40%	-42.2	-41.5	-1.60%
67514 ROBLIN 4	66615 YORKTON4	91.3	91	-0.40%	91.5	91.3	-0.20%	91.4	91.2	-0.20%	91.5	91.3	-0.20%	91.3	91	-0.30%	91.3	91	-0.30%	91.3	91	-0.30%	91.4	91.1	-0.30%	91.4	91.1	-0.30%	91.4	91.1	-0.30%	91.4	91.2	-0.20%
67515 RALL 4	66630 EBCAMPB4	6.5	6.1	-6.10%	6.7	6.5	-3.50%	6.6	6.4	-3.50%	6.7	6.4	-3.40%	6.5	6.1	-5.90%	6.5	6.1	-5.80%	6.5	6.1	-5.80%	6.5	6.2	-5.80%	6.6	6.2	-5.40%	6.5	6.2	-4.80%	6.6	6.3	-4.30%
	SUBTOTALS FOR: MH_SPC_W	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.7	-0.10%	55.8	55.7	-0.10%	55.8	55.7	0.00%	55.8	55.7	0.00%	55.7	55.7	0.00%	55.8	55.9	0.30%
		Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0.2	0.00%
64095 MNTZUMA3	64064 BONDRNT3	8.9	6.8	-24.10%	17.1	19.4	13.50%	14.4	16.4	13.60%	15.5	18.3	17.70%	12.7	7.3	-42.70%	10.5	8.7	-16.70%	9.2	7.3	-20.90%	9.6	8	-17.30%	10.7	9.4	-12.20%	10.9	10.6	-2.30%	10.1	10.2	1.00%
	SUBTOTALS FOR: MNTZUMA_W	8.9	6.8	-24.10%	17.1	19.4	13.50%	14.4	16.4	13.60%	15.5	18.3	17.70%	12.7	7.3	-42.70%	10.5	8.7	-16.70%	9.2	7.3	-20.90%	9.6	8	-17.30%	10.7	9.4	-12.20%	10.9	10.6	-2.30%	10.1	10.2	1.00%
		Difference =	-2.2	-0.40%	Difference =	2.3	0.40%	Difference =	2	0.30%	Difference =	2.8	0.50%	Difference =	-5.4	-0.90%	Difference =	-1.8	-0.30%	Difference =	-1.9	-0.30%	Difference =	-1.7	-0.30%	Difference =	-1.3	-0.20%	Difference =	-0.3	0.00%	Difference =	0.1	0.00%
61702 LASKIN 7	61705 BABBITT7	63.4	63.3	-0.20%	63.5	63.4	-0.20%	63.5	63.4	-0.20%	63.4	63.3	-0.10%	63.4	63.3	-0.10%	63.4	63.3	-0.20%	63.4	63.3	-0.20%	63.4	63.3	-0.20%	63.4	63.3	-0.20%	63.4	63.3	-0.20%	63.5	63.4	-0.20%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.8	-0.10%	43.9	43.8	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%
61702 LASKIN 7	62451 LAKELND7	64.5	64.4	-0.20%	64.6	64.5	-0.10%	64.6	64.5	-0.10%	64.6	64.5	-0.20%	64.5	64.4	-0.10%	64.5	64.4	-0.20%	64.5	64.4	-0.20%	64.5	64.4	-0.20%	64.6	64.5	-0.20%	64.5	64.5	-0.10%	64.6	64.5	-0.20%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.5	-0.30%	-74.8	-74.6	-0.30%	-74.8	-74.5	-0.30%	-74.8	-74.6	-0.30%	-74.7	-74.5	-0.20%	-74.8	-74.5	-0.30%	-74.8	-74.6	-0.30%	-74.8	-74.6	-0.30%	-74.8	-74.6	-0.30%	-74.8	-74.6	-0.30%	-74.8	-74.6	-0.30%
61626 BOSWELL4	61625 BLCKBRY4	138.4	138.5	-0.70%	140.2	139.8	-0.30%	139.9	139.5	-0.30%	140.1	139.7	-0.30%	139.2	138.4	-0.60%	139.5	138.6	-0.70%	139.5	138.6	-0.60%	139.6	138.7	-0.60%	139.7	138.9	-0.60%	139.8	138.9	-0.50%	139.7	138.9	-0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.7	134.8	-0.60%	136.4	136.1	-0.30%	136.2	135.8	-0.30%	136.3	136	-0.30%	135.5	134.8	-0.50%	135.8	134.9	-0.60%	135.8	135	-0.60%	135.8	135	-0.60%	136	135.2	-0.60%	135.9	135.2	-0.50%	135.8	135.3	-0.50%
61626 BOSWELL4	61627 SHANNON4	87.8	89.8	2.10%	86.3	87.1	0.90%	86.8	87.5	0.80%	86.5	87.3	0.80%	86.2	89.7	1.70%	87.7	89.4	2.00%	87.8	89.3	1.90%	87.5	89.2	1.90%	87.3	88.9	1.80%	87.4	88.8	1.60%	87.3	88.7	1.60%
61615 ARROWHD4	61614 BIL TAP4	55.9	50.7	-9.30%	58.7	55.1	-6.10%	57.6	54.1	-6.10%	58.4	54.8	-6.10%	54.6	50.5	-7.50%	56.1	51.1	-8.80%	56.4	51.7	-8.30%	56.8	51.9	-8.10%	57	52.5	-7.90%	56.8	52.6	-7.30%	57.1	53	-7.30%
61615 ARROWHD4	61554 AWHD1JCT	154.9	154.3	-0.40%	155.5	155.1	-0.30%	155.2	154.9	-0.20%	155.4	155	-0.30%	154.7	154.2	-0.30%	154.9	154.3	-0.40%	155	154.5	-0.40%	155.1	154.5	-0.40%	155.1	154.6	-0.40%	155.1	154.6	-0.30%	155.1	154.7	-0.30%
61615 ARROWHD4	61556 AWHD2JCT	160.3	159.6	-0.40%	160.9	160.5	-0.30%	160.7	160.3	-0.20%	160.8	160.4	-0.30%	160.1	159.6	-0.30%	160.3	159.7	-0.40%	160.4	159.8	-0.40%	160.5	159.9	-0.40%	160.6	160	-0.40%	160.5	160	-0.30%	160.6	160.1	-0.30%
61615 ARROWHD4	61624 FORBES 4	-110.5	-112.1	1.40%	-110.8	-113.1	2.10%	-110.8	-113.3	2.10%	-110.7	-113.1	2.20%	-111.2	-112.2	0.90%	-110.6	-112.2	1.40%	-110.4	-111.7	1.20%	-110.3	-111.7	1.20%	-110.4	-111.8	1.30%	-110.5	-112	1.30%	-110.1	-111.6	1.40%
61615 ARROWHD4	63055 BEARCK 4	56.6	63.

67105 LELANDO3	66506 FTTHOMP3	132.4	144.9	9.40%	128.9	139.7	8.40%	130	140.5	8.00%	129.1	138.9	8.30%	136	145.5	7.00%	132.6	144.6	9.20%	131.4	142.6	8.60%	130.8	141.8	8.40%	130.3	141.1	8.30%	130.8	141.1	7.90%	130.1	140.5	8.00%
67105 LELANDO3	67160 GROTON 3	254.9	244.6	-4.00%	258.1	250.9	-2.80%	256.9	249.7	-2.80%	257.6	250.6	-2.70%	259.7	248.2	-5.20%	255.6	246.1	-3.60%	253.9	242.6	-4.50%	253.7	242.3	-4.50%	254.1	242.9	-4.40%	254	243.4	-4.20%	254	243.5	-4.10%
67101 ANTELOP3	67120 BRDLAND3	193.6	191.3	-1.10%	194.4	193.5	-0.40%	194	193	-0.50%	194.2	193.4	-0.40%	195.4	192.9	-1.30%	194	192.2	-0.90%	192.6	189.3	-1.70%	192.3	188.8	-1.80%	192.4	189	-1.80%	192.4	189.3	-1.80%	192.2	189.2	-1.60%
63314 BIGSTON4	66503 BLAIR 4	-5	203.1	-999.00%	-76.5	78.2	-202.20%	-70.5	84.1	-219.30%	-75.3	79.7	-205.80%				-1.4	215.1	-999.00%	-14.5	181.9	-999.00%	-23.2	189.5	-831.00%	-25.8	165.4	-741.80%	-24.8	185.3	-785.20%	-26.2	184.1	-726.60%
66554 MORRIS 4	66550 GRANITF4	15.3	55.7	263.50%	-3.4	25.6	-861.60%	-7.8	21.7	-378.80%	-5.5	24.4	-546.00%	19.8	62.1	211.80%	15.2	53.9	255.80%														
63336 AUDUBON4	63053 HUBBARD4	116.5	137.2	17.80%	105.1	116.6	10.90%	108.1	119.3	10.40%	106.2	117.3	10.50%	118.7	137.7	16.00%	115.6	135.6	17.30%	114.1	132.7	16.30%	112.2	130.2	16.00%	110.9	128.3	15.70%	111.3	127.4	14.50%	111	126.9	14.30%
66521 SULLYBT4	66519 OAHE 4	-70.5	-62.7	-11.00%	-72.7	-65.8	-9.40%	-72	-65.4	-9.20%	-72.6	-65.7	-9.50%	-67.4	-62	-8.10%	-70.2	-62.5	-11.00%	-71.4	-64.6	-9.50%	-71.9	-65.3	-9.10%	-72.2	-65.8	-8.90%	-71.8	-65.7	-8.50%	-72.4	-66.1	-8.60%
63052 INMAN 4	61611 WINGRIV4	100.9	116.4	17.40%	83	88.8	7.00%	87.5	92.6	6.10%	84.6	89.8	6.10%	105.6	119.5	13.10%	99.7	116.4	16.70%	99.4	115.3	16.00%	97.2	112.3	15.60%	95.2	109.6	15.10%	95.8	108.4	13.10%	95.3	107.7	13.00%
66470 BISON 4	66497 MAURINE4	-1.1	4.7	-516.70%	-2.5	2.6	-205.50%	-2.1	3	-244.10%	-2.4	2.7	-214.80%	0.1	4.9	999.00%	-1.1	4.6	-521.80%	-1.5	3.9	-357.00%	-1.7	3.6	-307.70%	-1.9	3.3	-274.30%	-1.7	3.3	-280.70%	-2	3.1	-256.20%
66718 LAPORTE7	61640 BADOURA7	0.5	6.5	999.00%	-2.4	1.3	-153.60%	-1.7	1.9	-213.50%	-2.1	1.4	-167.70%	0.9	6.8	760.30%	0.3	5.9	999.00%	-0.1	5.4	-999.00%	-0.5	4.8	-999.00%	-0.8	4.4	-635.40%	-0.7	4.2	-663.50%	-0.8	4.1	-619.10%
63222 ALEXAND7	60144 DGLASCO7	33.3	35.7	7.40%	28.3	28	-1.00%	29.1	28.7	-1.50%	28.5	28.1	-1.50%	34.5	36	4.50%	33	35.2	6.80%	32.8	34.5	5.20%	30.9	32.2	4.20%	30.7	32	4.10%	30.9	31.9	3.10%	30.7	31.7	3.10%
67327 ELLENDL7	67401 ABDNJCT7	-6.3	-1.8	-72.20%	-8.1	-4.8	-41.40%	-7.9	-4.6	-41.50%	-8.1	-4.7	-41.90%	-3.3	-0.6	-80.80%	-6	-1.5	-75.20%	-6.8	-2.9	-57.70%	-7.1	-3.4	-53.00%	-7.3	-3.5	-51.50%	-7.1	-3.4	-51.80%	-7.4	-3.6	-50.90%
66432 EDGELEY7	66534 ORDWAY 7	-19.5	-20.5	5.30%	-19.3	-20	3.30%	-19.5	-20.2	3.70%	-19.4	-20	2.90%	-17.4	-19.8	13.90%	-19.2	-20.1	4.90%	-20.1	-21.8	8.30%	-20.4	-22.1	8.70%	-20.3	-22.1	8.50%	-20.3	-21.9	7.70%	-20.4	-21.9	7.50%
66438 FORMAN 7	66522 SUMMIT-7	-22.8	-19.3	-14.40%	-23.9	-21.5	-10.10%	-23.8	-21.5	-9.80%	-24	-21.5	-10.30%	-18.9	-17.9	-10.00%	-22.2	-18.9	-14.80%	-23.1	-20.5	-11.30%	-23.4	-21	-10.50%	-23.5	-21	-10.40%	-23.4	-20.9	-10.70%	-23.6	-21	-10.80%
63311 CANBY 4	66550 GRANITF4	90.1	197	118.50%	49.8	130.3	161.90%	48.2	129.7	169.30%	48.6	130.2	167.80%	103.7	207.4	100.00%	89.3	193.5	116.70%	80.1	177	121.00%	73.6	168.2	128.70%	73.5	168.3	129.10%	72.5	169.4	133.80%	73.6	170.6	131.70%
62006 KERKHO 7	62005 KERKHOT7	9.3	14.6	56.30%	8.2	9.1	48.50%	5.4	8.2	53.00%	5.9	8.8	50.30%	9.9	15.1	52.70%	9.3	13.6	46.40%	23.7	37.1	56.30%	16.5	26.1	58.80%	16.5	26.1	58.40%	16.4	26.2	60.30%	16.3	26.3	60.80%
66752 DRAYTON4	67557 LETELER4	-238.5	-216.9	-9.10%	-249.9	-236.9	-5.20%	-246.8	-233.8	-5.30%	-248.6	-236.1	-5.10%	-238.4	-216.5	-8.40%	-239.5	-218.5	-8.80%	-240.2	-220.2	-8.30%	-241.6	-222.2	-8.00%	-243.1	-224.5	-7.80%	-242.7	-225.6	-7.00%	-242.9	-225.9	-7.00%
63379 RUGBY 4	67523 GLENBOR4	42.4	58	36.00%	33.8	44	30.20%	36.1	46.4	28.50%	34.8	44.5	28.10%	42.6	58.8	37.90%	41.4	57.8	38.90%	41.7	57.7	38.20%	40.9	56.4	38.00%	39.8	54.7	37.40%	40	53.7	34.20%	40	53.6	33.90%
63361 BIGSTN3	63057 WLLMAR3				202.5	354.7	75.10%	187.6	339.3	80.90%	186.6	351.4	78.00%																				
63361 BIGSTN3	66600 BLAIR 3													-57.9	175.3	-402.50%																
63320 6MI GRV4	66550 GRANITF4																			31.7	98.6	204.90%	-11.6	34.6	-392.40%	-20	22.2	-211.10%	-21.1	23.6	-212.20%	-20.1	24.8	-223.60%
63320 6MI GRV4	63050 WILLMAR4																						78	112	43.70%	95.8	138.3	45.40%	94.1	140.8	49.50%	96.5	143.2	48.50%
	SUBTOTALS FOR: NDEX	625.8	1091.5	74.40%	631.1	1114.2	76.60%	630.7	1112.9	76.50%	631	1114.1	76.60%	624.6	1091	74.70%	626.3	1093	74.50%	623.6	1086.6	74.20%	624.2	1088.8	74.40%	624.4	1089.7	74.50%	624.4	1090.4	74.60%	624.3	1090.6	74.70%
		Difference =	465.7		Difference =	483.1		Difference =	482.2		Difference =	483.1		Difference =	466.4		Difference =	466.8		Difference =	463		Difference =	464.6		Difference =	465.3		Difference =	466		Difference =	466.4	
36408 WEMPL: B	39058 PAD 345	636.1	640	0.60%	631.8	631.1	-0.10%	632.6	632.4	0.00%	632	631.1	-0.10%	634.3	639.8	0.90%	635.4	639.3	0.60%	636.1	640.3	0.70%	635.7	638.8	0.60%	635.3	638.8	0.60%	635	638.1	0.50%	635.3	638.1	0.40%
	SUBTOTALS FOR: NI_WUMS	636.1	640	0.60%	631.8	631.1	-0.10%	632.6	632.4	0.00%	632	631.1	-0.10%	634.3	639.8	0.90%	635.4	639.3	0.60%	636.1	640.3	0.70%	635.7	638.8	0.60%	635.3	638.8	0.60%	635	638.1	0.50%	635.3	638.1	0.40%
		Difference =	4	0.70%	Difference =	-0.7	-0.10%	Difference =	-0.2	0.00%	Difference =	-0.9	-0.20%	Difference =	5.5	0.90%	Difference =	3.9	0.70%	Difference =	4.2	0.70%	Difference =	4.1	0.70%	Difference =	3.5	0.60%	Difference =	3	0.50%	Difference =	2.8	0.50%
60105 PR ISLD3	61950 BYRON 3	-204.7	-193.8	-5.30%	-180.8	-147.5	-18.40%	-189.1	-160.5	-15.10%	-182.5	-149.1	-18.30%	-198.1	-193	-2.60%	-202.4	-191.1	-5.60%	-204.7	-194.3	-5.10%	-203	-191.8	-5.50%	-200.5	-187.3	-6.60%	-199.7	-184.2	-7.80%	-199	-181.5	-8.80%
	SUBTOTALS FOR: PRI-BYN	-204.7	-193.8	-5.30%	-180.8	-147.5	-18.40%	-189.1	-160.5	-15.10%	-182.5	-149.1	-18.30%	-198.1	-193	-2.60%	-202.4	-191.1	-5.60%	-204.7	-194.3	-5.10%	-203	-191.8	-5.50%	-200.5	-187.3	-6.60%	-199.7	-184.2	-7.80%	-199	-181.5	-8.80%
		Difference =	10.9	1.90%	Difference =	33.3		Difference =	28.6	4.80%	Difference =	33.5		Difference =	5.1	0.80%	Difference =	11.3	1.90%	Difference =	10.4	1.70%	Difference =	11.2	1.80%	Difference =	13.2	2.20%	Difference =	15.6	2.60%	Difference =	17.5	2.90%
36382 QUAD ,	34036 ROCK CK3	510.1	514.1	0.80%	507.4	509.3	0.40%	508.3	510.1	0.40%	507.5	509.2	0.30%	508.1	514.1	1.00%	509.5	513.7	0.80%	509.8	514.3	0.90%	509.6	514.1	0.90%	509.7	513.4	0.70%	509.7	513.2	0.70%	509.2	512.7	0.70%
	SUBTOTALS FOR: QUAD-ROCKC	510.1	514.1	0.80%	507.4	509.3	0.40%	508.3	510.1	0.40%	507.5	509.2	0.30%	508.1	514.1	1.00%	509.5	513.7	0.80%	509.8	514.3	0.90%	509.6	514.1	0.90%	509.7	513.4	0.70%	509.7	513.2	0.70%	509.2	512.7	0.70%
		Difference =	4	0.70%	Difference =	1.8	0.30%	Difference =	1.8	0.30%	Difference =	1.7	0.30%	Difference =	5	0.80%	Difference =	4.2	0.70%	Difference =	4.6	0.80%	Difference =	4.5	0.70%	Difference =	3.7	0.60%	Difference =	3.5	0.60%	Difference =	3.5	0.60%
36382 QUAD ,	64405 SUB 91 3	554.5	559.3	0.90%	555.1	559	0.70%	554.9	559	0.70%	554.4	558.5	0.70%	555.3	559.4	0.70%	554.7	559.6	0.90%	554.5	559.5	0.90%	554.5	559.5	0.90%	554.6	559.5	0.90%	554.8	559.8	0.90%	553.9	558.9	0.90%
64400 MECCORD3	64403 E MOLIN3	275	278.3	1.20%	275.6	278.7	1.00%	275.6	278.6	1.10%	275.2	278.3	1.10%	275.8	278.4	0.90%	275.2	278.6	1.20%	275.1	278.4	1.20%	275.1	278.4	1.20%	275.2	278.5	1.20%	275.3	278.8	1.20%	274.7	278.1	1.30%
	SUBTOTALS FOR: QUADCITY_W	829.5	837.6	1.00%	830.9	837.7	0.80%	830.4	837.5	0.90%	829.6	836.8	0.90%	831.1	837.7	0.80%	829.9	838.2	1.00%	829.6	837.9	1.00%	829.6	837.9	1.00%	829.8	838	1.00%	830.1	838.5	1.00%	828.6	837	1.00%
		Difference =	8.1	1.30%	Difference =	6.8	1.10%	Difference =	7.1	1.20%	Difference =	7.2	1.20%	Difference =	6.7	1.10%	Difference =	8.2	1.40%	Difference =	8.3	1.40%	Difference =	8.3	1.40%	Difference =	8.2	1.40%	Difference =	8.4	1.40%	Difference =	8.5	1.40%
64831 GENTLMN3	64943 REDWILO3	277.2	276.8	-0.10%	275.3	274.7	-0.20%	276.1	275.3	-0.30%	275.9	275.1	-0.30%	277.1	276.8	-0.20%	276.9	276.3	-0.20%	277	276.4	-0.20%	277	276.3	-0.30%	276.6	276	-0.20%	276.8	275.7	-0.40%	276.9	275.9	-0.40%
	SUBTOTALS FOR: WNE_WKS	277.2	276.8	-0.10%	275.3	274.7	-0.20%	276.1	275.3	-0.30%	275.9	275.1	-0.30%	277.1	276.8	-0.20%	276.9	276.3	-0.20%	277	276.4	-0.20%	277	276.3	-0.30%	276.6	276	-0.20%	276.8	275.7	-0.40%	276.9	275.9	-0.40%
		Difference =	-0.4	-0.10%	Difference =	-0.7	-0.10%	Difference =	-0.8	-0.10%	Difference =	-0.8	-0.10%	Difference =	-0.4	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.6	-0.10%	Difference =	-0.7	-0.10%	Difference =	-0.6	-0.10%	Difference =	-1	-0.20%	Difference =	-1	-0.20%
66756 SOBUTTE4	63049 STANTON4	-36.4	-26.3	-27.70%	-41.4	-34	-17.70%	-40.2	-32.9	-18.20%	-40.9	-33.8	-17.50%	-34.1	-25.6	-25.00%	-36.7	-26.7	-27.10%	-37.4	-28.2	-24.50%	-38.1	-29.3	-23.10%	-38.7	-30.3	-21.80%	-38.5	-30.7	-20.20%	-38.7	-30.9	-20.10%
66756 SOBUTTE4	66751 CENTER 4	-41.4	-46.6	12.70%	-39.2	-41.7	6.50%	-39.7	-42.3	6.60%	-39.4	-41.9	6.20%	-40.7	-46.4	14.10%	-41	-46.1	12.40%	-41.8	-47.4	13.60%	-41.7	-47.4	13.80%	-41.5	-47.1	13.30%	-41.5	-46.8	12.80%	-41.6	-46.9	12.60%
66756 SOBUTTE4	66791 CENTER 3	90	85.2	-5.40%	92.8	88	-5.20%	92.1	87.4	-5.10%	92.6	87.9	-5.10%	87	84.2	-3.20%	89.9	85.1	-5.40%	91.3	87.9	-3.80%	92.1	88.9	-3.40%	92.4	88.6	-3.10%	92.2	89.8	-2.70%	92.5	90	-2.70%
	SUBTOTALS FOR: Y2DC	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%	Difference =	0	0.00%
60186 AS KING3	60304 EAU CL 3	317.8	310.6	-2.30%	328.7	332.8	1.30%	326.6	330.1	1.10%	327.6	332.6	1.50%	321	311	-3.10%	319.3	312.3	-2.20%	317.8	310.3	-2.40%	318.9	311.8	-2.20%	320.1	314.3	-1.80%	320.7	316.2	-1.40%	319.3	315.4	-1.20%
60105 PR ISLD3	61950 BYRON 3	-204.7	-193.8	-5.30%	-180.8	-147.5	-18.40%	-189.1	-160.5	-15.10%	-182.5	-149.1	-18.30%	-198.1	-193	-2.60%	-202.4	-191.1	-5.60%	-204.7	-194.3	-5.10%	-203	-191.8	-5.50%	-200.5	-187.3	-6.60%	-199.7	-184.2	-7.80%	-199	-181.5	-8.80%
60192 BLUE LK3	60108 WILMART3	-495.7	-526.7	6.30%	-453.7	-449.8	-0.80%	-473.7	-535	12.90%	-460.1	-456.2	-0.80%	-465	-525.8	8.40%	-500.2	-532.3	6.40%	-496.1	-528	6.40%	-494.1	-525	6.30%	-490.5	-518.5	5.90%	-493.9	-495.7	9.20%	-489.6	-508.9	3.90%
60187 AS KING7	60325 WLOWRV7	128.6	128.1	-0.40%	130.1	131.1	0.80%	129.9	130.8	0.70%	129.9	131	0.90%	128	128.1	-0.70%	128.6	128.3	-0.40%	128.6	128.1	-0.40%	128.8	128.3	-0.40%	128.9	128.6	-0.20%	129	128.9	-0.10%	128.7	128.7	0.00%
60238 REDROCK7	58966 GLENMONT	50	48.7	-2.50%	52.1	52.8	1.40%	51.5	51.8	0.60%	51.9	52.4	1.10%	50.4	48.7	-3.20%	50.2	49	-2.40%	50	48.7	-2.50%	50.2	49	-2.40%	50.5	48.6	-1.90%	50.6	49.7	-1.70%	50.5	49.7	-1.60%
62234 LKMARN 7	60276 AIRLAKE7	53.7	40	-25.60%	52.9	38.4	-27.40%	53.1	39	-26.50%	53.6	39.1	-27.00%	53.5	40	-25.30%	53.9	40.2	-25.50%	53.8	40	-25.50%	53.7	40	-25.60%	53.6	39.8	-25.80%	53.4	39.5	-25.90%	54.4	40.5	-25.60%
	SUBTOTALS FOR: MNEX (INFO)	-150.3	-193.1	28.50%	-70.7	-42.2	-40.40%	-101.6	-143.7	41.50%	-79.7	-50.1	-37.20%	-129.3	-191	47.70%	-150.4	-193.6	28.70%	-150.6	-195.1	29.80%	-145.6	-187.7	29.00%	-137.7	-174.5	26.70%	-99.9	-145.5	45.50%	-135.6	-156.2	15.20%
		Difference =	-42.8	-7.10%	Difference =	28.6	4.80%	Difference =	-42.2	-7.00%	Difference =	29.6	4.90%	Difference =	-61.7	-10.30%	Difference =	-43.2	-7.20%	Difference =	-44.5	-7.40%	Difference =	-42.2	-7.00%	Difference =	-36.8	-6.10%	Difference =	-45.5	-7.60%	Difference =	-20.6	-3.40%

APPENDIX F.2

Constrained Interface Analysis Results
While Scheduling
Big Stone II Participants Individually

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 1						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	11.30%	7.90%	-9.30%	5.80%	8.00%	-7.80%	3.20%
COOPER_S	2.40%	1.60%	-12.50%	-0.90%	1.80%	2.60%	-1.40%
ECL-ARP	-4.30%	-6.70%	6.70%	-5.30%	-4.60%	4.90%	-2.60%
FT CAL_S	3.20%	1.70%	20.80%	-0.50%	1.70%	6.60%	-0.30%
GGS	1.50%	1.20%	-24.90%	0.60%	1.30%	2.20%	-0.20%
GRIS_LNC	4.80%	3.90%	-5.00%	2.40%	4.30%	7.80%	0.10%
LACYGNE_N	-0.20%	0.00%	1.80%	0.80%	-0.10%	1.80%	0.80%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.40%	-0.20%	0.20%
MHEX_N	-0.40%	-0.30%	-0.30%	-0.10%	-0.30%	-0.20%	0.10%
MHEX_S	0.60%	0.50%	0.30%	0.30%	0.50%	0.30%	0.00%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-5.90%	-4.40%	5.20%	-1.70%	-4.30%	7.20%	-0.70%
MP_EXPORT	-0.90%	0.90%	-4.60%	1.40%	-0.20%	-3.70%	3.20%
MWSI	15.50%	-21.90%	17.80%	-14.00%	0.10%	15.50%	-7.40%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.40%	96.00%	97.80%	98.40%	96.30%	97.80%	-8.70%
NI_WUMS	1.70%	2.60%	-3.70%	2.10%	1.70%	-3.20%	1.70%
PRI-BYN	19.90%	-15.20%	11.10%	-8.80%	4.70%	10.50%	-4.80%
QUAD-ROCKC	1.90%	0.90%	-1.80%	0.20%	1.20%	-1.30%	0.60%
QUADCITY_W	0.70%	-0.50%	1.20%	0.80%	0.00%	4.50%	0.30%
WNE_WKS	1.20%	0.90%	-3.80%	0.10%	1.00%	1.10%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	9.90%	-43.00%	23.30%	-24.20%	-13.60%	22.40%	-14.20%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 2						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	8.90%	5.30%	-11.00%	4.20%	5.50%	-9.50%	1.90%
COOPER_S	2.30%	1.30%	-12.80%	-0.80%	1.70%	2.40%	-1.30%
ECL-ARP	-2.30%	-4.50%	8.20%	-3.90%	-2.50%	6.40%	-1.50%
FT CAL_S	3.00%	1.50%	20.50%	-0.40%	1.50%	6.40%	-0.20%
GGS	1.10%	0.80%	-25.20%	0.40%	1.00%	2.00%	-0.40%
GRIS_LNC	3.60%	2.70%	-5.90%	1.60%	3.20%	7.10%	-0.50%
LACYGNE_N	-0.20%	-0.10%	1.80%	0.60%	-0.30%	1.70%	0.70%
LKM-WFB	-0.40%	0.80%	-0.30%	0.10%	-14.60%	-0.30%	0.10%
MHEX_N	-0.10%	-0.20%	-0.20%	-0.30%	-0.20%	-0.10%	0.10%
MHEX_S	0.20%	0.30%	0.20%	0.30%	0.30%	0.10%	-0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-4.90%	-3.30%	6.00%	-1.20%	-3.30%	8.00%	-0.20%
MP_EXPORT	-1.30%	0.50%	-4.90%	1.10%	-0.70%	-4.00%	2.90%
MWSI	21.80%	-15.00%	22.60%	-9.80%	6.60%	20.10%	-4.00%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	98.60%	98.40%	99.90%	100.40%	98.60%	99.90%	-6.50%
NI_WUMS	0.90%	1.80%	-4.40%	1.50%	0.80%	-3.80%	1.20%
PRI-BYN	24.10%	-10.40%	14.40%	-5.80%	9.10%	13.70%	-2.50%
QUAD-ROCKC	1.80%	1.10%	-1.90%	0.80%	1.00%	-1.30%	0.80%
QUADCITY_W	0.40%	-0.60%	1.20%	0.50%	-0.10%	4.40%	0.10%
WNE_WKS	1.00%	0.70%	-4.00%	0.10%	0.80%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	23.60%	-27.90%	34.30%	-14.80%	0.50%	32.90%	-6.90%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 3						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	9.20%	5.70%	-10.70%	4.00%	5.90%	-9.20%	2.00%
COOPER_S	2.30%	1.20%	-12.80%	-0.50%	1.60%	2.40%	-1.40%
ECL-ARP	-2.40%	-4.70%	8.00%	-3.60%	-2.80%	6.20%	-1.60%
FT CAL_S	3.10%	1.50%	20.60%	-0.30%	1.50%	6.50%	-0.30%
GGS	1.10%	0.80%	-25.20%	0.40%	0.90%	2.00%	-0.40%
GRIS_LNC	3.50%	2.60%	-6.10%	1.60%	3.00%	6.90%	-0.60%
LACYGNE_N	-0.30%	0.00%	1.70%	0.50%	-0.20%	1.70%	0.70%
LKM-WFB	-0.40%	0.90%	-0.20%	0.10%	-14.50%	-0.20%	0.10%
MHEX_N	-0.10%	-0.10%	0.00%	-0.10%	-0.10%	-0.10%	0.20%
MHEX_S	0.20%	0.20%	0.00%	0.10%	0.20%	0.10%	-0.20%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-4.80%	-3.30%	6.00%	-1.10%	-3.40%	7.90%	-0.10%
MP_EXPORT	-1.20%	0.50%	-4.70%	0.90%	-0.50%	-3.90%	2.90%
MWSI	20.70%	-16.30%	21.40%	-9.50%	5.20%	19.00%	-4.50%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	98.50%	98.20%	99.60%	100.30%	98.40%	99.70%	-6.70%
NI_WUMS	1.00%	1.90%	-4.20%	1.40%	1.00%	-3.60%	1.30%
PRI-BYN	23.10%	-11.50%	13.40%	-5.90%	7.90%	12.80%	-2.90%
QUAD-ROCKC	1.30%	0.90%	-1.90%	0.10%	1.00%	-1.30%	0.50%
QUADCITY_W	0.70%	-0.40%	1.30%	0.60%	-0.10%	4.40%	0.40%
WNE_WKS	1.10%	0.70%	-3.90%	0.20%	0.80%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	10.20%	-42.10%	19.30%	-14.80%	-17.20%	18.10%	-11.40%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 3b						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	8.80%	5.20%	-11.00%	4.00%	5.50%	-9.40%	1.90%
COOPER_S	2.10%	1.20%	-12.90%	-1.10%	1.50%	2.00%	-1.50%
ECL-ARP	-2.20%	-4.40%	8.30%	-3.60%	-2.40%	6.40%	-1.40%
FT CAL_S	2.90%	1.40%	20.40%	-0.60%	1.30%	6.20%	-0.30%
GGS	1.10%	0.80%	-25.20%	0.40%	0.90%	2.00%	-0.40%
GRIS_LNC	3.60%	2.70%	-5.90%	1.70%	3.10%	7.10%	-0.50%
LACYGNE_N	-0.20%	0.00%	1.80%	0.70%	-0.10%	1.90%	0.70%
LKM-WFB	-0.40%	0.80%	-0.30%	0.10%	-14.60%	-0.30%	0.10%
MHEX_N	-0.20%	-0.10%	0.00%	-0.20%	-0.10%	-0.10%	0.20%
MHEX_S	0.20%	0.20%	0.00%	0.30%	0.20%	0.10%	-0.20%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-4.70%	-3.20%	6.20%	-1.20%	-3.30%	8.10%	-0.10%
MP_EXPORT	-1.40%	0.40%	-4.90%	0.90%	-0.70%	-4.00%	2.80%
MWSI	22.00%	-14.70%	22.60%	-9.40%	6.70%	20.10%	-3.90%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	98.60%	98.40%	99.80%	100.60%	98.60%	99.80%	-6.50%
NI_WUMS	0.90%	1.70%	-4.30%	1.50%	0.80%	-3.70%	1.20%
PRI-BYN	24.20%	-10.30%	14.30%	-5.80%	9.10%	13.70%	-2.50%
QUAD-ROCKC	1.60%	0.80%	-2.20%	0.90%	1.20%	-1.10%	0.50%
QUADCITY_W	0.70%	-0.40%	1.30%	0.30%	-0.10%	4.50%	0.30%
WNE_WKS	0.90%	0.60%	-4.00%	-0.10%	0.80%	0.80%	-0.50%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	24.10%	-27.30%	34.20%	-15.20%	0.80%	33.00%	-6.70%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 4						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	12.00%	8.70%	-8.30%	6.30%	8.80%	-6.70%	3.70%
COOPER_S	2.40%	1.40%	-12.80%	-1.40%	1.70%	2.30%	-1.50%
ECL-ARP	-4.90%	-7.40%	5.90%	-5.70%	-5.20%	4.10%	-3.00%
FT CAL_S	3.90%	2.30%	21.30%	-0.20%	2.30%	7.20%	0.10%
GGS	1.30%	1.00%	-25.10%	0.50%	1.10%	2.10%	-0.30%
GRIS_LNC	4.30%	3.40%	-5.60%	2.00%	3.80%	7.30%	-0.30%
LACYGNE_N	-0.10%	0.20%	2.00%	1.00%	0.00%	1.90%	0.90%
LKM-WFB	-0.20%	1.00%	-0.10%	0.20%	-14.40%	-0.20%	0.20%
MHEX_N	-0.20%	-0.20%	-0.20%	-0.20%	-0.20%	-0.10%	0.20%
MHEX_S	0.40%	0.40%	0.30%	0.30%	0.40%	0.10%	-0.20%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-6.50%	-4.90%	4.70%	-2.20%	-4.90%	6.60%	-0.90%
MP_EXPORT	-0.40%	1.40%	-4.00%	1.70%	0.30%	-3.10%	3.50%
MWSI	13.70%	-23.70%	15.60%	-15.30%	-1.70%	13.10%	-8.50%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.10%	95.70%	97.60%	98.00%	96.10%	97.50%	-9.00%
NI_WUMS	2.20%	3.00%	-3.20%	2.50%	2.20%	-2.60%	2.00%
PRI-BYN	18.60%	-16.30%	9.70%	-9.50%	3.50%	9.00%	-5.50%
QUAD-ROCKC	2.70%	1.90%	-1.00%	1.70%	1.90%	-0.70%	1.10%
QUADCITY_W	0.50%	-0.60%	1.20%	0.50%	-0.10%	4.40%	0.30%
WNE_WKS	1.10%	0.80%	-3.90%	-0.10%	0.90%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	5.90%	-46.60%	19.00%	-26.70%	-17.40%	17.70%	-16.30%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 5						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	11.30%	7.90%	-9.20%	5.80%	8.00%	-7.60%	3.20%
COOPER_S	2.20%	1.20%	-12.80%	-1.30%	1.50%	2.20%	-1.50%
ECL-ARP	-4.30%	-6.70%	6.70%	-5.30%	-4.60%	4.90%	-2.60%
FT CAL_S	3.10%	1.60%	20.60%	-0.70%	1.50%	6.40%	-0.30%
GGS	1.40%	1.10%	-25.00%	0.50%	1.20%	2.20%	-0.20%
GRIS_LNC	4.60%	3.80%	-5.20%	2.20%	4.20%	7.80%	0.00%
LACYGNE_N	-0.20%	0.20%	1.80%	0.90%	0.00%	2.00%	0.80%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.40%	-0.20%	0.20%
MHEX_N	-0.20%	-0.30%	-0.20%	-0.10%	-0.20%	-0.20%	0.10%
MHEX_S	0.40%	0.50%	0.30%	0.20%	0.30%	0.30%	0.00%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.10%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	-0.10%	0.00%
MNTZUMA_W	-5.90%	-4.40%	5.30%	-1.60%	-4.20%	7.20%	-0.70%
MP_EXPORT	-0.80%	1.00%	-4.50%	1.50%	-0.10%	-3.60%	3.20%
MWSI	15.50%	-21.80%	17.70%	-14.10%	0.10%	15.30%	-7.40%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.50%	96.10%	98.00%	98.60%	96.40%	97.80%	-8.50%
NI_WUMS	1.80%	2.70%	-3.70%	2.20%	1.80%	-3.10%	1.80%
PRI-BYN	19.80%	-15.10%	11.00%	-8.80%	4.70%	10.40%	-4.80%
QUAD-ROCKC	1.80%	1.40%	-1.90%	0.60%	1.60%	-0.90%	1.00%
QUADCITY_W	0.60%	-0.50%	1.30%	0.60%	0.00%	4.40%	0.30%
WNE_WKS	1.20%	0.80%	-3.80%	0.00%	1.00%	1.00%	-0.30%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	9.60%	-43.10%	23.20%	-24.60%	-13.80%	22.00%	-14.30%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 6						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	11.40%	8.00%	-9.10%	5.90%	8.00%	-7.60%	3.40%
COOPER_S	2.20%	1.40%	-12.80%	-1.20%	1.70%	2.00%	-1.60%
ECL-ARP	-4.40%	-6.80%	6.60%	-5.30%	-4.60%	4.80%	-2.70%
FT CAL_S	3.20%	1.70%	20.60%	-0.60%	1.60%	6.40%	-0.40%
GGS	1.40%	1.10%	-25.00%	0.60%	1.20%	2.20%	-0.30%
GRIS_LNC	4.60%	3.80%	-5.20%	2.20%	4.20%	7.70%	0.00%
LACYGNE_N	-0.10%	0.10%	1.90%	0.80%	-0.10%	2.00%	0.90%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.40%	-0.20%	0.20%
MHEX_N	-0.30%	-0.30%	-0.20%	-0.30%	-0.20%	-0.10%	0.10%
MHEX_S	0.50%	0.50%	0.30%	0.40%	0.40%	0.20%	0.00%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-6.00%	-4.50%	5.30%	-1.70%	-4.30%	7.20%	-0.70%
MP_EXPORT	-0.80%	1.00%	-4.50%	1.50%	-0.10%	-3.60%	3.40%
MWSI	15.50%	-21.90%	17.70%	-14.00%	0.10%	15.30%	-7.70%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.10%	95.70%	97.60%	98.10%	96.00%	97.60%	-9.60%
NI_WUMS	1.90%	2.70%	-3.60%	2.30%	1.90%	-3.00%	1.80%
PRI-BYN	19.80%	-15.10%	11.00%	-8.60%	4.60%	10.50%	-5.00%
QUAD-ROCKC	2.40%	1.60%	-1.60%	1.40%	1.50%	-0.50%	0.90%
QUADCITY_W	0.60%	-0.40%	1.30%	0.80%	0.00%	4.50%	0.40%
WNE_WKS	1.20%	0.90%	-3.80%	0.10%	1.00%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	9.60%	-43.10%	23.20%	-24.00%	-13.80%	22.30%	-14.70%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 7						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	11.30%	8.00%	-9.10%	5.70%	8.00%	-7.70%	3.40%
COOPER_S	1.90%	1.10%	-13.00%	-1.50%	1.50%	2.10%	-1.80%
ECL-ARP	-4.30%	-6.70%	8.60%	-5.20%	-4.50%	4.90%	-2.70%
FT CAL_S	3.00%	1.50%	20.50%	-0.70%	1.60%	6.40%	-0.40%
GGS	1.40%	1.10%	-25.00%	0.50%	1.20%	2.20%	-0.30%
GRIS_LNC	4.60%	3.80%	-5.20%	2.20%	4.20%	7.70%	0.00%
LACYGNE_N	0.00%	0.20%	1.90%	1.00%	0.00%	1.90%	0.90%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.50%	-0.20%	0.20%
MHEX_N	-0.20%	-0.20%	-0.10%	-0.10%	-0.20%	0.00%	0.20%
MHEX_S	0.40%	0.40%	0.10%	0.20%	0.30%	0.10%	-0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-5.90%	-4.40%	5.30%	-1.80%	-4.30%	7.30%	-0.60%
MP_EXPORT	-0.80%	1.00%	-4.40%	1.50%	-0.10%	-3.60%	3.40%
MWSI	15.60%	-21.70%	17.70%	-13.50%	0.30%	15.50%	-7.70%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.30%	95.90%	97.70%	98.30%	96.20%	97.80%	-9.40%
NI_WUMS	1.90%	2.70%	-3.70%	2.20%	1.80%	-3.10%	1.80%
PRI-BYN	19.90%	-15.00%	11.10%	-8.40%	4.80%	10.60%	-5.00%
QUAD-ROCKC	2.30%	1.60%	-1.40%	1.30%	1.60%	-1.00%	0.70%
QUADCITY_W	0.60%	-0.60%	1.30%	0.50%	0.00%	4.50%	0.40%
WNE_WKS	1.10%	0.80%	-3.90%	-0.10%	0.90%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	10.10%	-42.60%	23.40%	-23.30%	-13.30%	22.60%	-14.60%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 8						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	11.00%	7.70%	-9.30%	5.30%	7.70%	-7.80%	3.30%
COOPER_S	2.30%	1.20%	-12.80%	-0.90%	1.60%	2.10%	-1.70%
ECL-ARP	-4.10%	-6.50%	8.90%	-4.70%	-4.30%	5.00%	-2.70%
FT CAL_S	3.20%	1.60%	20.60%	-0.40%	1.60%	6.40%	-0.40%
GGS	1.40%	1.10%	-25.00%	0.50%	1.20%	2.10%	-0.30%
GRIS_LNC	4.50%	3.70%	-5.30%	2.00%	4.00%	7.70%	-0.10%
LACYGNE_N	-0.20%	0.10%	1.80%	0.70%	-0.10%	2.00%	0.90%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.50%	-0.20%	0.20%
MHEX_N	-0.10%	-0.20%	-0.10%	-0.10%	-0.20%	0.00%	0.20%
MHEX_S	0.30%	0.40%	0.10%	0.20%	0.30%	0.10%	-0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-5.70%	-4.20%	5.50%	-1.70%	-4.20%	7.40%	-0.60%
MP_EXPORT	-0.80%	1.00%	-4.50%	1.40%	-0.20%	-3.60%	3.40%
MWSI	16.10%	-21.30%	18.10%	-12.50%	0.80%	15.70%	-7.50%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.40%	96.00%	97.80%	98.30%	96.30%	97.80%	-9.40%
NI_WUMS	1.70%	2.60%	-3.80%	1.90%	1.70%	-3.10%	1.80%
PRI-BYN	20.20%	-14.80%	11.20%	-7.80%	5.10%	10.70%	-4.90%
QUAD-ROCKC	1.60%	1.10%	-2.20%	0.90%	1.10%	-1.10%	0.70%
QUADCITY_W	0.60%	-0.50%	1.30%	0.50%	0.00%	4.50%	0.30%
WNE_WKS	1.20%	0.80%	-3.90%	0.10%	1.00%	1.00%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	10.80%	-41.80%	24.00%	-21.50%	-12.40%	23.10%	-14.30%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 9						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	10.70%	7.20%	-9.60%	5.10%	7.50%	-8.00%	3.10%
COOPER_S	2.00%	1.20%	-12.70%	-0.80%	1.40%	2.20%	-1.60%
ECL-ARP	-3.80%	-6.10%	7.00%	-4.50%	-4.10%	5.10%	-2.40%
FT CAL_S	3.00%	1.50%	20.60%	-0.40%	1.50%	6.40%	-0.40%
GGS	1.30%	1.00%	-25.10%	0.60%	1.10%	2.10%	-0.30%
GRIS_LNC	4.30%	3.40%	-5.50%	2.20%	3.80%	7.50%	-0.20%
LACYGNE_N	0.00%	0.10%	1.80%	0.70%	0.00%	2.00%	0.90%
LKM-WFB	-0.30%	0.90%	-0.20%	0.10%	-14.40%	-0.20%	0.20%
MHEX_N	-0.20%	-0.30%	-0.20%	-0.20%	-0.20%	-0.20%	0.10%
MHEX_S	0.40%	0.40%	0.20%	0.30%	0.30%	0.20%	-0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-5.40%	-4.00%	5.60%	-1.60%	-4.00%	7.50%	-0.40%
MP_EXPORT	-0.90%	0.90%	-4.50%	1.20%	-0.20%	-3.60%	3.30%
MWSI	17.00%	-20.10%	18.60%	-11.90%	1.40%	16.10%	-7.00%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.50%	96.10%	98.00%	98.50%	96.40%	97.90%	-9.30%
NI_WUMS	1.60%	2.40%	-3.80%	1.90%	1.70%	-3.20%	1.70%
PRI-BYN	20.80%	-14.00%	11.60%	-7.50%	5.50%	11.00%	-4.50%
QUAD-ROCKC	2.00%	0.80%	-2.30%	0.80%	1.20%	-1.30%	0.20%
QUADCITY_W	0.80%	-0.40%	1.30%	0.40%	0.10%	4.60%	0.50%
WNE_WKS	1.10%	0.70%	-3.90%	0.10%	0.80%	0.90%	-0.40%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	10.10%	-42.20%	19.30%	-14.90%	-17.30%	18.00%	-12.50%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

2009 Summer Peak Case

Generation to Generation Dispatch

	Alternative 9b						
Flowgate	CMMPA	GRE	HCPD	HUC	MMPA	MRES	OTP
ARN-HAZLTN	10.50%	7.20%	-9.70%	5.30%	7.30%	-8.10%	3.20%
COOPER_S	2.20%	1.10%	-12.90%	-0.70%	1.60%	2.10%	-1.80%
ECL-ARP	-3.70%	-6.10%	7.20%	-4.70%	-4.00%	5.30%	-2.50%
FT CAL_S	3.10%	1.50%	20.50%	-0.30%	1.50%	6.30%	-0.50%
GGS	1.30%	1.00%	-25.10%	0.60%	1.10%	2.10%	-0.30%
GRIS_LNC	4.20%	3.40%	-5.50%	2.10%	3.80%	7.50%	-0.20%
LACYGNE_N	-0.20%	0.10%	1.90%	0.60%	-0.10%	1.90%	1.00%
LKM-WFB	-0.30%	0.90%	-0.20%	0.20%	-14.50%	-0.20%	0.20%
MHEX_N	-0.20%	-0.20%	-0.20%	-0.10%	-0.20%	-0.10%	0.20%
MHEX_S	0.30%	0.40%	0.20%	0.20%	0.30%	0.20%	-0.10%
MH_SPC_E	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MH_SPC_W	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNTZUMA_W	-5.40%	-3.80%	5.60%	-1.50%	-3.80%	7.70%	-0.40%
MP_EXPORT	-0.90%	0.90%	-4.60%	1.40%	-0.20%	-3.70%	3.30%
MWSI	17.60%	-19.60%	19.30%	-12.70%	2.10%	16.80%	-7.00%
NDDC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
NDEX	96.50%	96.10%	97.90%	98.60%	96.50%	97.90%	-9.30%
NI_WUMS	1.50%	2.40%	-3.90%	2.00%	1.60%	-3.30%	1.70%
PRI-BYN	21.30%	-13.50%	12.10%	-7.90%	6.10%	11.50%	-4.50%
QUAD-ROCKC	1.90%	1.30%	-1.80%	0.80%	1.10%	-1.00%	1.00%
QUADCITY_W	0.70%	-0.30%	1.30%	0.70%	0.20%	4.60%	0.40%
WNE_WKS	1.10%	0.70%	-3.90%	0.20%	0.90%	1.00%	-0.50%
Y2DC	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
MNEX (INFO)	14.70%	-37.40%	27.00%	-22.10%	-8.90%	25.80%	-12.80%

Summary: 8 Flowgates Violated
1 Flowgate Possibly Violated

Distribution Factor Analysis

Transmission Alternative 1

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definitior			CMMPA		GRE		HCPD		HUC		MMPA		MRES		OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	384.9	393.4	2.20%	384.9	392.8	2.10%	384.9	377.9	-1.80%	384.9	387.8	0.80%	384.9	392.8	2.10%	384.9	377.1	-2.00%	384.9	388.1	0.80%
SUBTOTALS FOR: ARN-HAZLTN		384.9	393.4	2.20%	384.9	392.8	2.10%	384.9	377.9	-1.80%	384.9	387.8	0.80%	384.9	392.8	2.10%	384.9	377.1	-2.00%	384.9	388.1	0.80%
		Difference =	8.6		Difference =	7.9		Difference =	-6.9	**-9.30%**	Difference =	2.9		Difference =	8		Difference =	-7.8	**-7.80%**	Difference =	3.2	**3.20%**
64786 COOPER 3	59199 ST JOE 3	54.3	55.3	1.90%	54.3	55.2	1.60%	54.3	49	-9.80%	54.3	54	-0.50%	54.3	55.3	1.90%	54.3	55.3	1.80%	54.3	53.5	-1.60%
64786 COOPER 3	96039 7FAIRPT	63.4	64.1	1.20%	63.4	64	1.10%	63.4	59.3	-6.40%	63.4	63.2	-0.30%	63.4	64.1	1.20%	63.4	64.9	2.50%	63.4	62.8	-0.90%
SUBTOTALS FOR: COOPER_S		117.7	119.5	1.50%	117.7	119.2	1.30%	117.7	108.3	-8.00%	117.7	117.2	-0.40%	117.7	119.5	1.50%	117.7	120.2	2.20%	117.7	116.2	-1.20%
		Difference =	1.8	**2.40%**	Difference =	1.6	**1.60%**	Difference =	-9.4	**-12.50%**	Difference =	-0.4	**-0.90%**	Difference =	1.8	**1.80%**	Difference =	2.6	**2.60%**	Difference =	-1.4	**-1.40%**
60304 EAU CL 3	92494 ARP 345	92.3	89	-3.60%	92.3	85.6	-7.30%	92.3	97.4	5.50%	92.3	89.7	-2.80%	92.3	87.8	-4.90%	92.3	97.3	5.40%	92.3	89.7	-2.80%
SUBTOTALS FOR: ECL-ARP		92.3	89	-3.60%	92.3	85.6	-7.30%	92.3	97.4	5.50%	92.3	89.7	-2.80%	92.3	87.8	-4.90%	92.3	97.3	5.40%	92.3	89.7	-2.80%
		Difference =	-3.3	**-4.30%**	Difference =	-6.7	**-6.70%**	Difference =	5.1		Difference =	-2.6	**-5.30%**	Difference =	-4.6	**-4.60%**	Difference =	4.9	**4.90%**	Difference =	-2.6	**-2.60%**
65351 S3451 3	65354 S3454 3	82.2	82.8	0.70%	82.2	82.5	0.30%	82.2	89.2	8.40%	82.2	82	-0.30%	82.2	82.4	0.30%	82.2	83.7	1.80%	82.2	82.1	-0.20%
65351 S3451 3	65359 S3459 3	30.2	31.8	5.20%	30.2	31.5	4.10%	30.2	37.6	24.40%	30.2	30.2	-0.10%	30.2	31.4	4.00%	30.2	34.3	13.60%	30.2	30.1	-0.30%
65451 S1251 5	65497 S1297 5	39.7	40	0.80%	39.7	39.9	0.60%	39.7	40.9	3.20%	39.7	39.7	0.00%	39.7	39.9	0.60%	39.7	40.6	2.40%	39.7	39.7	0.00%
SUBTOTALS FOR: FT CAL_S		152.1	154.6	1.60%	152.1	153.9	1.10%	152.1	167.7	10.20%	152.1	151.9	-0.20%	152.1	153.8	1.10%	152.1	158.7	4.30%	152.1	151.8	-0.20%
		Difference =	2.4	**3.20%**	Difference =	1.7	**1.70%**	Difference =	15.6		Difference =	-0.2	**-0.50%**	Difference =	1.7	**1.70%**	Difference =	6.6		Difference =	-0.3	**-0.30%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	268.6	-1.90%	273.8	273.9	0.00%	273.8	274	0.00%	273.8	274.3	0.20%	273.8	273.9	0.00%
64831 GENTLMN3	64984 SWEET W3	328.2	328.3	0.00%	328.2	328.3	0.00%	328.2	321.9	-1.90%	328.2	328.3	0.00%	328.2	328.3	0.00%	328.2	328.7	0.20%	328.2	328.2	0.00%
64831 GENTLMN3	64943 REDWILO3	277.2	278.1	0.30%	277.2	278.1	0.30%	277.2	274.3	-1.00%	277.2	277.2	0.00%	277.2	278.2	0.40%	277.2	278.3	0.40%	277.2	276.8	-0.10%
SUBTOTALS FOR: GGS		1356.8	1357.9	0.10%	1356.8	1358	0.10%	1356.8	1338.1	-1.40%	1356.8	1357.1	0.00%	1356.8	1358.1	0.10%	1356.8	1359.1	0.20%	1356.8	1356.6	0.00%
		Difference =	1.1	**1.50%**	Difference =	1.2	**1.20%**	Difference =	-18.7	**-24.90%**	Difference =	0.3	**0.60%**	Difference =	1.3	**1.30%**	Difference =	2.2	**2.20%**	Difference =	-0.2	**-0.20%**
64933 PAULINE3	64902 MOORE 3	55.9	57	2.10%	55.9	57.1	2.20%	55.9	54.3	-2.80%	55.9	56.2	0.60%	55.9	57.2	2.40%	55.9	58.4	4.50%	55.9	55.9	0.10%
64839 GR ISLD4	64780 COLMB.W4	99.8	99.6	-0.30%	99.8	99.6	-0.20%	99.8	95.9	-3.90%	99.8	99.9	0.10%	99.8	99.6	-0.20%	99.8	99.6	-0.20%	99.8	99.8	0.00%
66571 GR ISLD3	64896 MCCOOL 3	145.8	148.5	1.90%	145.8	148.7	2.00%	145.8	147.5	1.20%	145.8	146.6	0.50%	145.8	149	2.20%	145.8	151.4	3.80%	145.8	145.9	0.00%
SUBTOTALS FOR: GRIS_LNC		301.5	305.1	1.20%	301.5	305.4	1.30%	301.5	297.7	-1.20%	301.5	302.7	0.40%	301.5	305.8	1.40%	301.5	309.3	2.60%	301.5	301.6	0.00%
		Difference =	3.6	**4.80%**	Difference =	3.9	**3.90%**	Difference =	-3.8	**-5.00%**	Difference =	1.2	**2.40%**	Difference =	4.3	**4.30%**	Difference =	7.8		Difference =	0.1	**0.10%**
57981 LACYGNE7	57965 W.GRDNR7	577.8	577.6	0.00%	577.8	577.7	0.00%	577.8	578.7	0.20%	577.8	578	0.00%	577.8	577.6	0.00%	577.8	578.8	0.20%	577.8	578.2	0.10%
57981 LACYGNE7	57968 STILWEL7	720.5	720.6	0.00%	720.5	720.6	0.00%	720.5	720.9	0.10%	720.5	720.7	0.00%	720.5	720.6	0.00%	720.5	721.3	0.10%	720.5	720.9	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.3	1298.2	0.00%	1298.3	1298.3	0.00%	1298.3	1299.6	0.10%	1298.3	1298.7	0.00%	1298.3	1298.2	0.00%	1298.3	1300.1	0.10%	1298.3	1299.1	0.10%
		Difference =	-0.1	**-0.20%**	Difference =	0	**0.00%**	Difference =	1.3	**1.80%**	Difference =	0.4	**0.80%**	Difference =	-0.1	**-0.10%**	Difference =	1.8	**1.80%**	Difference =	0.8	**0.80%**
62234 LKMARN 7	60276 AIRLAKE7	53.7	53.5	-0.40%	53.7	54.7	1.80%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	54	0.40%
SUBTOTALS FOR: LKM-WFB		53.7	53.5	-0.40%	53.7	54.7	1.80%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	54	0.40%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.4	**-14.40%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-144.2	-144.6	0.30%	-144.2	-144.8	0.50%	-144.2	-144.4	0.20%	-144.2	-144.4	0.20%	-144.2	-144.8	0.40%	-144.2	-144.4	0.20%	-144.2	-144.3	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1139	1146.3	0.60%	1139	1149.4	0.90%	1139	-1142.4	0.30%	-1139	1142.4	0.30%	1139	1148.3	0.80%	1139	-1143.4	0.40%	-1139	-1137.9	-0.10%
66752 DRAYTON4	67557 LETELER4	-234.2	-229.9	-1.80%	-234.2	-228.2	-2.60%	-234.2	-231.8	-1.00%	-234.2	-232.2	-0.90%	-234.2	-228.7	-2.30%	-234.2	-231.1	-1.30%	-234.2	-235.9	0.70%
63379 RUGBY 4	67523 GLENBOR4	42.4	45.7	7.70%	42.4	47.2	11.20%	42.4	43.5	2.40%	42.4	44	3.80%	42.4	46.6	9.80%	42.4	43.9	3.40%	42.4	43.3	2.10%
SUBTOTALS FOR: MHEX_N		-1474.9	1475.2	0.00%	1474.9	1475.2	0.00%	1474.9	-1475.1	0.00%	-1474.9	1474.9	0.00%	1474.9	1475.2	0.00%	1474.9	-1475.1	0.00%	-1474.9	-1474.8	0.00%
		Difference =	-0.3	**-0.40%**	Difference =	-0.3	**-0.30%**	Difference =	-0.2	**-0.30%**	Difference =	-0.1	**-0.10%**	Difference =	-0.3	**-0.30%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.10%**
67576 RICHER 4	60175 ROSEAU 4	146.6	147.1	0.30%	146.6	147.3	0.50%	146.6	146.8	0.20%	146.6	146.9	0.20%	146.6	147.2	0.40%	146.6	146.9	0.20%	146.6	146.8	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1155.8	1163.3	0.70%	1155.8	1166.4	0.90%	1155.8	1159.2	0.30%	1155.8	1159.3	0.30%	1155.8	1165.3	0.80%	1155.8	1160.3	0.40%	1155.8	1154.7	-0.10%
67557 LETELER4	66752 DRAYTON4	238.5	234.1	-1.90%	238.5	232.3	-2.60%	238.5	236.1	-1.00%	238.5	236.4	-0.90%	238.5	232.9	-2.40%	238.5	235.4	-1.30%	238.5	240.3	0.80%
67523 GLENBOR4	63379 RUGBY 4	-42.1	-45.2	7.60%	-42.1	-46.7	11.10%	-42.1	-43.1	2.40%	-42.1	-43.6	3.70%	-42.1	-46.1	9.70%	-42.1	-43.5	3.40%	-42.1	-42.9	2.00%
SUBTOTALS FOR: MHEX_S		1498.8	1499.3	0.00%	1498.8	1499.3	0.00%	1498.8	1499.1	0.00%	1498.8	1499	0.00%	1498.8	1499.3	0.00%	1498.8	1499.1	0.00%	1498.8	1498.9	0.00%
		Difference =	0.4	**0.60%**	Difference =	0.5	**0.50%**	Difference =	0.2	**0.30%**	Difference =	0.1	**0.30%**	Difference =	0.5	**0.50%**	Difference =	0.3	**0.30%**	Difference =	0	**0.00%**
68613 AUBURNT4	67525 RESTON 4	42.2	42.1	-0.40%	42.2	42	-0.50%	42.2	42.2	-0.10%	42.2	42.2	-0.20%	42.2	42	-0.40%	42.2	42.2	-0.20%	42.2	42.2	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.5	-90.5	-0.10%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.2	-1.20%	-6.3	-6.2	-1.80%	-6.3	-6.3	-0.50%	-6.3	-6.2	-0.60%	-6.3	-6.2	-1.50%	-6.3	-6.2	-0.60%	-6.3	-6.3	0.00%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.1	-41.9	-0.40%	-42.1	-41.9	-0.50%	-42.1	-42	-0.10%	-42.1	-42	-0.20%	-42.1	-41.9	-0.40%	-42.1	-42	-0.20%	-42.1	-42	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.3	91.3	-0.10%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.4	-1.20%	6.5	6.4	-1.80%	6.5	6.5	-0.50%	6.5	6.4	-0.60%	6.5	6.4	-1.50%	6.5	6.4	-0.60%	6.5	6.5	0.00%
SUBTOTALS FOR: MH_SPC_W		55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 1

2009 Summer Peak Case

Generation to Generation Dispatcl

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3 64064 BONDRNT3		8.9	4.4	-50.20%	8.9	4.5	-49.20%	8.9	12.8	43.70%	8.9	8.1	-9.30%	8.9	4.6	-48.60%	8.9	16.2	80.90%	8.9	8.2	-8.00%
SUBTOTALS FOR: MNTZUMA_W		8.9	4.4	-50.20%	8.9	4.5	-49.20%	8.9	12.8	43.70%	8.9	8.1	-9.30%	8.9	4.6	-48.60%	8.9	16.2	80.90%	8.9	8.2	-8.00%
	Difference =	-4.5	**-5.90%**	Difference =	-4.4	**-4.40%**	Difference =	3.9	[redacted]	Difference =	-0.8	**-1.70%**	Difference =	-4.3	**-4.30%**	Difference =	7.2	[redacted]	Difference =	-0.7	**-0.70%**
61702 LASKIN 7 61705 BABBITT7		63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7 61722 FORBES 7		43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7 62451 LAKELND7		64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7 61574 LASKNJCT		-74.8	-74.7	-0.10%	-74.8	-74.7	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.7	-0.20%	-74.8	-74.8	0.10%
61626 BOSWELL4 61625 BLCKBRY4		139.4	139.2	-0.20%	139.4	139	-0.30%	139.4	139.3	-0.10%	139.4	139.3	-0.10%	139.4	139.1	-0.30%	139.4	139.2	-0.20%	139.4	140.1	0.50%
61626 BOSWELL4 61625 BLCKBRY4		*135.7*	*135.4*	*-0.20%*	*135.7*	*135.3*	*-0.30%*	*135.7*	*135.5*	*-0.10%*	*135.7*	*135.6*	*-0.10%*	*135.7*	*135.4*	*-0.30%*	*135.7*	*135.5*	*-0.20%*	*135.7*	*136.4*	*0.50%*
61626 BOSWELL4 61627 SHANNON4		87.8	88.3	0.60%	87.8	88.6	0.90%	87.8	88.1	0.40%	87.8	88	0.20%	87.8	88.5	0.80%	87.8	88.2	0.50%	87.8	86.3	-1.60%
61615 ARROWHD461614 98L TAP4		55.9	54.6	-2.40%	55.9	54.4	-2.70%	55.9	54.3	-2.80%	55.9	55.6	-0.60%	55.9	54.3	-2.80%	55.9	54.1	-3.30%	55.9	58.5	4.60%
61615 ARROWHD461554 AWHD1JCT		154.9	154.8	-0.10%	154.9	154.7	-0.20%	154.9	154.6	-0.20%	154.9	154.9	0.00%	154.9	154.7	-0.10%	154.9	154.6	-0.20%	154.9	155.6	0.40%
61615 ARROWHD461556 AWHD2JCT		160.3	160.2	-0.10%	160.3	160.1	-0.20%	160.3	160	-0.20%	160.3	160.3	0.00%	160.3	160.1	-0.10%	160.3	160	-0.20%	160.3	161	0.40%
61615 ARROWHD461624 FORBES 4		-110.5	-110.9	0.30%	-110.5	-110.3	-0.20%	-110.5	-111.7	1.00%	-110.5	-110.4	-0.10%	-110.5	-110.7	0.20%	-110.5	-111.8	1.10%	-110.5	-110.2	-0.30%
61615 ARROWHD463055 BEARCK 4		56.6	58	2.30%	56.6	59.5	5.00%	56.6	56.6	-0.10%	56.6	57.7	1.80%	56.6	58.7	3.60%	56.6	56.8	0.20%	56.6	55.6	-1.80%
SUBTOTALS FOR: MP_EXPORT		777.3	776.6	-0.10%	777.3	778.3	0.10%	777.3	773.9	-0.40%	777.3	778	0.10%	777.3	777.1	0.00%	777.3	773.6	-0.50%	777.3	780.6	0.40%
	Difference =	-0.7	**-0.90%**	Difference =	0.9	**0.90%**	Difference =	-3.4	**-4.60%**	Difference =	0.7	**1.40%**	Difference =	-0.2	**-0.20%**	Difference =	-3.7	**-3.70%**	Difference =	3.2	**3.20%**
60105 PR ISLD3 61950 BYRON 3		-204.7	-189.6	-7.40%	-204.7	-219.9	7.40%	-204.7	-196.4	-4.10%	-204.7	-209.1	2.10%	-204.7	-200	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.6	2.40%
60304 EAU CL 3 92494 ARP 345		92.3	89	-3.60%	92.3	85.6	-7.30%	92.3	97.4	5.50%	92.3	89.7	-2.80%	92.3	87.8	-4.90%	92.3	97.3	5.40%	92.3	89.7	-2.80%
SUBTOTALS FOR: MWSI		-112.4	-100.6	-10.50%	-112.4	-134.3	19.50%	-112.4	-99	-11.90%	-112.4	-119.4	6.20%	-112.4	-112.3	-0.10%	-112.4	-96.9	-13.80%	-112.4	-119.8	6.60%
	Difference =	11.8	[redacted]	Difference =	-21.9	**-21.90%**	Difference =	13.4	[redacted]	Difference =	-7	**-14.00%**	Difference =	0.1	**0.10%**	Difference =	15.5	[redacted]	Difference =	-7.4	**-7.40%**
66756 SQBUTTE4 63049 STANTON4		-36.4	-34.4	-5.50%	-36.4	-33.7	-7.40%	-36.4	-34.9	-4.30%	-36.4	-35.4	-2.70%	-36.4	-33.8	-7.10%	-36.4	-34.3	-5.80%	-36.4	-36.8	1.20%
66756 SQBUTTE4 66751 CENTER 4		-41.4	-42.1	1.80%	-41.4	-42.6	2.90%	-41.4	-41	-0.80%	-41.4	-41.8	1.00%	-41.4	-42.3	2.30%	-41.4	-41.1	-0.60%	-41.4	-42.8	3.50%
66756 SQBUTTE4 66791 CENTER 3		90	88.8	-1.40%	90	88.5	-1.70%	90	88.1	-2.10%	90	89.5	-0.60%	90	88.4	-1.80%	90	87.7	-2.60%	90	91.9	2.10%
63041 COAL CR4 63042 COAL TP4		-23.2	-23.4	0.60%	-23.2	-23.4	0.90%	-23.2	-23.2	-0.10%	-23.2	-23.3	0.30%	-23.2	-23.4	0.70%	-23.2	-23.2	0.00%	-23.2	-23.4	0.70%
63041 COAL CR4 63049 STANTON4		-125.3	-126.2	0.80%	-125.3	-126.7	1.20%	-125.3	-125.4	0.10%	-125.3	-125.8	0.40%	-125.3	-126.5	1.00%	-125.3	-125.5	0.20%	-125.3	-126.1	0.60%
63041 COAL CR4 63381 UNDERWD4		144.6	145.7	0.80%	144.6	146.3	1.20%	144.6	144.7	0.10%	144.6	145.2	0.40%	144.6	146	1.00%	144.6	144.8	0.10%	144.6	145.6	0.70%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
	Difference =	0	0.00%	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3 66506 FTTHOMP3		132.4	134.3	1.40%	132.4	134.3	1.40%	132.4	136.9	3.30%	132.4	133	0.50%	132.4	134.7	1.70%	132.4	137.1	3.50%	132.4	130.8	-1.20%
67105 LELANDO3 67160 GROTON 3		254.9	253.7	-0.50%	254.9	253.2	-0.70%	254.9	253.4	-0.60%	254.9	254.5	-0.20%	254.9	253.4	-0.60%	254.9	254.4	-0.20%	254.9	252.3	-1.00%
67101 ANTELOP3 67120 BRDLAND3		193.6	193.4	-0.10%	193.6	193.1	-0.20%	193.6	194.2	0.30%	193.6	193.5	0.00%	193.6	193.4	-0.10%	193.6	194.8	0.70%	193.6	191.3	-1.20%
63361 BIGSTN3 66503 BLAIR 4		-5	22.2	-544.50%	-5	30.3	-705.80%	-5	23.6	-572.70%	-5	12.8	-356.00%	-5	30.8	-716.50%	-5	34.4	-787.90%	-5	20	-499.30%
66554 MORRIS 4 66550 GRANITF4		15.3	21.6	40.70%	15.3	23.5	53.70%	15.3	21.3	39.00%	15.3	21.5	40.50%	15.3	23.8	55.50%	15.3	23.6	54.20%	15.3	13.5	-11.80%
63336 AUDUBON4 63053 HUBBARD4		116.5	120.6	3.50%	116.5	122.2	4.90%	116.5	119	2.20%	116.5	118.6	1.80%	116.5	121.7	4.50%	116.5	119.7	2.80%	116.5	113.2	-2.80%
66521 SULLYBT4 66519 OAHE 4		-70.5	-69.3	-1.70%	-70.5	-69.3	-1.60%	-70.5	-67.4	-4.40%	-70.5	-70	-0.60%	-70.5	-69	-2.10%	-70.5	-67.2	-4.60%	-70.5	-72	2.20%
63052 INMAN 4 61611 WINGRIV4		100.9	107.4	6.50%	100.9	109.9	8.90%	100.9	105.6	4.60%	100.9	104.3	3.30%	100.9	109.3	8.30%	100.9	106.8	5.80%	100.9	81.8	-18.90%
66470 BISON 4 66497 MAURINE4		-1.1	-0.4	-61.80%	-1.1	-0.4	-62.50%	-1.1	1.6	-244.20%	-1.1	-0.9	-19.90%	-1.1	-0.3	-76.20%	-1.1	0.6	-154.40%	-1.1	-1.7	54.40%
66716 LAPORTE7 61640 BADOURA7		0.5	1.5	181.80%	0.5	1.9	256.80%	0.5	1	96.50%	0.5	1	98.80%	0.5	1.7	234.30%	0.5	1.2	126.10%	0.5	0.7	27.10%
63222 ALEXAND7 60144 DGLASCO7		33.3	34.9	4.90%	33.3	35.5	6.70%	33.3	34.4	3.60%	33.3	34.3	3.20%	33.3	35.4	6.30%	33.3	34.8	4.50%	33.3	26.4	-20.50%
67327 ELLENDL7 67401 ABDNJCT7		-6.3	-5.5	-12.40%	-6.3	-5.4	-14.20%	-6.3	-5.1	-19.70%	-6.3	-5.9	-6.90%	-6.3	-5.3	-16.40%	-6.3	-4.5	-28.70%	-6.3	-7.7	21.60%
66432 EDGELEY7 66534 ORDWAY 7		-19.5	-19.6	0.30%	-19.5	-19.7	1.00%	-19.5	-19.1	-1.80%	-19.5	-19.5	0.10%	-19.5	-19.6	0.20%	-19.5	-18.8	-3.80%	-19.5	-21.2	8.80%
66438 FORMAN 7 66522 SUMMIT-7		-22.6	-22	-2.50%	-22.6	-21.9	-2.80%	-22.6	-21.7	-4.00%	-22.6	-22.2	-1.60%	-22.6	-21.8	-3.30%	-22.6	-20.7	-8.10%	-22.6	-24.1	7.00%
63311 CANBY 4 66550 GRANITF4		90.1	104.5	16.00%	90.1	109.2	21.20%	90.1	103.7	15.10%	90.1	101.5	12.70%	90.1	109.3	21.30%	90.1	108.3	20.10%	90.1	104	15.40%
62006 KERKHO 7 62005 KERKHOT7		9.3	10.3	10.30%	9.3	10.6	13.70%	9.3	10.2	9.90%	9.3	10.8	15.80%	9.3	10.7	14.50%	9.3	10.6	13.80%	9.3	6.9	-25.40%
66752 DRAYTON4 67557 LETELER4		-238.5	-234.1	-1.90%	-238.5	-232.3	-2.60%	-238.5	-236.1	-1.00%	-238.5	-236.4	-0.90%	-238.5	-232.9	-2.40%	-238.5	-235.4	-1.30%	-238.5	-240.3	0.80%
63379 RUGBY 4 67523 GLENBOR4		42.4	45.7	7.70%	42.4	47.2	11.20%	42.4	43.5	2.40%	42.4	44	3.80%	42.4	46.6	9.80%	42.4	43.9	3.40%	42.4	43.3	2.10%
SUBTOTALS FOR: NDEX		625.8	699	11.70%	625.8	721.8	15.30%	625.8	699.1	11.70%	625.8	674.9	7.90%	625.8	722.1	15.40%	625.8	723.6	15.60%	625.8	617.1	-1.40%
	Difference =	73.3	[redacted]	Difference =	96	[redacted]	Difference =	73.4	[redacted]	Difference =	49.2	[redacted]	Difference =	96.3	[redacted]	Difference =	97.8	[redacted]	Difference =	-8.7	**-8.70%**
36406 WEMPL; B 39058 PAD 345		636.1	637.4	0.20%	636.1	638.7	0.40%	636.1	633.3	-0.40%	636.1	637.1	0.20%	636.1	637.8	0.30%	636.1	632.9	-0.50%	636.1	637.8	0.30%
SUBTOTALS FOR: NI_WUMS		636.1	637.4	0.20%	636.1	638.7	0.40%	636.1	633.3	-0.40%	636.1	637.1	0.20%	636.1	637.8	0.30%	636.1	632.9	-0.50%	636.1	637.8	0.30%
	Difference =	1.3	**1.70%**	Difference =	2.6	**2.60%**	Difference =	-2.8	**-3.70%**	Difference =	1.1	**2.10%**	Difference =	1.7	**1.70%**	Difference =	-3.2	**-3.20%**	Difference =	1.7	**1.70%**
60105 PR ISLD3 61950 BYRON 3		-204.7	-189.6	-7.40%	-204.7	-219.9	7.40%	-204.7	-196.4	-4.10%	-204.7	-209.1	2.10%	-204.7	-200	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.6	2.40%
SUBTOTALS FOR: PRI-BYN		-204.7	-189.6	-7.40%	-204.7	-219.9	7.40%	-204.7	-196.4	-4.10%	-204.7	-209.1	2.10%	-204.7	-200	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.6	2.40%
	Difference =	15.1	[redacted]	Difference =	-15.2	**-15.20%**	Difference =	8.3	[redacted]	Difference =	-4.4	**-8.80%**	Difference =	4.7	**4.70%**	Difference =	10.5	[redacted]	Difference =	-4.8	**-4.80%**
36382 QUAD ; 34036 ROCK CK3		510.1	511.5	0.30%	510.1	510.9	0.20%	510.1	508.7	-0.30%	510.1	510.2	0.00%	510.1	511.3	0.20%	510.1	508.8	-0.30%	510.1	510.7	0.10%
SUBTOTALS FOR: QUAD-ROCKC		510.1	511.5	0.30%	510.1	510.9	0.20%	510.1	508.7	-0.30%	510.1	510.2	0.00%	510.1	511.3	0.20%	510.1	508.8	-0.30%	510.1	510.7	0.10%
	Difference =	1.4	**1.90%**	Difference =	0.9	**0.90%**	Difference =	-1.4	**-1.80%**	Difference =	0.1	**0.20%**	Difference =	1.2	**1.20%**	Difference =	-1.3	**-1.30%**	Difference =	0.6	**0.60%**
36382 QUAD ; 64405 SUB 91 3		554.5	554.8	0.10%	554.5	554.3	0.00%	554.5	554.9	0.10%	554.5	554.7	0.00%	554.5	554.6	0.00%	554.5	556.9	0.40%	554.5	554.7	0.00%
64400 MECCORD3 64403 E MOLIN3		275	275.1	0.00%	275	274.7	-0.10%	275	275.5	0.20%	275	275.1	0.00%	275	274.9	0.00%	275	277	0.70%	275	275.1	0.00%
SUBTOTALS FOR: QUADCITY_W		829.5	830	0.10%	829.5	829	-0.10%	829.5	830.4	0.10%	829.5	829.8	0.00%	829.5	829.5	0.00%	829.5	834	0.50%	829.5	829.8	0.00%

Distribution Factor Analysis

Transmission Alternative 1

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
		Difference =	0.5	**0.70%**	Difference =	-0.5	**-0.50%**	Difference =	0.9	**1.20%**	Difference =	0.4	**0.80%**	Difference =	0	**0.00%**	Difference =	4.5	**4.50%**	Difference =	0.3	**0.30%**
64831 GENTLMN3	64943 REDWILO3	277.2	278.1	0.30%	277.2	278.1	0.30%	277.2	274.3	-1.00%	277.2	277.2	0.00%	277.2	278.2	0.40%	277.2	278.3	0.40%	277.2	276.8	-0.10%
SUBTOTALS FOR: WNE_WKS		277.2	278.1	0.30%	277.2	278.1	0.30%	277.2	274.3	-1.00%	277.2	277.2	0.00%	277.2	278.2	0.40%	277.2	278.3	0.40%	277.2	276.8	-0.10%
		Difference =	0.9	**1.20%**	Difference =	0.9	**0.90%**	Difference =	-2.8	**-3.80%**	Difference =	0.1	**0.10%**	Difference =	1	**1.00%**	Difference =	1.1	**1.10%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-36.4	-34.4	-5.50%	-36.4	-33.7	-7.40%	-36.4	-34.9	-4.30%	-36.4	-35.4	-2.70%	-36.4	-33.8	-7.10%	-36.4	-34.3	-5.80%	-36.4	-36.8	1.20%
66756 SQBUTTE4	66751 CENTER 4	-41.4	-42.1	1.80%	-41.4	-42.6	2.90%	-41.4	-41	-0.80%	-41.4	-41.8	1.00%	-41.4	-42.3	2.30%	-41.4	-41.1	-0.60%	-41.4	-42.8	3.50%
66756 SQBUTTE4	66791 CENTER 3	90	88.8	-1.40%	90	88.5	-1.70%	90	88.1	-2.10%	90	89.5	-0.60%	90	88.4	-1.80%	90	87.7	-2.60%	90	91.9	2.10%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	317.8	317.7	0.00%	317.8	311	-2.10%	317.8	322.9	1.60%	317.8	315.1	-0.80%	317.8	315.1	-0.80%	317.8	323.1	1.70%	317.8	315.1	-0.60%
60105 PR ISLD3	61950 BYRON 3	-204.7	-189.6	-7.40%	-204.7	-219.9	7.40%	-204.7	-196.4	-4.10%	-204.7	-209.1	2.10%	-204.7	-200	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.6	2.40%
60192 BLUE LK3	60050 WLMRTHTP	-495.7	-503.6	1.60%	-495.7	-515.2	3.90%	-495.7	-492.7	-0.60%	-495.7	-500	0.90%	-495.7	-496.3	0.10%	-495.7	-490.1	-1.10%	-495.7	-502.1	1.30%
60187 AS KING7	60325 WILOWRV7	128.6	128.9	0.20%	128.6	127.7	-0.70%	128.6	129.2	0.50%	128.6	128.2	-0.30%	128.6	128.4	-0.10%	128.6	129.2	0.50%	128.6	128.3	-0.20%
60238 REDROCK7	68966 GLENMONT	50	50.3	0.70%	50	48.4	-3.10%	50	50.6	1.20%	50	49.5	-0.90%	50	49.6	-0.80%	50	50.6	1.30%	50	49.8	-0.40%
62234 LKMARN 7	60276 AIRLAKE7	53.7	53.5	-0.40%	53.7	54.7	1.80%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	54	0.40%
SUBTOTALS FOR: MNEX (INFO)		-150.3	-142.8	-5.00%	-150.3	-193.3	28.60%	-150.3	-132.8	-11.60%	-150.3	-162.4	8.00%	-150.3	-163.9	9.10%	-150.3	-127.9	-14.90%	-150.3	-164.5	9.50%
		Difference =	7.5	**9.90%**	Difference =	-43	**-43.00%**	Difference =	17.5	**23.30%**	Difference =	-12.1	**-24.20%**	Difference =	-13.6	**-13.60%**	Difference =	22.4	**22.40%**	Difference =	-14.2	**-14.20%**

Distribution Factor Analysis
Transmission Alternative 2
2009 Summer Peak Case
Generation to Generation Dispatch

Interface Definition			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	371.9	378.6	1.80%	371.9	377.1	1.40%	371.9	363.6	-2.20%	371.9	373.9	0.60%	371.9	377.3	1.50%	371.9	362.4	-2.60%	371.9	373.8	0.50%
SUBTOTALS FOR: ARN-HAZLTN		371.9	378.6	1.80%	371.9	377.1	1.40%	371.9	363.6	-2.20%	371.9	373.9	0.60%	371.9	377.3	1.50%	371.9	362.4	-2.60%	371.9	373.8	0.50%
		Difference =	6.7	[redacted]	Difference =	5.3	[redacted]	Difference =	-8.3	**-11.00%**	Difference =	2.1	**4.20%**	Difference =	5.5	[redacted]	Difference =	-9.5	**-9.50%**	Difference =	1.9	**1.90%**
64786 COOPER 3	59199 ST JOE 3	52.4	53.4	1.90%	52.4	53.2	1.50%	52.4	47	-10.40%	52.4	52.2	-0.50%	52.4	53.4	1.90%	52.4	53.3	1.70%	52.4	51.6	-1.50%
64786 COOPER 3	96039 7FAIRPT	61.9	62.6	1.20%	61.9	62.5	0.90%	61.9	57.8	-6.70%	61.9	61.8	-0.30%	61.9	62.7	1.20%	61.9	63.4	2.40%	61.9	61.4	-0.90%
SUBTOTALS FOR: COOPER_S		114.3	116	1.50%	114.3	115.7	1.20%	114.3	104.7	-8.40%	114.3	113.9	-0.40%	114.3	116.1	1.50%	114.3	116.7	2.10%	114.3	113	-1.10%
		Difference =	1.7	**2.30%**	Difference =	1.3	**1.30%**	Difference =	-9.6	**-12.80%**	Difference =	-0.4	**-0.80%**	Difference =	1.7	**1.70%**	Difference =	2.4	**2.40%**	Difference =	-1.3	**-1.30%**
60304 EAU CL 3	92494 ARP 345	103.2	101.4	-1.70%	103.2	98.7	-4.40%	103.2	109.3	6.00%	103.2	101.2	-1.90%	103.2	100.7	-2.40%	103.2	109.6	6.20%	103.2	101.7	-1.40%
SUBTOTALS FOR: ECL-ARP		103.2	101.4	-1.70%	103.2	98.7	-4.40%	103.2	109.3	6.00%	103.2	101.2	-1.90%	103.2	100.7	-2.40%	103.2	109.6	6.20%	103.2	101.7	-1.40%
		Difference =	-1.7	**-2.30%**	Difference =	-4.5	**-4.50%**	Difference =	6.2	[redacted]	Difference =	-2	**-3.90%**	Difference =	-2.5	**-2.50%**	Difference =	6.4	[redacted]	Difference =	-1.5	**-1.50%**
65351 S3451 3	65354 S3454 3	81.8	82.4	0.70%	81.8	82.1	0.40%	81.8	88.7	8.50%	81.8	81.6	-0.20%	81.8	82	0.30%	81.8	83.3	1.90%	81.8	81.7	-0.10%
65351 S3451 3	65359 S3459 3	28	29.4	5.10%	28	29	3.60%	28	35.2	25.80%	28	27.9	-0.10%	28	29	3.70%	28	31.9	14.10%	28	27.8	-0.40%
65451 S1251 5	65497 S1297 5	39.2	39.5	0.70%	39.2	39.4	0.50%	39.2	40.5	3.10%	39.2	39.2	0.00%	39.2	39.4	0.50%	39.2	40.2	2.30%	39.2	39.2	-0.10%
SUBTOTALS FOR: FT CAL_S		148.9	151.3	1.60%	148.9	150.4	1.00%	148.9	164.3	10.30%	148.9	148.7	-0.10%	148.9	150.4	1.00%	148.9	155.3	4.30%	148.9	148.7	-0.20%
		Difference =	2.3	**3.00%**	Difference =	1.5	**1.50%**	Difference =	15.4	[redacted]	Difference =	-0.2	**-0.40%**	Difference =	1.5	**1.50%**	Difference =	6.4	[redacted]	Difference =	-0.2	**-0.20%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.8	0.00%	157.9	157.9	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.6	273.7	0.00%	273.6	273.7	0.00%	273.6	268.4	-1.90%	273.6	273.7	0.00%	273.6	273.7	0.00%	273.6	274.1	0.20%	273.6	273.7	0.00%
64831 GENTLMN3	64984 SWEET W3	327.9	328	0.00%	327.9	328	0.00%	327.9	321.6	-1.90%	327.9	328	0.00%	327.9	328	0.00%	327.9	328.4	0.20%	327.9	327.9	0.00%
64831 GENTLMN3	64943 REDWILO3	275.3	276.1	0.30%	275.3	276	0.20%	275.3	272.3	-1.10%	275.3	275.4	0.00%	275.3	276.2	0.30%	275.3	276.3	0.30%	275.3	274.9	-0.10%
SUBTOTALS FOR: GGS		1354.5	1355.4	0.10%	1354.5	1355.4	0.10%	1354.5	1335.6	-1.40%	1354.5	1354.7	0.00%	1354.5	1355.5	0.10%	1354.5	1356.5	0.10%	1354.5	1354.2	0.00%
		Difference =	0.8	**1.10%**	Difference =	0.8	**0.80%**	Difference =	-18.9	**-25.20%**	Difference =	0.2	**0.40%**	Difference =	1	**1.00%**	Difference =	2	**2.00%**	Difference =	-0.4	**-0.40%**
64933 PAULINE3	64902 MOORE 3	53.5	54.4	1.70%	53.5	54.3	1.60%	53.5	51.7	-3.30%	53.5	53.7	0.40%	53.5	54.5	1.90%	53.5	55.7	4.20%	53.5	53.3	-0.30%
64839 GR ISLD4	64780 COLMB.W4	100.1	99.9	-0.30%	100.1	100	-0.20%	100.1	96.3	-3.90%	100.1	100.2	0.10%	100.1	100	-0.20%	100.1	99.9	-0.20%	100.1	100.1	0.00%
66571 GR ISLD3	64896 MCCOOL 3	140.3	142.4	1.50%	140.3	142.3	1.40%	140.3	141.5	0.90%	140.3	140.8	0.40%	140.3	142.6	1.70%	140.3	145.3	3.60%	140.3	139.9	-0.30%
SUBTOTALS FOR: GRIS_LNC		293.9	296.6	0.90%	293.9	296.6	0.90%	293.9	289.5	-1.50%	293.9	294.7	0.30%	293.9	297.1	1.10%	293.9	301	2.40%	293.9	293.4	-0.20%
		Difference =	2.7	**3.60%**	Difference =	2.7	**2.70%**	Difference =	-4.4	**-5.90%**	Difference =	0.8	**1.60%**	Difference =	3.2	**3.20%**	Difference =	7.1	[redacted]	Difference =	-0.5	**-0.50%**
57981 LACYGNE7	57965 W.GRDNR7	578.1	577.9	0.00%	578.1	577.9	0.00%	578.1	579	0.20%	578.1	578.2	0.00%	578.1	577.8	0.00%	578.1	579.1	0.20%	578.1	578.4	0.10%
57981 LACYGNE7	57968 STILWEL7	720.5	720.5	0.00%	720.5	720.5	0.00%	720.5	720.8	0.10%	720.5	720.6	0.00%	720.5	720.4	0.00%	720.5	721.2	0.10%	720.5	720.8	0.00%
SUBTOTALS FOR: LACYGNE_N		1298.5	1298.3	0.00%	1298.5	1298.4	0.00%	1298.5	1299.8	0.10%	1298.5	1298.8	0.00%	1298.5	1298.2	0.00%	1298.5	1300.3	0.10%	1298.5	1299.2	0.10%
		Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	1.3	**1.80%**	Difference =	0.3	**0.60%**	Difference =	-0.3	**-0.30%**	Difference =	1.7	**1.70%**	Difference =	0.7	**0.70%**
62234 LKMARN 7	60276 AIRLAKE7	52.9	52.5	-0.60%	52.9	53.7	1.50%	52.9	52.6	-0.40%	52.9	52.9	0.10%	52.9	38.3	-27.60%	52.9	52.5	-0.60%	52.9	53	0.20%
SUBTOTALS FOR: LKM-WFB		52.9	52.5	-0.60%	52.9	53.7	1.50%	52.9	52.6	-0.40%	52.9	52.9	0.10%	52.9	38.3	-27.60%	52.9	52.5	-0.60%	52.9	53	0.20%
		Difference =	-0.3	**-0.40%**	Difference =	0.8	**0.80%**	Difference =	-0.2	**-0.30%**	Difference =	0	**0.10%**	Difference =	-14.6	**-14.60%**	Difference =	-0.3	**-0.30%**	Difference =	0.1	**0.10%**
60175 ROSEAU 4	67576 RICHER 4	-142.9	-143.2	0.20%	-142.9	-143.3	0.30%	-142.9	-143	0.10%	-142.9	-143	0.10%	-142.9	-143.3	0.30%	-142.9	-143	0.10%	-142.9	-142.9	0.00%
60173 ROSEAUN2	67564 DORSEY 2	-1120.2	1125.1	0.40%	-1120.2	1127.3	0.60%	1120.2	1121.9	0.10%	1120.2	1122.7	0.20%	1120.2	1126.4	0.60%	-1120.2	1122.4	0.20%	1120.2	1117.5	-0.20%
66752 DRAYTON4	67557 LETELER4	-245.1	-242.2	-1.20%	-245.1	-241	-1.70%	-245.1	-243.8	-0.60%	-245.1	-243.7	-0.60%	-245.1	-241.5	-1.50%	-245.1	-243.4	-0.70%	-245.1	-247.7	1.10%
63379 RUGBY 4	67523 GLENBOR4	33.8	36	6.50%	33.8	37	9.60%	33.8	34.1	0.80%	33.8	34.9	3.30%	33.8	36.5	8.10%	33.8	34.2	1.30%	33.8	33.8	0.10%
SUBTOTALS FOR: MHEX_N		-1474.4	1474.5	0.00%	-1474.4	1474.6	0.00%	1474.4	1474.5	0.00%	1474.4	1474.5	0.00%	1474.4	1474.6	0.00%	-1474.4	1474.6	0.00%	1474.4	1474.3	0.00%
		Difference =	-0.1	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.20%**	Difference =	-0.1	**-0.30%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	0.1	**0.10%**
67576 RICHER 4	60175 ROSEAU 4	145.3	145.7	0.20%	145.3	145.8	0.30%	145.3	145.4	0.10%	145.3	145.5	0.10%	145.3	145.7	0.30%	145.3	145.4	0.10%	145.3	145.3	0.00%
67564 DORSEY 2	60173 ROSEAUN2	1136.4	1141.5	0.40%	1136.4	1143.8	0.60%	1136.4	1138.1	0.10%	1136.4	1139	0.20%	1136.4	1142.9	0.60%	1136.4	1138.7	0.20%	1136.4	1133.6	-0.20%
67557 LETELER4	66752 DRAYTON4	249.9	246.8	-1.20%	249.9	245.6	-1.70%	249.9	248.5	-0.60%	249.9	248.5	-0.60%	249.9	246.1	-1.50%	249.9	248.1	-0.70%	249.9	252.6	1.10%
67523 GLENBOR4	63379 RUGBY 4	-33.6	-35.7	6.50%	-33.6	-36.7	9.50%	-33.6	-33.8	0.80%	-33.6	-34.7	3.30%	-33.6	-36.3	8.00%	-33.6	-34	1.30%	-33.6	-33.6	0.10%
SUBTOTALS FOR: MHEX_S		1498.1	1498.2	0.00%	1498.1	1498.4	0.00%	1498.1	1498.2	0.00%	1498.1	1498.3	0.00%	1498.1	1498.4	0.00%	1498.1	1498.2	0.00%	1498.1	1498	0.00%
		Difference =	0.1	**0.20%**	Difference =	0.3	**0.30%**	Difference =	0.1	**0.20%**	Difference =	0.2	**0.30%**	Difference =	0.3	**0.30%**	Difference =	0.1	**0.10%**	Difference =	-0.1	**-0.10%**
68613 AUBURNT4	67525 RESTON 4	42.6	42.5	-0.20%	42.6	42.5	-0.30%	42.6	42.6	-0.10%	42.6	42.6	-0.10%	42.6	42.5	-0.30%	42.6	42.6	-0.10%	42.6	42.6	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.7	-90.6	-0.10%	-90.7	-90.6	-0.10%	-90.7	-90.7	0.00%	-90.7	-90.7	0.00%	-90.7	-90.6	-0.10%	-90.7	-90.7	0.00%	-90.7	-90.7	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.5	-6.4	-0.90%	-6.5	-6.4	-1.20%	-6.5	-6.5	-0.10%	-6.5	-6.5	-0.30%	-6.5	-6.4	-1.00%	-6.5	-6.5	-0.20%	-6.5	-6.5	0.40%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.4	-42.3	-0.20%	-42.4	-42.3	-0.30%	-42.4	-42.4	-0.10%	-42.4	-42.4	-0.10%	-42.4	-42.3	-0.30%	-42.4	-42.4	-0.10%	-42.4	-42.4	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.5	91.4	-0.10%	91.5	91.4	-0.10%	91.5	91.5	0.00%	91.5	91.5	0.00%	91.5	91.4	-0.10%	91.5	91.5	0.00%	91.5	91.5	0.00%
67515 RALL 4	68630 EBCAMPB4	6.7	6.6	-0.90%	6.7	6.6	-1.10%	6.7	6.7	-0.10%	6.7	6.7	-0.30%	6.7	6.6	-1.00%	6.7	6.7	-0.20%	6.7	6.7	0.30%
SUBTOTALS FOR: MH_SPC_W		55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 2

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	17.1	13.4	-21.80%	17.1	13.8	-19.40%	17.1	21.6	26.40%	17.1	16.5	-3.50%	17.1	13.8	-19.30%	17.1	25.1	46.70%	17.1	16.9	-1.20%
SUBTOTALS FOR: MNTZUMA_W		17.1	13.4	-21.80%	17.1	13.8	-19.40%	17.1	21.6	26.40%	17.1	16.5	-3.50%	17.1	13.8	-19.30%	17.1	25.1	46.70%	17.1	16.9	-1.20%
		Difference =	-3.7	**-4.90%**	Difference =	-3.3	**-3.30%**	Difference =	4.5	[redacted]	Difference =	-0.6	**-1.20%**	Difference =	-3.3	**-3.30%**	Difference =	8	[redacted]	Difference =	-0.2	**-0.20%**
61702 LASKIN 7	61705 BABBITT7	63.5	63.4	0.00%	63.5	63.5	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.8	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.6	64.6	0.00%	64.6	64.6	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.00%	64.6	64.6	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.8	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.8	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	140.2	140	-0.20%	140.2	139.9	-0.20%	140.2	140.1	-0.10%	140.2	140.1	0.00%	140.2	139.9	-0.20%	140.2	140	-0.10%	140.2	140.9	0.50%
61626 BOSWELL4	61625 BLCKBRY4	136.4	136.2	-0.20%	136.4	136.1	-0.20%	136.4	136.3	-0.10%	136.4	136.4	0.00%	136.4	136.2	-0.20%	136.4	136.3	-0.10%	136.4	137.2	0.50%
61626 BOSWELL4	61627 SHANNON4	86.3	86.8	0.50%	86.3	86.9	0.70%	86.3	86.5	0.30%	86.3	86.4	0.10%	86.3	86.8	0.60%	86.3	86.6	0.40%	86.3	84.9	-1.70%
61615 ARROWHD4	61614 98L TAP4	58.7	57.7	-1.80%	58.7	57.6	-2.00%	58.7	57.4	-2.30%	58.7	58.5	-0.40%	58.7	57.5	-2.10%	58.7	57.1	-2.70%	58.7	61.4	4.50%
61615 ARROWHD4	61554 AWHD1JCT	155.5	155.3	-0.10%	155.5	155.2	-0.10%	155.5	155.2	-0.20%	155.5	155.4	0.00%	155.5	155.3	-0.10%	155.5	155.1	-0.20%	155.5	156.1	0.40%
61615 ARROWHD4	61556 AWHD2JCT	160.9	160.7	-0.10%	160.9	160.6	-0.10%	160.9	160.6	-0.20%	160.9	160.8	0.00%	160.9	160.7	-0.10%	160.9	160.5	-0.20%	160.9	161.6	0.40%
61615 ARROWHD4	61624 FORBES 4	-110.8	-111.1	0.30%	-110.8	-110.7	-0.10%	-110.8	-112	1.10%	-110.8	-110.7	-0.10%	-110.8	-111.1	0.20%	-110.8	-112.1	1.20%	-110.8	-110.5	-0.30%
61615 ARROWHD4	63055 BEARCK 4	51.7	52.4	1.30%	51.7	53.7	3.80%	51.7	51.2	-1.00%	51.7	52.5	1.50%	51.7	53	2.40%	51.7	51.3	-0.90%	51.7	50.3	-2.70%
SUBTOTALS FOR: MP_EXPORT		776	775	-0.10%	776	776.5	0.10%	776	772.3	-0.50%	776	776.6	0.10%	776	775.3	-0.10%	776	772	-0.50%	776	778.9	0.40%
		Difference =	-1	**-1.30%**	Difference =	0.5	**0.50%**	Difference =	-3.7	**-4.90%**	Difference =	0.6	**1.10%**	Difference =	-0.7	**-0.70%**	Difference =	-4	**-4.00%**	Difference =	2.9	**2.90%**
60105 PR ISLD3	61950 BYRON 3	-180.8	-162.5	-10.10%	-180.8	-191.3	5.80%	-180.8	-170	-6.00%	-180.8	-183.7	1.60%	-180.8	-171.8	-5.00%	-180.8	-167.1	-7.60%	-180.8	-183.3	1.40%
60304 EAU CL 3	92494 ARP 345	103.2	101.4	-1.70%	103.2	98.7	-4.40%	103.2	109.3	6.00%	103.2	101.2	-1.90%	103.2	100.7	-2.40%	103.2	109.6	6.20%	103.2	101.7	-1.40%
SUBTOTALS FOR: MWSI		-77.6	-61.1	-21.30%	-77.6	-92.6	19.30%	-77.6	-60.7	-21.90%	-77.6	-82.5	6.30%	-77.6	-71.1	-8.50%	-77.6	-57.5	-25.90%	-77.6	-81.6	5.10%
		Difference =	16.6	[redacted]	Difference =	-15	**-15.00%**	Difference =	17	[redacted]	Difference =	-4.9	**-9.80%**	Difference =	6.6	[redacted]	Difference =	20.1	[redacted]	Difference =	-4	**-4.00%**
66756 SQBUTTE4	63049 STANTON4	-41.4	-40	-3.30%	-41.4	-39.6	-4.30%	-41.4	-40.3	-2.70%	-41.4	-40.7	-1.60%	-41.4	-39.7	-4.10%	-41.4	-39.8	-3.70%	-41.4	-42.3	2.40%
66756 SQBUTTE4	66751 CENTER 4	-39.2	-39.7	1.30%	-39.2	-40	2.20%	-39.2	-38.6	-1.40%	-39.2	-39.5	0.80%	-39.2	-39.8	1.60%	-39.2	-38.6	-1.40%	-39.2	-40.4	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.8	91.9	-0.90%	92.8	91.9	-1.00%	92.8	91.1	-1.80%	92.8	92.5	-0.30%	92.8	91.7	-1.20%	92.8	90.7	-2.20%	92.8	95	2.40%
63041 COAL CR4	63042 COAL TP4	-22.9	-23	0.40%	-22.9	-23	0.60%	-22.9	-22.8	-0.20%	-22.9	-22.9	0.20%	-22.9	-23	0.50%	-22.9	-22.8	-0.20%	-22.9	-23	0.50%
63041 COAL CR4	63049 STANTON4	-122.6	-123.3	0.50%	-122.6	-123.6	0.80%	-122.6	-122.5	-0.10%	-122.6	-123	0.30%	-122.6	-123.4	0.60%	-122.6	-122.5	-0.10%	-122.6	-123.2	0.50%
63041 COAL CR4	63381 UNDERWD4	141.6	142.3	0.50%	141.6	142.7	0.80%	141.6	141.4	-0.10%	141.6	142	0.30%	141.6	142.5	0.60%	141.6	141.5	-0.10%	141.6	142.3	0.50%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	-0.10%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	128.9	130.2	1.10%	128.9	130.1	0.90%	128.9	133	3.20%	128.9	129.2	0.30%	128.9	130.6	1.30%	128.9	133.2	3.40%	128.9	126.8	-1.60%
67105 LELANDO3	67160 GROTON 3	258.1	257.2	-0.30%	258.1	256.9	-0.50%	258.1	256.9	-0.50%	258.1	257.8	-0.10%	258.1	257.1	-0.40%	258.1	258	0.00%	258.1	255.5	-1.00%
67101 ANTELOP3	67120 BRDLAND3	194.4	194.3	0.00%	194.4	194	-0.20%	194.4	195.1	0.40%	194.4	194.3	0.00%	194.4	194.3	0.00%	194.4	195.7	0.70%	194.4	192	-1.20%
63361 BIGSTN3	66503 BLAIR 4	-76.5	-57	-25.50%	-76.5	-51.9	-32.20%	-76.5	-54.4	-28.90%	-76.5	-63.7	-16.70%	-76.5	-50.9	-33.50%	-76.5	-45.5	-40.50%	-76.5	-57.8	-24.50%
66554 MORRIS 4	66550 GRANITF4	-3.4	1.3	-138.20%	-3.4	2.8	-182.90%	-3.4	1.1	-133.90%	-3.4	1.3	-138.90%	-3.4	3	-190.80%	-3.4	3	-188.90%	-3.4	-6.8	102.70%
63336 AUDUBON4	63053 HUBBARD4	105.1	108.1	2.80%	105.1	109.2	3.90%	105.1	106.6	1.40%	105.1	106.7	1.50%	105.1	108.8	3.60%	105.1	107.1	1.90%	105.1	101.4	-3.50%
66521 SULLYBT4	66519 OAHE 4	-72.7	-71.8	-1.20%	-72.7	-71.9	-1.00%	-72.7	-69.8	-4.00%	-72.7	-72.4	-0.40%	-72.7	-71.6	-1.50%	-72.7	-69.7	-4.10%	-72.7	-74.6	2.60%
63052 INMAN 4	61611 WINGRIV4	83	87.7	5.70%	83	89.4	7.80%	83	86.2	3.90%	83	85.5	3.10%	83	89	7.30%	83	87	4.90%	83	63.2	-23.80%
66470 BISON 4	66497 MAURINE4	-2.5	-2	-21.10%	-2.5	-2	-18.90%	-2.5	0.1	-104.80%	-2.5	-2.4	-5.70%	-2.5	-1.9	-25.80%	-2.5	-0.9	-63.50%	-2.5	-3.3	30.10%
66716 LAPORTE7	61640 BADOURA7	-2.4	-1.7	-29.20%	-2.4	-1.4	-42.00%	-2.4	-2.1	-10.90%	-2.4	-1.9	-17.50%	-2.4	-1.5	-37.50%	-2.4	-2	-14.70%	-2.4	-2.1	-9.50%
63222 ALEXAND7	60144 DGLASCO7	28.3	29.5	4.30%	28.3	29.9	6.00%	28.3	29.1	2.90%	28.3	29.1	3.10%	28.3	29.8	5.60%	28.3	29.3	3.70%	28.3	21.3	-24.60%
67327 ELLENDL7	67401 ABDNJCT7	-8.1	-7.6	-7.20%	-8.1	-7.5	-7.70%	-8.1	-7.1	-13.30%	-8.1	-7.8	-3.70%	-8.1	-7.4	-9.50%	-8.1	-6.6	-19.60%	-8.1	-9.6	18.30%
66432 EDGELEY7	66534 ORDWAY 7	-19.3	-19.3	0.00%	-19.3	-19.4	0.50%	-19.3	-18.9	-2.00%	-19.3	-19.3	0.00%	-19.3	-19.3	-0.20%	-19.3	-18.5	-4.00%	-19.3	-20.9	8.40%
66438 FORMAN 7	66522 SUMMIT-7	-23.9	-23.5	-1.80%	-23.9	-23.5	-1.90%	-23.9	-23.1	-3.30%	-23.9	-23.7	-1.00%	-23.9	-23.3	-2.40%	-23.9	-22.3	-7.00%	-23.9	-25.6	6.90%
63311 CANBY 4	66550 GRANITF4	49.8	60.3	21.10%	49.8	63.5	27.70%	49.8	60	20.60%	49.8	58.2	17.10%	49.8	63.8	28.20%	49.8	63.5	27.70%	49.8	60.1	20.80%
62006 KERKHO 7	62005 KERKHOT7	6.2	6.9	12.60%	6.2	7.2	17.10%	6.2	6.8	11.00%	6.2	7.4	20.90%	6.2	7.3	17.90%	6.2	7.1	15.40%	6.2	3.6	-41.80%
66752 DRAYTON4	67557 LETELER4	-249.9	-246.8	-1.20%	-249.9	-245.6	-1.70%	-249.9	-248.5	-0.60%	-249.9	-248.5	-0.60%	-249.9	-246.1	-1.50%	-249.9	-248.1	-0.70%	-249.9	-252.6	1.10%
63379 RUGBY 4	67523 GLENBOR4	33.8	36	6.50%	33.8	37	9.60%	33.8	34.1	0.80%	33.8	34.9	3.30%	33.8	36.5	8.10%	33.8	34.2	1.30%	33.8	33.8	0.10%
63361 BIGSTN3	63057 WLLMAR3	202.5	224.4	10.80%	202.5	232.6	14.80%	202.5	220.9	9.10%	202.5	216.5	6.90%	202.5	231.5	14.30%	202.5	226.4	11.80%	202.5	220.1	8.70%
SUBTOTALS FOR: NDEX		631.1	706.1	11.90%	631.1	729.5	15.60%	631.1	706	11.90%	631.1	681.3	8.00%	631.1	729.7	15.60%	631.1	731	15.80%	631.1	624.6	-1.00%
		Difference =	75	[redacted]	Difference =	98.4	[redacted]	Difference =	74.9	[redacted]	Difference =	50.2	[redacted]	Difference =	98.6	[redacted]	Difference =	99.9	[redacted]	Difference =	-6.5	**-6.50%**
36406 WEMPL; B	39058 PAD 345	631.8	632.5	0.10%	631.8	633.6	0.30%	631.8	628.5	-0.50%	631.8	632.6	0.10%	631.8	632.7	0.10%	631.8	628	-0.60%	631.8	633	0.20%
SUBTOTALS FOR: NI_WUMS		631.8	632.5	0.10%	631.8	633.6	0.30%	631.8	628.5	-0.50%	631.8	632.6	0.10%	631.8	632.7	0.10%	631.8	628	-0.60%	631.8	633	0.20%
		Difference =	0.7	**0.90%**	Difference =	1.8	**1.80%**	Difference =	-3.3	**-4.40%**	Difference =	0.7	**1.50%**	Difference =	0.8	**0.80%**	Difference =	-3.8	**-3.80%**	Difference =	1.2	**1.20%**
60105 PR ISLD3	61950 BYRON 3	-180.8	-162.5	-10.10%	-180.8	-191.3	5.80%	-180.8	-170	-6.00%	-180.8	-183.7	1.60%	-180.8	-171.8	-5.00%	-180.8	-167.1	-7.60%	-180.8	-183.3	1.40%
SUBTOTALS FOR: PRI-BYN		-180.8	-162.5	-10.10%	-180.8	-191.3	5.80%	-180.8	-170	-6.00%	-180.8	-183.7	1.60%	-180.8	-171.8	-5.00%	-180.8	-167.1	-7.60%	-180.8	-183.3	1.40%
		Difference =	18.3	[redacted]	Difference =	-10.4	**-10.40%**	Difference =	10.8	[redacted]	Difference =	-2.9	**-5.80%**	Difference =	9.1	[redacted]	Difference =	13.7	[redacted]	Difference =	-2.5	**-2.50%**
36382 QUAD ;	34036 ROCK CK3	507.4	508.8	0.30%	507.4	508.5	0.20%	507.4	506	-0.30%	507.4	507.8	0.10%	507.4	508.4	0.20%	507.4	506.1	-0.30%	507.4	508.2	0.20%
SUBTOTALS FOR: QUAD-ROCKC		507.4	508.8	0.30%	507.4	508.5	0.20%	507.4	506	-0.30%	507.4	507.8	0.10%	507.4	508.4	0.20%	507.4	506.1	-0.30%	507.4	508.2	0.20%
		Difference =	1.4	**1.80%**	Difference =	1.1	**1.10%**	Difference =	-1.5	**-1.90%**	Difference =	0.4	**0.80%**	Difference =	1	**1.00%**	Difference =	-1.3	**-1.30%**	Difference =	0.8	**0.80%**
36382 QUAD ;	64405 SUB 91 3	555.1	555.4	0.00%	555.1	554.9	0.00%	555.1	555.5	0.10%	555.1	555.3	0.00%	555.1	555.1	0.00%	555.1	557.5	0.40%	555.1	555.2	0.00%
64400 MECCORD3	64403 E MOLIN3	275.8	275.9	0.00%	275.8	275.5	-0.10%	275.8	276.3	0.20%	275.8	275.9	0.00%	275.8	275.7	0.00%	275.8	277.8	0.70%	275.8	275.9	0.00%

Distribution Factor Analysis

Transmission Alternative 2

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W		830.9	831.2	0.00%	830.9	830.4	-0.10%	830.9	831.8	0.10%	830.9	831.2	0.00%	830.9	830.8	0.00%	830.9	835.3	0.50%	830.9	831.1	0.00%
		Difference =	0.3	**0.40%**	Difference =	-0.6	**-0.60%**	Difference =	0.9	**1.20%**	Difference =	0.2	**0.50%**	Difference =	-0.1	**-0.10%**	Difference =	4.4	**4.40%**	Difference =	0.1	**0.10%**
64831 GENTLMN3	64943 REDWILO3	275.3	276.1	0.30%	275.3	276	0.20%	275.3	272.3	-1.10%	275.3	275.4	0.00%	275.3	276.2	0.30%	275.3	276.3	0.30%	275.3	274.9	-0.10%
SUBTOTALS FOR: WNE_WKS		275.3	276.1	0.30%	275.3	276	0.20%	275.3	272.3	-1.10%	275.3	275.4	0.00%	275.3	276.2	0.30%	275.3	276.3	0.30%	275.3	274.9	-0.10%
		Difference =	0.8	**1.00%**	Difference =	0.7	**0.70%**	Difference =	-3	**-4.00%**	Difference =	0	**0.10%**	Difference =	0.8	**0.80%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-41.4	-40	-3.30%	-41.4	-39.6	-4.30%	-41.4	-40.3	-2.70%	-41.4	-40.7	-1.60%	-41.4	-39.7	-4.10%	-41.4	-39.8	-3.70%	-41.4	-42.3	2.40%
66756 SQBUTTE4	66751 CENTER 4	-39.2	-39.7	1.30%	-39.2	-40	2.20%	-39.2	-38.6	-1.40%	-39.2	-39.5	0.80%	-39.2	-39.8	1.60%	-39.2	-38.6	-1.40%	-39.2	-40.4	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.8	91.9	-0.90%	92.8	91.9	-1.00%	92.8	91.1	-1.80%	92.8	92.5	-0.30%	92.8	91.7	-1.20%	92.8	90.7	-2.20%	92.8	95	2.40%
SUBTOTALS FOR: Y2DC		*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	328.7	330.2	0.50%	328.7	324.2	-1.40%	328.7	335	1.90%	328.7	326.7	-0.60%	328.7	328.2	-0.20%	328.7	335.5	2.10%	328.7	327.2	-0.50%
60105 PR ISLD3	61950 BYRON 3	-180.8	-162.5	-10.10%	-180.8	-191.3	5.80%	-180.8	-170	-6.00%	-180.8	-183.7	1.60%	-180.8	-171.8	-5.00%	-180.8	-167.1	-7.60%	-180.8	-183.3	1.40%
60192 BLUE LK3	60050 WLMRTHTP	-453.7	-456.4	0.60%	-453.7	-465.6	2.60%	-453.7	-446.4	-1.60%	-453.7	-455.6	0.40%	-453.7	-447.1	-1.40%	-453.7	-442.8	-2.40%	-453.7	-456.6	0.60%
60187 AS KING7	60325 WILOWRV7	130.1	130.6	0.40%	130.1	129.5	-0.50%	130.1	130.9	0.60%	130.1	129.8	-0.20%	130.1	130.2	0.10%	130.1	130.9	0.70%	130.1	130	-0.10%
60238 REDROCK7	68966 GLENMONT	52.1	52.7	1.30%	52.1	51	-2.10%	52.1	52.9	1.60%	52.1	51.8	-0.60%	52.1	52	0.00%	52.1	53	1.80%	52.1	52.1	0.00%
62234 LKMARN 7	60276 AIRLAKE7	52.9	52.5	-0.60%	52.9	53.7	1.50%	52.9	52.6	-0.40%	52.9	52.9	0.10%	52.9	38.3	-27.60%	52.9	52.5	-0.60%	52.9	53	0.20%
SUBTOTALS FOR: MNEX (INFO)		-70.7	-52.8	-25.30%	-70.7	-98.6	39.40%	-70.7	-45	-36.30%	-70.7	-78.1	10.40%	-70.7	-70.2	-0.70%	-70.7	-37.9	-46.50%	-70.7	-77.7	9.80%
		Difference =	17.9	**23.60%**	Difference =	-27.9	**-27.90%**	Difference =	25.7	**34.30%**	Difference =	-7.4	**-14.80%**	Difference =	0.5	**0.50%**	Difference =	32.9	**32.90%**	Difference =	-6.9	**-6.90%**

Distribution Factor Analysis

Transmission Alternative 3

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definition			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	375.6	382.6	1.90%	375.6	381.3	1.50%	375.6	367.6	-2.10%	375.6	377.6	0.50%	375.6	381.5	1.60%	375.6	366.4	-2.50%	375.6	377.6	0.50%
SUBTOTALS FOR: ARN-HAZLTN		375.6	382.6	1.90%	375.6	381.3	1.50%	375.6	367.6	-2.10%	375.6	377.6	0.50%	375.6	381.5	1.60%	375.6	366.4	-2.50%	375.6	377.6	0.50%
		Difference =	7	[redacted]	Difference =	5.7	[redacted]	Difference =	-8	**-10.70%**	Difference =	2	**4.00%**	Difference =	5.9	[redacted]	Difference =	-9.2	**-9.20%**	Difference =	2	**2.00%**
64786 COOPER 3	59199 ST JOE 3	53.3	54.3	1.90%	53.3	54	1.30%	53.3	47.9	-10.20%	53.3	53.2	-0.30%	53.3	54.2	1.70%	53.3	54.2	1.70%	53.3	52.5	-1.60%
64786 COOPER 3	96039 7FAIRPT	62.6	63.3	1.20%	62.6	63.1	0.80%	62.6	58.4	-6.60%	62.6	62.5	-0.20%	62.6	63.3	1.10%	62.6	64.1	2.40%	62.6	62	-0.90%
SUBTOTALS FOR: COOPER_S		115.9	117.7	1.50%	115.9	117.1	1.00%	115.9	106.3	-8.30%	115.9	115.7	-0.20%	115.9	117.5	1.30%	115.9	118.3	2.00%	115.9	114.5	-1.20%
		Difference =	1.7	**2.30%**	Difference =	1.2	**1.20%**	Difference =	-9.6	**-12.80%**	Difference =	-0.3	**-0.50%**	Difference =	1.6	**1.60%**	Difference =	2.4	**2.40%**	Difference =	-1.4	**-1.40%**
60304 EAU CL 3	92494 ARP 345	100.8	98.9	-1.80%	100.8	96	-4.70%	100.8	106.8	5.90%	100.8	99	-1.80%	100.8	98	-2.70%	100.8	107	6.10%	100.8	99.2	-1.50%
SUBTOTALS FOR: ECL-ARP		100.8	98.9	-1.80%	100.8	96	-4.70%	100.8	106.8	5.90%	100.8	99	-1.80%	100.8	98	-2.70%	100.8	107	6.10%	100.8	99.2	-1.50%
		Difference =	-1.9	**-2.40%**	Difference =	-4.7	**-4.70%**	Difference =	6	[redacted]	Difference =	-1.8	**-3.60%**	Difference =	-2.8	**-2.80%**	Difference =	6.2	[redacted]	Difference =	-1.6	**-1.60%**
65351 S3451 3	65354 S3454 3	82	82.6	0.80%	82	82.3	0.40%	82	88.9	8.50%	82	81.8	-0.20%	82	82.3	0.40%	82	83.6	1.90%	82	81.9	-0.10%
65351 S3451 3	65359 S3459 3	28.8	30.2	5.00%	28.8	29.8	3.50%	28.8	36	25.20%	28.8	28.8	-0.10%	28.8	29.8	3.60%	28.8	32.8	13.90%	28.8	28.6	-0.60%
65451 S1251 5	65497 S1297 5	39.4	39.7	0.70%	39.4	39.6	0.50%	39.4	40.6	3.10%	39.4	39.4	0.00%	39.4	39.6	0.50%	39.4	40.3	2.40%	39.4	39.4	-0.10%
SUBTOTALS FOR: FT CAL_S		150.1	152.5	1.60%	150.1	151.7	1.00%	150.1	165.6	10.30%	150.1	150	-0.10%	150.1	151.7	1.00%	150.1	156.7	4.30%	150.1	149.9	-0.20%
		Difference =	2.3	**3.10%**	Difference =	1.5	**1.50%**	Difference =	15.4	[redacted]	Difference =	-0.2	**-0.30%**	Difference =	1.5	**1.50%**	Difference =	6.5	[redacted]	Difference =	-0.3	**-0.30%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.8	0.00%	157.9	157.8	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.8	0.00%	157.9	157.9	0.00%	157.9	157.8	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.7	273.7	0.00%	273.7	273.7	0.00%	273.7	268.4	-1.90%	273.7	273.7	0.00%	273.7	273.8	0.00%	273.7	274.1	0.10%	273.7	273.7	0.00%
64831 GENTLMN3	64984 SWEET W3	328	328	0.00%	328	328	0.00%	328	321.6	-1.90%	328	328	0.00%	328	328.1	0.00%	328	328.5	0.20%	328	328	0.00%
64831 GENTLMN3	64943 REDWILO3	276.1	276.9	0.30%	276.1	276.7	0.20%	276.1	273.1	-1.10%	276.1	276.1	0.00%	276.1	276.8	0.30%	276.1	277	0.30%	276.1	275.7	-0.10%
SUBTOTALS FOR: GGS		1355.3	1356.2	0.10%	1355.3	1356.1	0.10%	1355.3	1336.4	-1.40%	1355.3	1355.6	0.00%	1355.3	1356.3	0.10%	1355.3	1357.3	0.10%	1355.3	1354.9	0.00%
		Difference =	0.8	**1.10%**	Difference =	0.8	**0.80%**	Difference =	-18.9	**-25.20%**	Difference =	0.2	**0.40%**	Difference =	0.9	**0.90%**	Difference =	2	**2.00%**	Difference =	-0.4	**-0.40%**
64933 PAULINE3	64902 MOORE 3	54.3	55.2	1.60%	54.3	55.1	1.50%	54.3	52.5	-3.40%	54.3	54.5	0.40%	54.3	55.3	1.80%	54.3	56.5	4.10%	54.3	54.1	-0.30%
64839 GR ISLD4	64780 COLMB.W4	100	99.7	-0.30%	100	99.8	-0.20%	100	96.1	-3.90%	100	100	0.00%	100	99.8	-0.20%	100	99.8	-0.20%	100	100	0.00%
66571 GR ISLD3	64896 MCCOOL 3	142.2	144.3	1.40%	142.2	144.2	1.40%	142.2	143.4	0.80%	142.2	142.7	0.40%	142.2	144.5	1.60%	142.2	147.1	3.50%	142.2	141.8	-0.30%
SUBTOTALS FOR: GRIS_LNC		296.5	299.2	0.90%	296.5	299.2	0.90%	296.5	292	-1.50%	296.5	297.3	0.30%	296.5	299.6	1.00%	296.5	303.4	2.30%	296.5	295.9	-0.20%
		Difference =	2.7	**3.50%**	Difference =	2.6	**2.60%**	Difference =	-4.5	**-6.10%**	Difference =	0.8	**1.60%**	Difference =	3	**3.00%**	Difference =	6.9	[redacted]	Difference =	-0.6	**-0.60%**
57981 LACYGNE7	57965 W.GRDNR7	577.8	577.6	0.00%	577.8	577.8	0.00%	577.8	578.8	0.20%	577.8	577.9	0.00%	577.8	577.7	0.00%	577.8	578.8	0.20%	577.8	578.2	0.10%
57981 LACYGNE7	57968 STILWEL7	720.4	720.3	0.00%	720.4	720.4	0.00%	720.4	720.8	0.10%	720.4	720.5	0.00%	720.4	720.4	0.00%	720.4	721.1	0.10%	720.4	720.7	0.00%
SUBTOTALS FOR: LACYGNE_N		1298.2	1298	0.00%	1298.2	1298.2	0.00%	1298.2	1299.5	0.10%	1298.2	1298.4	0.00%	1298.2	1298	0.00%	1298.2	1299.9	0.10%	1298.2	1298.9	0.10%
		Difference =	-0.3	**-0.30%**	Difference =	0	**0.00%**	Difference =	1.3	**1.70%**	Difference =	0.2	**0.50%**	Difference =	-0.2	**-0.20%**	Difference =	1.7	**1.70%**	Difference =	0.7	**0.70%**
62234 LKMARN 7	60276 AIRLAKE7	53.1	52.8	-0.50%	53.1	54	1.60%	53.1	52.9	-0.30%	53.1	53.2	0.10%	53.1	38.6	-27.30%	53.1	52.9	-0.50%	53.1	53.3	0.30%
SUBTOTALS FOR: LKM-WFB		53.1	52.8	-0.50%	53.1	54	1.60%	53.1	52.9	-0.30%	53.1	53.2	0.10%	53.1	38.6	-27.30%	53.1	52.9	-0.50%	53.1	53.3	0.30%
		Difference =	-0.3	**-0.40%**	Difference =	0.9	**0.90%**	Difference =	-0.2	**-0.20%**	Difference =	0	**0.10%**	Difference =	-14.5	**-14.50%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.10%**
60175 ROSEAU 4	67576 RICHER 4	-143.2	-143.5	0.20%	-143.2	-143.7	0.30%	-143.2	-143.3	0.10%	-143.2	-143.4	0.10%	-143.2	-143.6	0.30%	-143.2	-143.4	0.10%	-143.2	-143.2	0.00%
60173 ROSEAUN2	67564 DORSEY 2	1125.4	1130.3	0.40%	-1125.4	1132.5	0.60%	-1125.4	1127	0.10%	1125.4	1127.8	0.20%	1125.4	1131.5	0.50%	1125.4	1127.6	0.20%	1125.4	-1122.5	-0.30%
66752 DRAYTON4	67557 LETELER4	-242.1	-239.2	-1.20%	-242.1	-238	-1.70%	-242.1	-240.7	-0.60%	-242.1	-240.7	-0.60%	-242.1	-238.4	-1.50%	-242.1	-240.4	-0.70%	-242.1	-244.8	1.10%
63379 RUGBY 4	67523 GLENBOR4	36.1	38.3	6.10%	36.1	39.3	9.00%	36.1	36.4	0.80%	36.1	37.2	3.00%	36.1	38.9	7.60%	36.1	36.6	1.30%	36.1	36.1	0.00%
SUBTOTALS FOR: MHEX_N		1474.7	1474.7	0.00%	-1474.7	1474.8	0.00%	-1474.7	1474.6	0.00%	1474.7	1474.7	0.00%	1474.7	1474.7	0.00%	1474.7	1474.7	0.00%	1474.7	-1474.4	0.00%
		Difference =	-0.1	**-0.10%**	Difference =	-0.1	**-0.10%**	Difference =	0	**0.00%**	Difference =	0	**-0.10%**	Difference =	-0.1	**-0.10%**	Difference =	-0.1	**-0.10%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	145.6	146	0.20%	145.6	146.1	0.30%	145.6	145.8	0.10%	145.6	145.8	0.10%	145.6	146.1	0.30%	145.6	145.8	0.10%	145.6	145.7	0.00%
67564 DORSEY 2	60173 ROSEAUN2	1141.8	1146.8	0.40%	1141.8	1149.1	0.60%	1141.8	1143.4	0.10%	1141.8	1144.2	0.20%	1141.8	1148.1	0.60%	1141.8	1144	0.20%	1141.8	1138.8	-0.30%
67557 LETELER4	66752 DRAYTON4	246.8	243.7	-1.20%	246.8	242.5	-1.70%	246.8	245.4	-0.60%	246.8	245.3	-0.60%	246.8	243	-1.60%	246.8	244.9	-0.70%	246.8	249.6	1.10%
67523 GLENBOR4	63379 RUGBY 4	-35.8	-38	6.00%	-35.8	-39	8.90%	-35.8	-36.1	0.80%	-35.8	-36.9	3.00%	-35.8	-38.5	7.60%	-35.8	-36.3	1.30%	-35.8	-35.8	0.00%
SUBTOTALS FOR: MHEX_S		1498.4	1498.5	0.00%	1498.4	1498.6	0.00%	1498.4	1498.4	0.00%	1498.4	1498.5	0.00%	1498.4	1498.6	0.00%	1498.4	1498.5	0.00%	1498.4	1498.2	0.00%
		Difference =	0.1	**0.20%**	Difference =	0.2	**0.20%**	Difference =	0	**0.00%**	Difference =	0.1	**0.10%**	Difference =	0.2	**0.20%**	Difference =	0.1	**0.10%**	Difference =	-0.2	**-0.20%**
68613 AUBURNT4	67525 RESTON 4	42.5	42.4	-0.20%	42.5	42.4	-0.30%	42.5	42.5	-0.10%	42.5	42.5	-0.10%	42.5	42.4	-0.30%	42.5	42.5	-0.10%	42.5	42.5	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.6	-90.6	0.00%	-90.6	-90.6	-0.10%	-90.6	-90.6	0.00%	-90.6	-90.6	0.00%	-90.6	-90.6	-0.10%	-90.6	-90.6	0.00%	-90.6	-90.7	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.4	-6.4	-0.90%	-6.4	-6.4	-1.20%	-6.4	-6.4	-0.10%	-6.4	-6.4	-0.40%	-6.4	-6.4	-1.00%	-6.4	-6.4	-0.20%	-6.4	-6.5	0.40%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.10%	-54.6	-54.6	0.10%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.3	-42.2	-0.20%	-42.3	-42.2	-0.30%	-42.3	-42.3	-0.10%	-42.3	-42.3	-0.10%	-42.3	-42.2	-0.30%	-42.3	-42.3	-0.10%	-42.3	-42.3	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.4	91.4	0.00%	91.4	91.4	-0.10%	91.4	91.4	0.00%	91.4	91.4	0.00%	91.4	91.4	-0.10%	91.4	91.4	0.00%	91.4	91.5	0.00%
67515 RALL 4	68630 EBCAMPB4	6.6	6.6	-0.80%	6.6	6.6	-1.20%	6.6	6.6	-0.10%	6.6	6.6	-0.40%	6.6	6.6	-1.00%	6.6	6.6	-0.20%	6.6	6.7	0.40%
SUBTOTALS FOR: MH_SPC_W		55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.10%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 3

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	14.4	10.8	-25.20%	14.4	11.1	-22.80%	14.4	18.9	31.30%	14.4	13.9	-3.70%	14.4	11	-23.30%	14.4	22.3	55.00%	14.4	14.3	-0.60%
SUBTOTALS FOR: MNTZUMA_W		14.4	10.8	-25.20%	14.4	11.1	-22.80%	14.4	18.9	31.30%	14.4	13.9	-3.70%	14.4	11	-23.30%	14.4	22.3	55.00%	14.4	14.3	-0.60%
		Difference =	-3.6	**-4.80%**	Difference =	-3.3	**-3.30%**	Difference =	4.5	[redacted]	Difference =	-0.5	**-1.10%**	Difference =	-3.4	**-3.40%**	Difference =	7.9	[redacted]	Difference =	-0.1	**-0.10%**
61702 LASKIN 7	61705 BABBITT7	63.5	63.4	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.4	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.6	64.5	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.9	139.7	-0.20%	139.9	139.6	-0.20%	139.9	139.8	-0.10%	139.9	139.9	-0.10%	139.9	139.7	-0.20%	139.9	139.8	-0.10%	139.9	140.7	0.50%
61626 BOSWELL4	61625 BLCKBRY4	136.2	136	-0.20%	136.2	135.9	-0.20%	136.2	136.1	-0.10%	136.2	136.1	-0.10%	136.2	135.9	-0.20%	136.2	136	-0.10%	136.2	136.9	0.50%
61626 BOSWELL4	61627 SHANNON4	86.8	87.2	0.50%	86.8	87.4	0.70%	86.8	87	0.30%	86.8	86.9	0.20%	86.8	87.3	0.60%	86.8	87.1	0.40%	86.8	85.3	-1.70%
61615 ARROWHD4	61614 98L TAP4	57.6	56.6	-1.80%	57.6	56.5	-2.00%	57.6	56.3	-2.30%	57.6	57.4	-0.50%	57.6	56.4	-2.10%	57.6	56.1	-2.70%	57.6	60.3	4.60%
61615 ARROWHD4	61554 AWHD1JCT	155.2	155.1	-0.10%	155.2	155	-0.10%	155.2	155	-0.20%	155.2	155.2	0.00%	155.2	155.1	-0.10%	155.2	154.9	-0.20%	155.2	155.9	0.40%
61615 ARROWHD4	61556 AWHD2JCT	160.7	160.5	-0.10%	160.7	160.4	-0.10%	160.7	160.4	-0.20%	160.7	160.6	0.00%	160.7	160.5	-0.10%	160.7	160.3	-0.20%	160.7	161.3	0.40%
61615 ARROWHD4	61624 FORBES 4	-110.9	-111.3	0.30%	-110.9	-110.8	-0.10%	-110.9	-112.1	1.00%	-110.9	-110.9	-0.10%	-110.9	-111.2	0.20%	-110.9	-112.2	1.10%	-110.9	-110.6	-0.30%
61615 ARROWHD4	63055 BEARCK 4	53.1	53.8	1.30%	53.1	55.1	3.80%	53.1	52.6	-0.90%	53.1	53.8	1.40%	53.1	54.4	2.40%	53.1	52.7	-0.80%	53.1	51.7	-2.60%
SUBTOTALS FOR: MP_EXPORT		775.7	774.8	-0.10%	775.7	776.2	0.10%	775.7	772.2	-0.50%	775.7	776.2	0.10%	775.7	775.2	-0.10%	775.7	771.8	-0.50%	775.7	778.6	0.40%
		Difference =	-0.9	**-1.20%**	Difference =	0.5	**0.50%**	Difference =	-3.5	**-4.70%**	Difference =	0.5	**0.90%**	Difference =	-0.5	**-0.50%**	Difference =	-3.9	**-3.90%**	Difference =	2.9	**2.90%**
60105 PR ISLD3	61950 BYRON 3	-189.1	-171.5	-9.30%	-189.1	-200.6	6.10%	-189.1	-179	-5.30%	-189.1	-192	1.60%	-189.1	-181.1	-4.20%	-189.1	-176.2	-6.80%	-189.1	-192	1.50%
60304 EAU CL 3	92494 ARP 345	100.8	98.9	-1.80%	100.8	96	-4.70%	100.8	106.8	5.90%	100.8	99	-1.80%	100.8	98	-2.70%	100.8	107	6.10%	100.8	99.2	-1.50%
SUBTOTALS FOR: MWSI		-88.3	-72.5	-17.80%	-88.3	-104.5	18.50%	-88.3	-72.2	-18.20%	-88.3	-93	5.40%	-88.3	-83.1	-5.90%	-88.3	-69.2	-21.50%	-88.3	-92.7	5.10%
		Difference =	15.7	[redacted]	Difference =	-16.3	**-16.30%**	Difference =	16.1	[redacted]	Difference =	-4.8	**-9.50%**	Difference =	5.2	[redacted]	Difference =	19	[redacted]	Difference =	-4.5	**-4.50%**
66756 SQBUTTE4	63049 STANTON4	-40.2	-38.8	-3.30%	-40.2	-38.4	-4.40%	-40.2	-39.1	-2.80%	-40.2	-39.5	-1.60%	-40.2	-38.5	-4.20%	-40.2	-38.6	-3.80%	-40.2	-41.2	2.50%
66756 SQBUTTE4	66751 CENTER 4	-39.7	-40.2	1.30%	-39.7	-40.6	2.20%	-39.7	-39.2	-1.40%	-39.7	-40	0.80%	-39.7	-40.4	1.70%	-39.7	-39.2	-1.30%	-39.7	-41	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.1	91.3	-0.90%	92.1	91.2	-1.00%	92.1	90.5	-1.80%	92.1	91.8	-0.40%	92.1	91.1	-1.10%	92.1	90.1	-2.20%	92.1	94.4	2.50%
63041 COAL CR4	63042 COAL TP4	-23	-23.1	0.40%	-23	-23.1	0.60%	-23	-22.9	-0.20%	-23	-23	0.20%	-23	-23.1	0.50%	-23	-22.9	-0.20%	-23	-23.1	0.50%
63041 COAL CR4	63049 STANTON4	-123.3	-124	0.50%	-123.3	-124.3	0.80%	-123.3	-123.2	-0.10%	-123.3	-123.7	0.30%	-123.3	-124.1	0.70%	-123.3	-123.2	-0.10%	-123.3	-123.9	0.40%
63041 COAL CR4	63381 UNDERWD4	142.4	143.1	0.50%	142.4	143.5	0.80%	142.4	142.2	-0.10%	142.4	142.8	0.30%	142.4	143.3	0.60%	142.4	142.3	-0.10%	142.4	143	0.50%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELAND03	66506 FTTHOMP3	130	131.3	1.00%	130	131.2	0.90%	130	134.1	3.10%	130	130.4	0.30%	130	131.6	1.20%	130	134.2	3.20%	130	127.9	-1.60%
67105 LELAND03	67160 GROTON 3	256.9	256	-0.30%	256.9	255.7	-0.50%	256.9	255.7	-0.50%	256.9	256.6	-0.10%	256.9	255.9	-0.40%	256.9	256.8	0.00%	256.9	254.3	-1.00%
67101 ANTELOP3	67120 BRDLAND3	194	193.9	0.00%	194	193.6	-0.20%	194	194.6	0.30%	194	193.9	0.00%	194	193.9	-0.10%	194	195.3	0.70%	194	191.6	-1.20%
63361 BIGSTN3	66503 BLAIR 4	-70.5	-50.9	-27.80%	-70.5	-45.6	-35.40%	-70.5	-48.5	-31.30%	-70.5	-57.7	-18.10%	-70.5	-44.9	-36.30%	-70.5	-39.7	-43.70%	-70.5	-51.7	-26.60%
66554 MORRIS 4	66550 GRANITF4	-7.8	-3	-61.50%	-7.8	-1.5	-81.50%	-7.8	-3.2	-58.80%	-7.8	-3.3	-57.40%	-7.8	-1.2	-84.30%	-7.8	-1.4	-82.70%	-7.8	-11.2	43.10%
63336 AUDUBON4	63053 HUBBARD4	108.1	111	2.70%	108.1	112.2	3.80%	108.1	109.6	1.40%	108.1	109.7	1.50%	108.1	111.8	3.40%	108.1	110	1.80%	108.1	104.4	-3.40%
66521 SULLYBT4	66519 OAHE 4	-72	-71.2	-1.20%	-72	-71.3	-1.00%	-72	-69.2	-4.00%	-72	-71.7	-0.40%	-72	-71	-1.40%	-72	-69.1	-4.10%	-72	-73.9	2.60%
63052 INMAN 4	61611 WINGRIV4	87.5	92.1	5.30%	87.5	93.9	7.30%	87.5	90.6	3.60%	87.5	90	2.90%	87.5	93.4	6.80%	87.5	91.4	4.50%	87.5	67.6	-22.70%
66470 BISON 4	66497 MAURINE4	-2.1	-1.5	-25.00%	-2.1	-1.6	-22.10%	-2.1	0.5	-126.20%	-2.1	-1.9	-7.70%	-2.1	-1.5	-29.50%	-2.1	-0.5	-75.40%	-2.1	-2.8	37.20%
66716 LAPORTE7	61640 BADOURA7	-1.7	-1	-40.80%	-1.7	-0.7	-58.70%	-1.7	-1.4	-15.20%	-1.7	-1.3	-23.80%	-1.7	-0.8	-52.40%	-1.7	-1.3	-20.60%	-1.7	-1.5	-13.10%
63222 ALEXAND7	60144 DGLASCO7	29.1	30.3	4.10%	29.1	30.8	5.70%	29.1	29.9	2.80%	29.1	30	2.80%	29.1	30.7	5.30%	29.1	30.2	3.50%	29.1	22.1	-24.00%
67327 ELLENDL7	67401 ABDNJCT7	-7.9	-7.3	-7.30%	-7.9	-7.3	-7.90%	-7.9	-8.8	-13.40%	-7.9	-7.6	-4.00%	-7.9	-7.1	-9.50%	-7.9	-8.3	-19.90%	-7.9	-9.4	18.90%
66432 EDGELEY7	66534 ORDWAY 7	-19.5	-19.5	0.00%	-19.5	-19.6	0.50%	-19.5	-19.1	-1.90%	-19.5	-19.4	0.00%	-19.5	-19.4	-0.10%	-19.5	-18.7	-3.90%	-19.5	-21.1	8.30%
66438 FORMAN 7	66522 SUMMIT-7	-23.8	-23.4	-1.80%	-23.8	-23.4	-1.90%	-23.8	-23.1	-3.30%	-23.8	-23.6	-1.10%	-23.8	-23.3	-2.40%	-23.8	-22.2	-6.90%	-23.8	-25.5	6.90%
63311 CANBY 4	66550 GRANITF4	48.2	58.9	22.30%	48.2	62.3	29.40%	48.2	58.6	21.60%	48.2	56.5	17.30%	48.2	62.4	29.60%	48.2	62.1	28.90%	48.2	58.7	21.80%
62006 KERKHO 7	62005 KERKHOT7	5.4	6.1	14.00%	5.4	6.4	18.80%	5.4	6.1	12.80%	5.4	6.5	21.30%	5.4	6.5	19.80%	5.4	6.3	17.90%	5.4	2.8	-48.20%
66752 DRAYTON4	67557 LETELER4	-246.8	-243.7	-1.20%	-246.8	-242.5	-1.70%	-246.8	-245.4	-0.60%	-246.8	-245.3	-0.60%	-246.8	-243	-1.60%	-246.8	-244.9	-0.70%	-246.8	-249.6	1.10%
63379 RUGBY 4	67523 GLENBOR4	36.1	38.3	6.10%	36.1	39.3	9.00%	36.1	36.4	0.80%	36.1	37.2	3.00%	36.1	38.9	7.60%	36.1	36.6	1.30%	36.1	36.1	0.00%
63361 BIGSTN3	63057 WLLMAR3	187.6	209.1	11.50%	187.6	216.8	15.60%	187.6	206	9.80%	187.6	202.1	7.70%	187.6	216.4	15.30%	187.6	211.6	12.80%	187.6	205.1	9.30%
SUBTOTALS FOR: NDEX		630.7	705.5	11.90%	630.7	728.9	15.60%	630.7	705.4	11.80%	630.7	680.8	7.90%	630.7	729.1	15.60%	630.7	730.4	15.80%	630.7	624	-1.10%
		Difference =	74.8	[redacted]	Difference =	98.2	[redacted]	Difference =	74.7	[redacted]	Difference =	50.1	[redacted]	Difference =	98.4	[redacted]	Difference =	99.7	[redacted]	Difference =	-6.7	**-6.70%**
36406 WEMPL; B	39058 PAD 345	632.6	633.4	0.10%	632.6	634.5	0.30%	632.6	629.5	-0.50%	632.6	633.3	0.10%	632.6	633.6	0.20%	632.6	629	-0.60%	632.6	633.9	0.20%
SUBTOTALS FOR: NI_WUMS		632.6	633.4	0.10%	632.6	634.5	0.30%	632.6	629.5	-0.50%	632.6	633.3	0.10%	632.6	633.6	0.20%	632.6	629	-0.60%	632.6	633.9	0.20%
		Difference =	0.8	**1.00%**	Difference =	1.9	**1.90%**	Difference =	-3.1	**-4.20%**	Difference =	0.7	**1.40%**	Difference =	1	**1.00%**	Difference =	-3.6	**-3.60%**	Difference =	1.3	**1.30%**
60105 PR ISLD3	61950 BYRON 3	-189.1	-171.5	-9.30%	-189.1	-200.6	6.10%	-189.1	-179	-5.30%	-189.1	-192	1.60%	-189.1	-181.1	-4.20%	-189.1	-176.2	-6.80%	-189.1	-192	1.50%
SUBTOTALS FOR: PRI-BYN		-189.1	-171.5	-9.30%	-189.1	-200.6	6.10%	-189.1	-179	-5.30%	-189.1	-192	1.60%	-189.1	-181.1	-4.20%	-189.1	-176.2	-6.80%	-189.1	-192	1.50%
		Difference =	17.6	[redacted]	Difference =	-11.5	**-11.50%**	Difference =	10.1	[redacted]	Difference =	-3	**-5.90%**	Difference =	7.9	[redacted]	Difference =	12.8	[redacted]	Difference =	-2.9	**-2.90%**
36382 QUAD ;	34036 ROCK CK3	508.3	509.2	0.20%	508.3	509.2	0.20%	508.3	506.9	-0.30%	508.3	508.4	0.00%	508.3	509.3	0.20%	508.3	507	-0.30%	508.3	508.8	0.10%
SUBTOTALS FOR: QUAD-ROCKC		508.3	509.2	0.20%	508.3	509.2	0.20%	508.3	506.9	-0.30%	508.3	508.4	0.00%	508.3	509.3	0.20%	508.3	507	-0.30%	508.3	508.8	0.10%
		Difference =	1	**1.30%**	Difference =	0.9	**0.90%**	Difference =	-1.4	**-1.90%**	Difference =	0.1	**0.10%**	Difference =	1	**1.00%**	Difference =	-1.3	**-1.30%**	Difference =	0.5	**0.50%**
36382 QUAD ;	64405 SUB 91 3	554.9	555.3	0.10%	554.9	554.7	0.00%	554.9	555.3	0.10%	554.9	555.1	0.00%	554.9	554.9	0.00%	554.9	557.3	0.40%	554.9	555.1	0.00%
64400 MECCORD3	64403 E MOLIN3	275.6	275.7	0.10%	275.6	275.3	-0.10%	275.6	276.1	0.20%	275.6	275.7	0.00%	275.6	275.5	0.00%	275.6	277.6	0.70%	275.6	275.7	0.00%

Distribution Factor Analysis

Transmission Alternative 3

2009 Summer Peak Case

Generation to Generation Dispatcl

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W		830.4	831	0.10%	830.4	830	0.00%	830.4	831.4	0.10%	830.4	830.7	0.00%	830.4	830.4	0.00%	830.4	834.9	0.50%	830.4	830.8	0.00%
		Difference =	0.6	**0.70%**	Difference =	-0.4	**-0.40%**	Difference =	1	**1.30%**	Difference =	0.3	**0.60%**	Difference =	-0.1	**-0.10%**	Difference =	4.4	**4.40%**	Difference =	0.4	**0.40%**
64831 GENTLMN3	64943 REDWILO3	276.1	276.9	0.30%	276.1	276.7	0.20%	276.1	273.1	-1.10%	276.1	276.1	0.00%	276.1	276.8	0.30%	276.1	277	0.30%	276.1	275.7	-0.10%
SUBTOTALS FOR: WNE_WKS		276.1	276.9	0.30%	276.1	276.7	0.20%	276.1	273.1	-1.10%	276.1	276.1	0.00%	276.1	276.8	0.30%	276.1	277	0.30%	276.1	275.7	-0.10%
		Difference =	0.8	**1.10%**	Difference =	0.7	**0.70%**	Difference =	-3	**-3.90%**	Difference =	0.1	**0.20%**	Difference =	0.8	**0.80%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-40.2	-38.8	-3.30%	-40.2	-38.4	-4.40%	-40.2	-39.1	-2.80%	-40.2	-39.5	-1.60%	-40.2	-38.5	-4.20%	-40.2	-38.6	-3.80%	-40.2	-41.2	2.50%
66756 SQBUTTE4	66751 CENTER 4	-39.7	-40.2	1.30%	-39.7	-40.6	2.20%	-39.7	-39.2	-1.40%	-39.7	-40	0.80%	-39.7	-40.4	1.70%	-39.7	-39.2	-1.30%	-39.7	-41	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.1	91.3	-0.90%	92.1	91.2	-1.00%	92.1	90.5	-1.80%	92.1	91.8	-0.40%	92.1	91.1	-1.10%	92.1	90.1	-2.20%	92.1	94.4	2.50%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	326.6	328.1	0.40%	326.6	321.9	-1.40%	326.6	332.7	1.90%	326.6	324.8	-0.60%	326.6	325.8	-0.30%	326.6	333.2	2.00%	326.6	325.1	-0.50%
60105 PR ISLD3	61950 BYRON 3	-189.1	-171.5	-9.30%	-189.1	-200.6	6.10%	-189.1	-179	-5.30%	-189.1	-192	1.60%	-189.1	-181.1	-4.20%	-189.1	-176.2	-6.80%	-189.1	-192	1.50%
60192 BLUE LK3	60050 WLMRTHTP	-473.7	-485.7	2.50%	-473.7	-498.6	5.30%	-473.7	-476.7	0.60%	-473.7	-475.8	0.40%	-473.7	-483.5	2.10%	-473.7	-476.4	0.60%	-473.7	-480.6	1.50%
60187 AS KING7	60325 WILOWRV7	129.9	130.3	0.40%	129.9	129.2	-0.50%	129.9	130.6	0.60%	129.9	129.6	-0.20%	129.9	129.9	0.10%	129.9	130.7	0.60%	129.9	129.7	-0.10%
60238 REDROCK7	68966 GLENMONT	51.5	52.1	1.10%	51.5	50.3	-2.40%	51.5	52.3	1.50%	51.5	51.2	-0.60%	51.5	51.4	-0.20%	51.5	52.4	1.70%	51.5	51.5	-0.10%
62234 LKMARN 7	60276 AIRLAKE7	53.1	52.8	-0.50%	53.1	54	1.60%	53.1	52.9	-0.30%	53.1	53.2	0.10%	53.1	38.6	-27.30%	53.1	52.9	-0.50%	53.1	53.3	0.30%
SUBTOTALS FOR: MNEX (INFO)		-101.6	-93.9	-7.60%	-101.6	-143.7	41.50%	-101.6	-87.1	-14.20%	-101.6	-109	7.30%	-101.6	-118.8	16.90%	-101.6	-83.4	-17.90%	-101.6	-113	11.20%
		Difference =	7.7	**10.20%**	Difference =	-42.1	**-42.10%**	Difference =	14.4	**19.30%**	Difference =	-7.4	**-14.80%**	Difference =	-17.2	**-17.20%**	Difference =	18.1	**18.10%**	Difference =	-11.4	**-11.40%**

Distribution Factor Analysis

Transmission Alternative 3b

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definitior				CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	371.8	378.5	1.80%	371.8	377	1.40%	371.8	363.6	-2.20%	371.8	373.8	0.50%	371.8	377.3	1.50%	371.8	362.4	-2.50%	371.8	373.7	0.50%
SUBTOTALS FOR: ARN-HAZLTN		371.8	378.5	1.80%	371.8	377	1.40%	371.8	363.6	-2.20%	371.8	373.8	0.50%	371.8	377.3	1.50%	371.8	362.4	-2.50%	371.8	373.7	0.50%
		Difference =	6.7		Difference =	5.2		Difference =	-8.2	**-11.00%**	Difference =	2	**4.00%**	Difference =	5.5		Difference =	-9.4	**-9.40%**	Difference =	1.9	**1.90%**
64786 COOPER 3	59199 ST JOE 3	53.6	54.5	1.70%	53.6	54.3	1.30%	53.6	48.1	-10.20%	53.6	53.3	-0.60%	53.6	54.5	1.50%	53.6	54.3	1.30%	53.6	52.8	-1.70%
64786 COOPER 3	96039 7FAIRPT	62.8	63.4	1.10%	62.8	63.3	0.80%	62.8	58.6	-6.70%	62.8	62.6	-0.30%	62.8	63.4	1.00%	62.8	64.1	2.10%	62.8	62.2	-1.00%
SUBTOTALS FOR: COOPER_S		116.4	118	1.40%	116.4	117.6	1.00%	116.4	106.7	-8.30%	116.4	115.9	-0.50%	116.4	117.9	1.20%	116.4	118.4	1.70%	116.4	114.9	-1.30%
		Difference =	1.6	**2.10%**	Difference =	1.2	**1.20%**	Difference =	-9.7	**-12.90%**	Difference =	-0.5	**-1.10%**	Difference =	1.5	**1.50%**	Difference =	2	**2.00%**	Difference =	-1.5	**-1.50%**
60304 EAU CL 3	92494 ARP 345	102.5	100.9	-1.60%	102.5	98.2	-4.30%	102.5	108.7	6.10%	102.5	100.7	-1.80%	102.5	100.1	-2.30%	102.5	108.9	6.30%	102.5	101.1	-1.40%
SUBTOTALS FOR: ECL-ARP		102.5	100.9	-1.60%	102.5	98.2	-4.30%	102.5	108.7	6.10%	102.5	100.7	-1.80%	102.5	100.1	-2.30%	102.5	108.9	6.30%	102.5	101.1	-1.40%
		Difference =	-1.7	**-2.20%**	Difference =	-4.4	**-4.40%**	Difference =	6.2		Difference =	-1.8	**-3.60%**	Difference =	-2.4	**-2.40%**	Difference =	6.4		Difference =	-1.4	**-1.40%**
65351 S3451 3	65354 S3454 3	82.4	82.9	0.70%	82.4	82.6	0.30%	82.4	89.2	8.40%	82.4	82.1	-0.20%	82.4	82.6	0.30%	82.4	83.8	1.80%	82.4	82.2	-0.20%
65351 S3451 3	65359 S3459 3	28.9	30.2	4.70%	28.9	29.8	3.20%	28.9	36	24.80%	28.9	28.8	-0.20%	28.9	29.8	3.30%	28.9	32.7	13.30%	28.9	28.7	-0.60%
65451 S1251 5	65497 S1297 5	39.4	39.7	0.60%	39.4	39.6	0.50%	39.4	40.6	3.10%	39.4	39.4	0.00%	39.4	39.6	0.50%	39.4	40.3	2.30%	39.4	39.4	-0.10%
SUBTOTALS FOR: FT CAL_S		150.6	152.8	1.40%	150.6	152	0.90%	150.6	165.9	10.10%	150.6	150.4	-0.20%	150.6	152	0.90%	150.6	156.8	4.10%	150.6	150.3	-0.20%
		Difference =	2.2	**2.90%**	Difference =	1.4	**1.40%**	Difference =	15.3		Difference =	-0.3	**-0.60%**	Difference =	1.3	**1.30%**	Difference =	6.2		Difference =	-0.3	**-0.30%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	155.9	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	156.4	-0.90%	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	157.9	0.00%	157.8	157.8	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.6	273.6	0.00%	273.6	273.6	0.00%	273.6	268.3	-1.90%	273.6	273.6	0.00%	273.6	273.6	0.00%	273.6	274	0.20%	273.6	273.6	0.00%
64831 GENTLMN3	64984 SWEET W3	327.8	327.9	0.00%	327.8	327.9	0.00%	327.8	321.5	-1.90%	327.8	327.9	0.00%	327.8	327.9	0.00%	327.8	328.4	0.20%	327.8	327.9	0.00%
64831 GENTLMN3	64943 REDWILO3	275.9	276.6	0.30%	275.9	276.6	0.20%	275.9	272.9	-1.10%	275.9	275.9	0.00%	275.9	276.7	0.30%	275.9	276.8	0.30%	275.9	275.4	-0.20%
SUBTOTALS FOR: GGS		1354.9	1355.7	0.10%	1354.9	1355.6	0.10%	1354.9	1335.9	-1.40%	1354.9	1355	0.00%	1354.9	1355.8	0.10%	1354.9	1356.8	0.10%	1354.9	1354.4	0.00%
		Difference =	0.8	**1.10%**	Difference =	0.8	**0.80%**	Difference =	-18.9	**-25.20%**	Difference =	0.2	**0.40%**	Difference =	0.9	**0.90%**	Difference =	2	**2.00%**	Difference =	-0.4	**-0.40%**
64933 PAULINE3	64902 MOORE 3	53.7	54.6	1.70%	53.7	54.6	1.60%	53.7	51.9	-3.30%	53.7	54	0.50%	53.7	54.7	1.80%	53.7	56	4.20%	53.7	53.6	-0.30%
64839 GR ISLD4	64780 COLMB.W4	99.9	99.7	-0.20%	99.9	99.7	-0.10%	99.9	96	-3.90%	99.9	100	0.10%	99.9	99.8	-0.10%	99.9	99.7	-0.20%	99.9	99.9	0.00%
66571 GR ISLD3	64896 MCCOOL 3	141	143	1.50%	141	142.9	1.40%	141	142.2	0.90%	141	141.5	0.40%	141	143.3	1.60%	141	145.9	3.50%	141	140.6	-0.30%
SUBTOTALS FOR: GRIS_LNC		294.6	297.3	0.90%	294.6	297.2	0.90%	294.6	290.2	-1.50%	294.6	295.4	0.30%	294.6	297.7	1.10%	294.6	301.7	2.40%	294.6	294.1	-0.20%
		Difference =	2.7	**3.60%**	Difference =	2.7	**2.70%**	Difference =	-4.4	**-5.90%**	Difference =	0.8	**1.70%**	Difference =	3.1	**3.10%**	Difference =	7.1		Difference =	-0.5	**-0.50%**
57981 LACYGNE7	57965 W.GRDNR7	577.6	577.5	0.00%	577.6	577.5	0.00%	577.6	578.6	0.20%	577.6	577.8	0.00%	577.6	577.5	0.00%	577.6	578.7	0.20%	577.6	578	0.10%
57981 LACYGNE7	57968 STILWEL7	720.2	720.1	0.00%	720.2	720.2	0.00%	720.2	720.5	0.10%	720.2	720.3	0.00%	720.2	720.2	0.00%	720.2	720.9	0.10%	720.2	720.5	0.00%
SUBTOTALS FOR: LACYGNE_N		1297.8	1297.6	0.00%	1297.8	1297.8	0.00%	1297.8	1299.1	0.10%	1297.8	1298.2	0.00%	1297.8	1297.6	0.00%	1297.8	1299.6	0.10%	1297.8	1298.5	0.10%
		Difference =	-0.2	**-0.20%**	Difference =	0	**0.00%**	Difference =	1.4	**1.80%**	Difference =	0.4	**0.70%**	Difference =	-0.1	**-0.10%**	Difference =	1.9	**1.90%**	Difference =	0.7	**0.70%**
62234 LKMARN 7	60276 AIRLAKE7	53.6	53.3	-0.60%	53.6	54.4	1.50%	53.6	53.4	-0.40%	53.6	53.6	0.10%	53.6	39	-27.20%	53.6	53.3	-0.60%	53.6	53.7	0.20%
SUBTOTALS FOR: LKM-WFB		53.6	53.3	-0.60%	53.6	54.4	1.50%	53.6	53.4	-0.40%	53.6	53.6	0.10%	53.6	39	-27.20%	53.6	53.3	-0.60%	53.6	53.7	0.20%
		Difference =	-0.3	**-0.40%**	Difference =	0.8	**0.80%**	Difference =	-0.2	**-0.30%**	Difference =	0	**0.10%**	Difference =	-14.6	**-14.60%**	Difference =	-0.3	**-0.30%**	Difference =	0.1	**0.10%**
60175 ROSEAU 4	67576 RICHER 4	-143	-143.3	0.20%	-143	-143.4	0.30%	-143	-143.1	0.10%	-143	-143.2	0.10%	-143	-143.4	0.30%	-143	-143.1	0.10%	-143	-143	0.00%
60173 ROSEAUN2	67564 DORSEY 2	1122.4	-1127.1	0.40%	-1122.4	-1129.2	0.60%	1122.4	-1123.8	0.10%	1122.4	-1124.8	0.20%	1122.4	-1128.3	0.50%	-1122.4	-1124.4	0.20%	-1122.4	-1119.4	-0.30%
66752 DRAYTON4	67557 LETELER4	-243.9	-241.1	-1.20%	-243.9	-239.9	-1.60%	-243.9	-242.6	-0.50%	-243.9	-242.5	-0.60%	-243.9	-240.3	-1.50%	-243.9	-242.2	-0.70%	-243.9	-246.6	1.10%
63379 RUGBY 4	67523 GLENBOR4	34.8	36.9	6.00%	34.8	37.9	9.00%	34.8	35	0.60%	34.8	35.8	3.10%	34.8	37.4	7.60%	34.8	35.2	1.10%	34.8	34.7	-0.10%
SUBTOTALS FOR: MHEX_N		1474.5	-1474.6	0.00%	-1474.5	-1474.7	0.00%	1474.5	-1474.5	0.00%	1474.5	-1474.6	0.00%	1474.5	-1474.7	0.00%	-1474.5	-1474.6	0.00%	-1474.5	-1474.3	0.00%
		Difference =	-0.1	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	0	**0.00%**	Difference =	-0.1	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	-0.1	**-0.10%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	145.4	145.8	0.20%	145.4	145.9	0.30%	145.4	145.5	0.10%	145.4	145.6	0.10%	145.4	145.8	0.30%	145.4	145.6	0.10%	145.4	145.5	0.00%
67564 DORSEY 2	60173 ROSEAUN2	1138.7	1143.5	0.40%	1138.7	1145.7	0.60%	1138.7	1140.2	0.10%	1138.7	1141.1	0.20%	1138.7	1144.8	0.50%	1138.7	1140.8	0.20%	1138.7	1135.6	-0.30%
67557 LETELER4	66752 DRAYTON4	248.6	245.7	-1.20%	248.6	244.5	-1.70%	248.6	247.3	-0.60%	248.6	247.2	-0.60%	248.6	244.9	-1.50%	248.6	246.9	-0.70%	248.6	251.5	1.10%
67523 GLENBOR4	63379 RUGBY 4	-34.5	-36.6	6.00%	-34.5	-37.6	8.90%	-34.5	-34.7	0.60%	-34.5	-35.6	3.10%	-34.5	-37.1	7.60%	-34.5	-34.9	1.10%	-34.5	-34.5	-0.10%
SUBTOTALS FOR: MHEX_S		1498.2	1498.4	0.00%	1498.2	1498.5	0.00%	1498.2	1498.2	0.00%	1498.2	1498.4	0.00%	1498.2	1498.4	0.00%	1498.2	1498.3	0.00%	1498.2	1498	0.00%
		Difference =	0.2	**0.20%**	Difference =	0.2	**0.20%**	Difference =	0	**0.00%**	Difference =	0.1	**0.30%**	Difference =	0.2	**0.20%**	Difference =	0.1	**0.10%**	Difference =	-0.2	**-0.20%**
68613 AUBURNT4	67525 RESTON 4	42.6	42.5	-0.20%	42.6	42.4	-0.30%	42.6	42.5	-0.10%	42.6	42.5	-0.10%	42.6	42.5	-0.30%	42.6	42.5	-0.10%	42.6	42.6	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.7	-90.6	0.00%	-90.7	-90.6	-0.10%	-90.7	-90.7	0.00%	-90.7	-90.6	0.00%	-90.7	-90.6	-0.10%	-90.7	-90.7	0.00%	-90.7	-90.7	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.5	-6.4	-0.80%	-6.5	-6.4	-1.10%	-6.5	-6.5	-0.10%	-6.5	-6.4	-0.40%	-6.5	-6.4	-1.00%	-6.5	-6.5	-0.20%	-6.5	-6.5	0.40%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.4	-42.3	-0.20%	-42.4	-42.3	-0.30%	-42.4	-42.4	-0.10%	-42.4	-42.3	-0.10%	-42.4	-42.3	-0.30%	-42.4	-42.3	-0.10%	-42.4	-42.4	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.5	91.4	0.00%	91.5	91.4	-0.10%	91.5	91.5	0.00%	91.5	91.4	0.00%	91.5	91.4	-0.10%	91.5	91.5	0.00%	91.5	91.5	0.00%
67515 RALL 4	68630 EBCAMPB4	6.7	6.6	-0.80%	6.7	6.6	-1.10%	6.7	6.7	-0.10%	6.7	6.6	-0.40%	6.7	6.6	-1.00%	6.7	6.7	-0.20%	6.7	6.7	0.30%
SUBTOTALS FOR: MH_SPC_W		55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 3b

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	15.5	11.9	-23.10%	15.5	12.3	-20.40%	15.5	20.2	30.00%	15.5	14.9	-4.00%	15.5	12.3	-21.00%	15.5	23.6	52.10%	15.5	15.4	-0.90%
SUBTOTALS FOR: MNTZUMA_W		15.5	11.9	-23.10%	15.5	12.3	-20.40%	15.5	20.2	30.00%	15.5	14.9	-4.00%	15.5	12.3	-21.00%	15.5	23.6	52.10%	15.5	15.4	-0.90%
		Difference =	-3.6	**-4.70%**	Difference =	-3.2	**-3.20%**	Difference =	4.7	[redacted]	Difference =	-0.6	**-1.20%**	Difference =	-3.3	**-3.30%**	Difference =	8.1	[redacted]	Difference =	-0.1	**-0.10%**
61702 LASKIN 7	61705 BABBITT7	63.5	63.4	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.8	-0.10%	43.9	43.9	0.00%
61702 LASKIN 7	62451 LAKELND7	64.6	64.6	0.00%	64.6	64.6	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.8	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.8	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	140.1	139.9	-0.10%	140.1	139.8	-0.20%	140.1	139.9	-0.10%	140.1	140	0.00%	140.1	139.8	-0.20%	140.1	139.9	-0.10%	140.1	140.8	0.50%
61626 BOSWELL4	61625 BLCKBRY4	136.3	136.1	-0.10%	136.3	136	-0.20%	136.3	136.2	-0.10%	136.3	136.3	0.00%	136.3	136.1	-0.20%	136.3	136.2	-0.10%	136.3	137	0.50%
61626 BOSWELL4	61627 SHANNON4	86.5	86.9	0.50%	86.5	87.1	0.70%	86.5	86.8	0.30%	86.5	86.7	0.10%	86.5	87.1	0.60%	86.5	86.9	0.40%	86.5	85.1	-1.70%
61615 ARROWHD4	61614 98L TAP4	58.4	57.3	-1.80%	58.4	57.2	-1.90%	58.4	57	-2.30%	58.4	58.1	-0.40%	58.4	57.2	-2.10%	58.4	56.8	-2.70%	58.4	61	4.60%
61615 ARROWHD4	61554 AWHD1JCT	155.4	155.2	-0.10%	155.4	155.2	-0.20%	155.4	155.1	-0.20%	155.4	155.3	-0.10%	155.4	155.2	-0.10%	155.4	155.1	-0.20%	155.4	156	0.40%
61615 ARROWHD4	61556 AWHD2JCT	160.8	160.7	-0.10%	160.8	160.6	-0.20%	160.8	160.5	-0.20%	160.8	160.7	-0.10%	160.8	160.6	-0.10%	160.8	160.5	-0.20%	160.8	161.5	0.40%
61615 ARROWHD4	61624 FORBES 4	-110.7	-111	0.30%	-110.7	-110.5	-0.10%	-110.7	-111.8	1.10%	-110.7	-110.5	-0.10%	-110.7	-110.9	0.20%	-110.7	-112	1.20%	-110.7	-110.3	-0.30%
61615 ARROWHD4	63055 BEARCK 4	52	52.7	1.30%	52	53.9	3.70%	52	51.5	-1.10%	52	52.8	1.50%	52	53.2	2.30%	52	51.5	-0.90%	52	50.6	-2.70%
SUBTOTALS FOR: MP_EXPORT		776	774.9	-0.10%	776	776.4	0.00%	776	772.3	-0.50%	776	776.4	0.10%	776	775.3	-0.10%	776	772	-0.50%	776	778.8	0.40%
		Difference =	-1.1	**-1.40%**	Difference =	0.4	**0.40%**	Difference =	-3.7	**-4.90%**	Difference =	0.5	**0.90%**	Difference =	-0.7	**-0.70%**	Difference =	-4	**-4.00%**	Difference =	2.8	**2.80%**
60105 PR ISLD3	61950 BYRON 3	-182.5	-164.1	-10.10%	-182.5	-192.9	5.70%	-182.5	-171.8	-5.90%	-182.5	-185.4	1.60%	-182.5	-173.4	-5.00%	-182.5	-168.8	-7.50%	-182.5	-185	1.40%
60304 EAU CL 3	92494 ARP 345	102.5	100.9	-1.60%	102.5	98.2	-4.30%	102.5	108.7	6.10%	102.5	100.7	-1.80%	102.5	100.1	-2.30%	102.5	108.9	6.30%	102.5	101.1	-1.40%
SUBTOTALS FOR: MWSI		-80	-63.3	-20.90%	-80	-94.7	18.40%	-80	-63.1	-21.20%	-80	-84.7	5.90%	-80	-73.3	-8.40%	-80	-59.9	-25.20%	-80	-83.9	4.80%
		Difference =	16.7	[redacted]	Difference =	-14.7	**-14.70%**	Difference =	16.9	[redacted]	Difference =	-4.7	**-9.40%**	Difference =	6.7	[redacted]	Difference =	20.1	[redacted]	Difference =	-3.9	**-3.90%**
66756 SQBUTTE4	63049 STANTON4	-40.9	-39.6	-3.20%	-40.9	-39.2	-4.20%	-40.9	-39.8	-2.70%	-40.9	-40.3	-1.50%	-40.9	-39.3	-4.10%	-40.9	-39.4	-3.70%	-40.9	-42	2.60%
66756 SQBUTTE4	66751 CENTER 4	-39.4	-39.9	1.30%	-39.4	-40.3	2.10%	-39.4	-38.8	-1.50%	-39.4	-39.7	0.80%	-39.4	-40	1.60%	-39.4	-38.9	-1.40%	-39.4	-40.7	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.6	91.8	-0.90%	92.6	91.7	-0.90%	92.6	90.9	-1.80%	92.6	92.3	-0.30%	92.6	91.5	-1.10%	92.6	90.5	-2.20%	92.6	94.9	2.50%
63041 COAL CR4	63042 COAL TP4	-22.9	-23	0.30%	-22.9	-23	0.60%	-22.9	-22.9	-0.20%	-22.9	-23	0.20%	-22.9	-23	0.40%	-22.9	-22.9	-0.20%	-22.9	-23	0.50%
63041 COAL CR4	63049 STANTON4	-122.9	-123.5	0.50%	-122.9	-123.9	0.80%	-122.9	-122.8	-0.10%	-122.9	-123.3	0.30%	-122.9	-123.7	0.60%	-122.9	-122.8	-0.10%	-122.9	-123.5	0.40%
63041 COAL CR4	63381 UNDERWD4	142	142.6	0.50%	142	143	0.80%	142	141.8	-0.10%	142	142.3	0.30%	142	142.8	0.60%	142	141.8	-0.10%	142	142.6	0.40%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	129.1	130.5	1.10%	129.1	130.3	0.90%	129.1	133.2	3.20%	129.1	129.5	0.30%	129.1	130.8	1.30%	129.1	133.4	3.30%	129.1	127	-1.70%
67105 LELANDO3	67160 GROTON 3	257.6	256.7	-0.30%	257.6	256.4	-0.40%	257.6	256.4	-0.50%	257.6	257.3	-0.10%	257.6	256.6	-0.40%	257.6	257.5	0.00%	257.6	255	-1.00%
67101 ANTELOP3	67120 BRDLAND3	194.2	194.1	0.00%	194.2	193.8	-0.20%	194.2	194.8	0.40%	194.2	194.1	0.00%	194.2	194.1	0.00%	194.2	195.5	0.70%	194.2	191.8	-1.20%
63314 BIGSTN3	66503 BLAIR 4	-75.3	-55.7	-26.00%	-75.3	-50.5	-33.00%	-75.3	-53.1	-29.40%	-75.3	-62.6	-16.90%	-75.3	-49.6	-34.10%	-75.3	-44.3	-41.20%	-75.3	-56.6	-24.90%
66554 MORRIS 4	66550 GRANITF4	-5.5	-0.6	-89.20%	-5.5	1	-118.60%	-5.5	-0.8	-84.80%	-5.5	-0.9	-83.30%	-5.5	1.2	-121.70%	-5.5	1	-119.20%	-5.5	-8.8	61.20%
63336 AUDUBON4	63053 HUBBARD4	106.2	109.1	2.80%	106.2	110.2	3.80%	106.2	107.6	1.40%	106.2	107.8	1.60%	106.2	109.9	3.50%	106.2	108.1	1.80%	106.2	102.6	-3.40%
66521 SULLYBT4	66519 OAHE 4	-72.6	-71.7	-1.20%	-72.6	-71.8	-1.00%	-72.6	-69.7	-4.00%	-72.6	-72.3	-0.40%	-72.6	-71.5	-1.50%	-72.6	-69.6	-4.10%	-72.6	-74.5	2.60%
63052 INMAN 4	61611 WINGRIV4	84.6	89.2	5.50%	84.6	90.9	7.50%	84.6	87.7	3.70%	84.6	87.2	3.10%	84.6	90.5	7.10%	84.6	88.5	4.60%	84.6	64.8	-23.30%
66470 BISON 4	66497 MAURINE4	-2.4	-1.9	-21.70%	-2.4	-1.9	-19.40%	-2.4	0.2	-109.50%	-2.4	-2.3	-5.90%	-2.4	-1.8	-26.40%	-2.4	-0.8	-66.10%	-2.4	-3.2	32.30%
66716 LAPORTE7	61640 BADQURA7	-2.1	-1.4	-31.00%	-2.1	-1.2	-44.70%	-2.1	-1.8	-11.70%	-2.1	-1.7	-18.40%	-2.1	-1.2	-40.10%	-2.1	-1.7	-16.00%	-2.1	-1.9	-9.90%
63222 ALEXAND7	60144 DGLASCO7	28.5	29.7	4.20%	28.5	30.1	5.70%	28.5	29.3	2.80%	28.5	29.3	2.90%	28.5	30	5.40%	28.5	29.5	3.60%	28.5	21.5	-24.50%
67327 ELLENDL7	67401 ABDNJCT7	-8.1	-7.5	-7.30%	-8.1	-7.5	-7.80%	-8.1	-7	-13.30%	-8.1	-7.8	-3.80%	-8.1	-7.3	-9.60%	-8.1	-6.5	-19.70%	-8.1	-9.6	18.30%
66432 EDGELEY7	66534 ORDWAY 7	-19.4	-19.4	-0.10%	-19.4	-19.5	0.40%	-19.4	-19	-2.10%	-19.4	-19.4	-0.10%	-19.4	-19.4	-0.30%	-19.4	-18.6	-4.10%	-19.4	-21	8.20%
66438 FORMAN 7	66522 SUMMIT-7	-24	-23.5	-1.80%	-24	-23.5	-1.90%	-24	-23.2	-3.30%	-24	-23.7	-1.10%	-24	-23.4	-2.50%	-24	-22.3	-7.00%	-24	-25.6	6.80%
63311 CANBY 4	66550 GRANITF4	48.6	59.3	22.00%	48.6	62.8	29.00%	48.6	59	21.40%	48.6	57	17.20%	48.6	62.9	29.30%	48.6	62.6	28.70%	48.6	59.1	21.60%
62006 KERKHO 7	62005 KERKHOT7	5.9	6.6	13.20%	5.9	6.9	17.80%	5.9	6.6	11.80%	5.9	7	19.90%	5.9	7	18.50%	5.9	6.8	16.50%	5.9	3.3	-43.80%
66752 DRAYTON4	67557 LETELER4	-248.6	-245.7	-1.20%	-248.6	-244.5	-1.70%	-248.6	-247.3	-0.60%	-248.6	-247.2	-0.60%	-248.6	-244.9	-1.50%	-248.6	-246.9	-0.70%	-248.6	-251.5	1.10%
63379 RUGBY 4	67523 GLENBOR4	34.8	36.9	6.00%	34.8	37.9	9.00%	34.8	35	0.60%	34.8	35.8	3.10%	34.8	37.4	7.60%	34.8	35.2	1.10%	34.8	34.7	-0.10%
63361 BIGSTN3	63057 WLLMAR3	199.6	221.2	10.80%	199.6	229.2	14.80%	199.6	217.9	9.20%	199.6	214.1	7.30%	199.6	228.3	14.40%	199.6	223.3	11.90%	199.6	217.2	8.80%
SUBTOTALS FOR: NDEX		631	705.9	11.90%	631	729.3	15.60%	631	705.8	11.90%	631	681.3	8.00%	631	729.6	15.60%	631	730.8	15.80%	631	624.5	-1.00%
		Difference =	75	[redacted]	Difference =	98.4	[redacted]	Difference =	74.8	[redacted]	Difference =	50.3	[redacted]	Difference =	98.6	[redacted]	Difference =	99.8	[redacted]	Difference =	-6.5	**-6.50%**
36406 WEMPL; B	39058 PAD 345	632	632.7	0.10%	632	633.7	0.30%	632	628.8	-0.50%	632	632.8	0.10%	632	632.9	0.10%	632	628.3	-0.60%	632	633.2	0.20%
SUBTOTALS FOR: NI_WUMS		632	632.7	0.10%	632	633.7	0.30%	632	628.8	-0.50%	632	632.8	0.10%	632	632.9	0.10%	632	628.3	-0.60%	632	633.2	0.20%
		Difference =	0.7	**0.90%**	Difference =	1.7	**1.70%**	Difference =	-3.2	**-4.30%**	Difference =	0.7	**1.50%**	Difference =	0.8	**0.80%**	Difference =	-3.7	**-3.70%**	Difference =	1.2	**1.20%**
60105 PR ISLD3	61950 BYRON 3	-182.5	-164.1	-10.10%	-182.5	-192.9	5.70%	-182.5	-171.8	-5.90%	-182.5	-185.4	1.60%	-182.5	-173.4	-5.00%	-182.5	-168.8	-7.50%	-182.5	-185	1.40%
SUBTOTALS FOR: PRI-BYN		-182.5	-164.1	-10.10%	-182.5	-192.9	5.70%	-182.5	-171.8	-5.90%	-182.5	-185.4	1.60%	-182.5	-173.4	-5.00%	-182.5	-168.8	-7.50%	-182.5	-185	1.40%
		Difference =	18.4	[redacted]	Difference =	-10.3	**-10.30%**	Difference =	10.7	[redacted]	Difference =	-2.9	**-5.80%**	Difference =	9.1	[redacted]	Difference =	13.7	[redacted]	Difference =	-2.5	**-2.50%**
36382 QUAD ;	34036 ROCK CK3	507.5	508.7	0.20%	507.5	508.3	0.20%	507.5	505.9	-0.30%	507.5	508	0.10%	507.5	508.8	0.20%	507.5	506.4	-0.20%	507.5	508	0.10%
SUBTOTALS FOR: QUAD-ROCKC		507.5	508.7	0.20%	507.5	508.3	0.20%	507.5	505.9	-0.30%	507.5	508	0.10%	507.5	508.8	0.20%	507.5	506.4	-0.20%	507.5	508	0.10%
		Difference =	1.2	**1.60%**	Difference =	0.8	**0.80%**	Difference =	-1.6	**-2.20%**	Difference =	0.5	**0.90%**	Difference =	1.2	**1.20%**	Difference =	-1.1	**-1.10%**	Difference =	0.5	**0.50%**
36382 QUAD ;	64405 SUB 91 3	554.4	554.7	0.10%	554.4	554.2	0.00%	554.4	554.8	0.10%	554.4	554.5	0.00%	554.4	554.4	0.00%	554.4	556.8	0.40%	554.4	554.6	0.00%
64400 MECCORD3	64403 E MOLIN3	275.2	275.4	0.10%	275.2	275	-0.10%	275.2	275.8	0.20%	275.2	275.3	0.00%	275.2	275.1	0.00%	275.2	277.3	0.70%	275.2	275.3	0.00%

Distribution Factor Analysis

Transmission Alternative 3b

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W		829.6	830.1	0.10%	829.6	829.1	-0.10%	829.6	830.6	0.10%	829.6	829.8	0.00%	829.6	829.5	0.00%	829.6	834.1	0.50%	829.6	829.9	0.00%
		Difference =	0.5	**0.70%**	Difference =	-0.4	**-0.40%**	Difference =	1	**1.30%**	Difference =	0.2	**0.30%**	Difference =	-0.1	**-0.10%**	Difference =	4.5	**4.50%**	Difference =	0.3	**0.30%**
64831 GENTLMN3	64943 REDWILO3	275.9	276.6	0.30%	275.9	276.6	0.20%	275.9	272.9	-1.10%	275.9	275.9	0.00%	275.9	276.7	0.30%	275.9	276.8	0.30%	275.9	275.4	-0.20%
SUBTOTALS FOR: WNE_WKS		275.9	276.6	0.30%	275.9	276.6	0.20%	275.9	272.9	-1.10%	275.9	275.9	0.00%	275.9	276.7	0.30%	275.9	276.8	0.30%	275.9	275.4	-0.20%
		Difference =	0.7	**0.90%**	Difference =	0.6	**0.60%**	Difference =	-3	**-4.00%**	Difference =	0	**-0.10%**	Difference =	0.8	**0.80%**	Difference =	0.8	**0.80%**	Difference =	-0.5	**-0.50%**
66756 SQBUTTE4	63049 STANTON4	-40.9	-39.6	-3.20%	-40.9	-39.2	-4.20%	-40.9	-39.8	-2.70%	-40.9	-40.3	-1.50%	-40.9	-39.3	-4.10%	-40.9	-39.4	-3.70%	-40.9	-42	2.60%
66756 SQBUTTE4	66751 CENTER 4	-39.4	-39.9	1.30%	-39.4	-40.3	2.10%	-39.4	-38.8	-1.50%	-39.4	-39.7	0.80%	-39.4	-40	1.60%	-39.4	-38.9	-1.40%	-39.4	-40.7	3.20%
66756 SQBUTTE4	66791 CENTER 3	92.6	91.8	-0.90%	92.6	91.7	-0.90%	92.6	90.9	-1.80%	92.6	92.3	-0.30%	92.6	91.5	-1.10%	92.6	90.5	-2.20%	92.6	94.9	2.50%
SUBTOTALS FOR: Y2DC		*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*	*12.2*	*12.2*	*0.00%*
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	327.6	329.2	0.50%	327.6	323.2	-1.30%	327.6	333.8	1.90%	327.6	325.7	-0.60%	327.6	327.1	-0.10%	327.6	334.4	2.10%	327.6	326.1	-0.40%
60105 PR ISLD3	61950 BYRON 3	-182.5	-164.1	-10.10%	-182.5	-192.9	5.70%	-182.5	-171.8	-5.90%	-182.5	-185.4	1.60%	-182.5	-173.4	-5.00%	-182.5	-168.8	-7.50%	-182.5	-185	1.40%
60192 BLUE LK3	60050 WLMRTHTP	-460.1	-462.5	0.50%	-460.1	-471.7	2.50%	-460.1	-452.7	-1.60%	-460.1	-462.4	0.50%	-460.1	-453.5	-1.40%	-460.1	-449.1	-2.40%	-460.1	-462.9	0.60%
60187 AS KING7	60325 WILOWRV7	129.9	130.4	0.40%	129.9	129.3	-0.40%	129.9	130.6	0.60%	129.9	129.6	-0.20%	129.9	130	0.10%	129.9	130.7	0.70%	129.9	129.8	-0.10%
60238 REDROCK7	68966 GLENMONT	51.9	52.5	1.20%	51.9	50.7	-2.20%	51.9	52.7	1.60%	51.9	51.6	-0.60%	51.9	51.8	-0.10%	51.9	52.8	1.80%	51.9	51.9	0.00%
62234 LKMARN 7	60276 AIRLAKE7	53.6	53.3	-0.60%	53.6	54.4	1.50%	53.6	53.4	-0.40%	53.6	53.6	0.10%	53.6	39	-27.20%	53.6	53.3	-0.60%	53.6	53.7	0.20%
SUBTOTALS FOR: MNEX (INFO)		-79.7	-61.4	-23.00%	-79.7	-107	34.30%	-79.7	-54	-32.20%	-79.7	-87.3	9.50%	-79.7	-78.9	-1.00%	-79.7	-46.7	-41.40%	-79.7	-86.4	8.40%
		Difference =	18.3	**24.10%**	Difference =	-27.3	**-27.30%**	Difference =	25.7	**34.20%**	Difference =	-7.6	**-15.20%**	Difference =	0.8	**0.80%**	Difference =	33	**33.00%**	Difference =	-6.7	**-6.70%**

Distribution Factor Analysis

Transmission Alternative 4

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definition			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	381.2	390.4	2.40%	381.2	389.9	2.30%	381.2	375	-1.60%	381.2	384.5	0.90%	381.2	390	2.30%	381.2	374.5	-1.80%	381.2	384.9	1.00%
SUBTOTALS FOR: ARN-HAZLTN		381.2	390.4	2.40%	381.2	389.9	2.30%	381.2	375	-1.60%	381.2	384.5	0.90%	381.2	390	2.30%	381.2	374.5	-1.80%	381.2	384.9	1.00%
		Difference =	9.2		Difference =	8.7		Difference =	-6.2	**-8.30%**	Difference =	3.2		Difference =	8.8		Difference =	-6.7	**-6.70%**	Difference =	3.7	**3.70%**
64786 COOPER 3	59199 ST JOE 3	53.1	54.1	1.90%	53.1	53.9	1.40%	53.1	47.7	-10.30%	53.1	52.7	-0.80%	53.1	54.1	1.80%	53.1	54	1.60%	53.1	52.2	-1.70%
64786 COOPER 3	96039 7FAIRPT	62.5	63.3	1.20%	62.5	63.1	1.00%	62.5	58.4	-6.60%	62.5	62.2	-0.40%	62.5	63.2	1.20%	62.5	64	2.40%	62.5	61.9	-1.00%
SUBTOTALS FOR: COOPER_S		115.6	117.4	1.60%	115.6	117	1.20%	115.6	106	-8.30%	115.6	114.9	-0.60%	115.6	117.3	1.50%	115.6	118	2.00%	115.6	114.1	-1.30%
		Difference =	1.8	**2.40%**	Difference =	1.4	**1.40%**	Difference =	-9.6	**-12.80%**	Difference =	-0.7	**-1.40%**	Difference =	1.7	**1.70%**	Difference =	2.3	**2.30%**	Difference =	-1.5	**-1.50%**
60304 EAU CL 3	92494 ARP 345	95.2	91.5	-3.90%	95.2	87.8	-7.80%	95.2	99.7	4.70%	95.2	92.4	-3.00%	95.2	90.1	-5.40%	95.2	99.3	4.30%	95.2	92.3	-3.10%
SUBTOTALS FOR: ECL-ARP		95.2	91.5	-3.90%	95.2	87.8	-7.80%	95.2	99.7	4.70%	95.2	92.4	-3.00%	95.2	90.1	-5.40%	95.2	99.3	4.30%	95.2	92.3	-3.10%
		Difference =	-3.7	**-4.90%**	Difference =	-7.4	**-7.40%**	Difference =	4.4		Difference =	-2.9	**-5.70%**	Difference =	-5.2	**-5.20%**	Difference =	4.1	**4.10%**	Difference =	-3	**-3.00%**
65351 S3451 3	65354 S3454 3	80.2	81	1.00%	80.2	80.7	0.60%	80.2	87.3	8.90%	80.2	80.1	-0.20%	80.2	80.7	0.60%	80.2	82	2.20%	80.2	80.2	0.00%
65351 S3451 3	65359 S3459 3	27.8	29.6	6.60%	27.8	29.3	5.40%	27.8	35.3	27.30%	27.8	27.8	0.20%	27.8	29.3	5.40%	27.8	32.2	15.90%	27.8	27.9	0.30%
65451 S1251 5	65497 S1297 5	39.2	39.6	0.90%	39.2	39.5	0.70%	39.2	40.5	3.30%	39.2	39.2	0.00%	39.2	39.5	0.70%	39.2	40.2	2.60%	39.2	39.2	0.00%
SUBTOTALS FOR: FT CAL_S		147.2	150.2	2.00%	147.2	149.5	1.50%	147.2	163.2	10.90%	147.2	147.1	-0.10%	147.2	149.5	1.50%	147.2	154.4	4.90%	147.2	147.3	0.10%
		Difference =	3	**3.90%**	Difference =	2.3	**2.30%**	Difference =	16		Difference =	-0.1	**-0.20%**	Difference =	2.3	**2.30%**	Difference =	7.2		Difference =	0.1	**0.10%**
64832 GENTLMN4	64909 N.PLATT4	157.5	157.5	0.00%	157.5	157.5	0.00%	157.5	156	-0.90%	157.5	157.5	0.00%	157.5	157.5	0.00%	157.5	157.5	0.00%	157.5	157.5	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	156.5	-0.90%	157.9	158	0.00%	157.9	157.9	0.00%	157.9	158	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.5	162.5	0.00%	162.5	162.5	0.00%	162.5	161	-0.90%	162.5	162.5	0.00%	162.5	162.5	0.00%	162.5	162.5	0.00%	162.5	162.5	0.00%
64831 GENTLMN3	64984 SWEET W3	274.1	274.2	0.00%	274.1	274.2	0.00%	274.1	268.9	-1.90%	274.1	274.2	0.00%	274.1	274.2	0.00%	274.1	274.5	0.20%	274.1	274.1	0.00%
64831 GENTLMN3	64984 SWEET W3	328.5	328.6	0.00%	328.5	328.6	0.00%	328.5	322.2	-1.90%	328.5	328.6	0.00%	328.5	328.6	0.00%	328.5	329	0.20%	328.5	328.5	0.00%
64831 GENTLMN3	64943 REDWILO3	277.1	277.9	0.30%	277.1	277.9	0.30%	277.1	274.1	-1.10%	277.1	277	0.00%	277.1	278	0.30%	277.1	278.1	0.40%	277.1	276.7	-0.10%
SUBTOTALS FOR: GGS		1357.5	1358.5	0.10%	1357.5	1358.5	0.10%	1357.5	1338.7	-1.40%	1357.5	1357.8	0.00%	1357.5	1358.7	0.10%	1357.5	1359.6	0.20%	1357.5	1357.2	0.00%
		Difference =	1	**1.30%**	Difference =	1	**1.00%**	Difference =	-18.9	**-25.10%**	Difference =	0.2	**0.50%**	Difference =	1.1	**1.10%**	Difference =	2.1	**2.10%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	56.2	57.3	1.90%	56.2	57.4	2.00%	56.2	54.6	-3.00%	56.2	56.6	0.60%	56.2	57.5	2.20%	56.2	58.6	4.30%	56.2	56.2	-0.10%
64839 GR ISLD4	64780 COLMB.W4	100.8	100.4	-0.40%	100.8	100.5	-0.30%	100.8	96.8	-4.00%	100.8	100.8	0.00%	100.8	100.5	-0.30%	100.8	100.4	-0.30%	100.8	100.7	-0.10%
66571 GR ISLD3	64896 MCCOOL 3	146.6	149.2	1.70%	146.6	149.2	1.80%	146.6	148.1	1.00%	146.6	147.3	0.40%	146.6	149.5	1.90%	146.6	151.9	3.60%	146.6	146.5	-0.10%
SUBTOTALS FOR: GRIS_LNC		303.7	306.9	1.10%	303.7	307.1	1.10%	303.7	299.4	-1.40%	303.7	304.7	0.30%	303.7	307.5	1.30%	303.7	311	2.40%	303.7	303.4	-0.10%
		Difference =	3.2	**4.30%**	Difference =	3.4	**3.40%**	Difference =	-4.2	**-5.60%**	Difference =	1	**2.00%**	Difference =	3.8	**3.80%**	Difference =	7.3		Difference =	-0.3	**-0.30%**
57981 LACYGNE7	57965 W.GRDNR7	578.1	578	0.00%	578.1	578.1	0.00%	578.1	579.1	0.20%	578.1	578.3	0.00%	578.1	578	0.00%	578.1	579.2	0.20%	578.1	578.5	0.10%
57981 LACYGNE7	57968 STILWEL7	720.7	720.8	0.00%	720.7	720.9	0.00%	720.7	721.2	0.10%	720.7	721	0.00%	720.7	720.8	0.00%	720.7	721.5	0.10%	720.7	721.1	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.8	1298.7	0.00%	1298.8	1299	0.00%	1298.8	1300.3	0.10%	1298.8	1299.3	0.00%	1298.8	1298.8	0.00%	1298.8	1300.7	0.10%	1298.8	1299.7	0.10%
		Difference =	0	**-0.10%**	Difference =	0.2	**0.20%**	Difference =	1.5	**2.00%**	Difference =	0.5	**1.00%**	Difference =	0	**0.00%**	Difference =	1.9	**1.90%**	Difference =	0.9	**0.90%**
62234 LKMARN 7	60276 AIRLAKE7	53.5	53.3	-0.30%	53.5	54.5	1.80%	53.5	53.4	-0.20%	53.5	53.6	0.20%	53.5	39.1	-26.90%	53.5	53.3	-0.30%	53.5	53.7	0.40%
SUBTOTALS FOR: LKM-WFB		53.5	53.3	-0.30%	53.5	54.5	1.80%	53.5	53.4	-0.20%	53.5	53.6	0.20%	53.5	39.1	-26.90%	53.5	53.3	-0.30%	53.5	53.7	0.40%
		Difference =	-0.2	**-0.20%**	Difference =	1	**1.00%**	Difference =	-0.1	**-0.10%**	Difference =	0.1	**0.20%**	Difference =	-14.4	**-14.40%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-144.3	-144.7	0.30%	-144.3	-144.9	0.50%	-144.3	-144.5	0.10%	-144.3	-144.5	0.20%	-144.3	-144.9	0.40%	-144.3	-144.6	0.20%	-144.3	-144.4	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1141.3	-1148.2	0.60%	-1141.3	-1151.3	0.90%	-1141.3	-1144.4	0.30%	-1141.3	1144.6	0.30%	-1141.3	-1150.2	0.80%	-1141.3	1145.4	0.40%	1141.3	-1139.7	-0.10%
66752 DRAYTON4	67557 LETELER4	-232.1	-228	-1.80%	-232.1	-226.4	-2.50%	-232.1	-230	-0.90%	-232.1	-230.2	-0.80%	-232.1	-227	-2.20%	-232.1	-229.4	-1.20%	-232.1	-234.1	0.90%
63379 RUGBY 4	67523 GLENBOR4	42.6	45.9	7.60%	42.6	47.3	11.10%	42.6	43.6	2.30%	42.6	44.2	3.70%	42.6	46.7	9.70%	42.6	44.2	3.70%	42.6	43.4	1.80%
SUBTOTALS FOR: MHEX_N		-1475	-1475.2	0.00%	-1475	-1475.3	0.00%	-1475	-1475.2	0.00%	-1475	1475.1	0.00%	-1475	-1475.3	0.00%	-1475	1475.1	0.00%	1475	-1474.8	0.00%
		Difference =	-0.1	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	146.7	147.2	0.30%	146.7	147.4	0.50%	146.7	146.9	0.10%	146.7	147	0.20%	146.7	147.4	0.40%	146.7	147	0.20%	146.7	146.9	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1158.1	1165.3	0.60%	1158.1	1168.5	0.90%	1158.1	1161.3	0.30%	1158.1	1161.6	0.30%	1158.1	1167.3	0.80%	1158.1	1162.4	0.40%	1158.1	1156.5	-0.10%
67557 LETELER4	66752 DRAYTON4	236.4	232.2	-1.80%	236.4	230.4	-2.50%	236.4	234.2	-0.90%	236.4	234.4	-0.80%	236.4	231	-2.30%	236.4	233.5	-1.20%	236.4	238.5	0.90%
67523 GLENBOR4	63379 RUGBY 4	-42.2	-45.4	7.50%	-42.2	-46.9	11.00%	-42.2	-43.2	2.30%	-42.2	-43.8	3.70%	-42.2	-46.3	9.60%	-42.2	-43.8	3.70%	-42.2	-43	1.80%
SUBTOTALS FOR: MHEX_S		1499	1499.3	0.00%	1499	1499.4	0.00%	1499	1499.2	0.00%	1499	1499.2	0.00%	1499	1499.4	0.00%	1499	1499.1	0.00%	1499	1498.8	0.00%
		Difference =	0.3	**0.40%**	Difference =	0.4	**0.40%**	Difference =	0.2	**0.30%**	Difference =	0.2	**0.30%**	Difference =	0.4	**0.40%**	Difference =	0.1	**0.10%**	Difference =	-0.2	**-0.20%**
68613 AUBURNT4	67525 RESTON 4	42.2	42.1	-0.30%	42.2	42	-0.50%	42.2	42.1	-0.10%	42.2	42.1	-0.20%	42.2	42	-0.40%	42.2	42.1	-0.20%	42.2	42.2	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.5	-90.4	-0.10%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.2	-1.20%	-6.3	-6.2	-1.70%	-6.3	-6.2	-0.40%	-6.3	-6.2	-0.60%	-6.3	-6.2	-1.60%	-6.3	-6.2	-0.70%	-6.3	-6.3	0.00%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42	-41.9	-0.30%	-42	-41.8	-0.50%	-42	-42	-0.10%	-42	-42	-0.20%	-42	-41.9	-0.40%	-42	-42	-0.20%	-42	-42	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.3	91.2	-0.10%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.4	-1.20%	6.5	6.4	-1.70%	6.5	6.4	-0.40%	6.5	6.4	-0.50%	6.5	6.4	-1.50%	6.5	6.4	-0.60%	6.5	6.5	0.00%
SUBTOTALS FOR: MH_SPC_W		55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 4

2009 Summer Peak Case

Generation to Generation Dispatcl

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	12.7	7.7	-39.00%	12.7	7.8	-38.70%	12.7	16.2	27.80%	12.7	11.6	-8.60%	12.7	7.8	-38.40%	12.7	19.3	52.50%	12.7	11.7	-7.40%
SUBTOTALS FOR: MNTZUMA_W		12.7	7.7	-39.00%	12.7	7.8	-38.70%	12.7	16.2	27.80%	12.7	11.6	-8.60%	12.7	7.8	-38.40%	12.7	19.3	52.50%	12.7	11.7	-7.40%
		Difference =	-4.9	**-6.50%**	Difference =	-4.9	**-4.90%**	Difference =	3.5	**4.70%**	Difference =	-1.1	**-2.20%**	Difference =	-4.9	**-4.90%**	Difference =	6.6	[redacted]	Difference =	-0.9	**-0.90%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	0.00%
61702 LASKIN 7	62451 LAKELND7	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.7	-74.7	-0.10%	-74.7	-74.7	0.00%	-74.7	-74.6	-0.10%	-74.7	-74.7	0.00%	-74.7	-74.7	0.00%	-74.7	-74.6	-0.10%	-74.7	-74.8	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.2	138.9	-0.20%	139.2	138.8	-0.30%	139.2	139.1	-0.10%	139.2	139.1	-0.10%	139.2	138.9	-0.20%	139.2	139	-0.10%	139.2	139.9	0.50%
61626 BOSWELL4	*61625 BLCKBRY4*	*135.5*	*135.2*	*-0.20%*	*135.5*	*135.1*	*-0.30%*	*135.5*	*135.4*	*-0.10%*	*135.5*	*135.4*	*-0.10%*	*135.5*	*135.2*	*-0.20%*	*135.5*	*135.3*	*-0.10%*	*135.5*	*136.2*	*0.50%*
61626 BOSWELL4	61627 SHANNON4	88.2	88.7	0.60%	88.2	89	0.90%	88.2	88.5	0.30%	88.2	88.4	0.20%	88.2	88.9	0.70%	88.2	88.6	0.40%	88.2	86.8	-1.60%
61615 ARROWHD4	61614 98L TAP4	54.6	53.5	-2.10%	54.6	53.3	-2.40%	54.6	53.3	-2.50%	54.6	54.4	-0.50%	54.6	53.3	-2.50%	54.6	53.1	-2.80%	54.6	57.3	4.90%
61615 ARROWHD4	61554 AWHD1JCT	154.7	154.6	-0.10%	154.7	154.5	-0.10%	154.7	154.4	-0.20%	154.7	154.6	0.00%	154.7	154.5	-0.10%	154.7	154.4	-0.20%	154.7	155.4	0.40%
61615 ARROWHD4	61556 AWHD2JCT	160.1	159.9	-0.10%	160.1	159.9	-0.10%	160.1	159.8	-0.20%	160.1	160	0.00%	160.1	159.9	-0.10%	160.1	159.8	-0.20%	160.1	160.8	0.40%
61615 ARROWHD4	61624 FORBES 4	-111.2	-111.4	0.20%	-111.2	-110.9	-0.30%	-111.2	-112.3	0.90%	-111.2	-111	-0.20%	-111.2	-111.3	0.10%	-111.2	-112.3	1.00%	-111.2	-110.8	-0.40%
61615 ARROWHD4	63055 BEARCK 4	56.8	58.1	2.30%	56.8	59.6	5.00%	56.8	56.8	-0.10%	56.8	57.8	1.80%	56.8	58.8	3.60%	56.8	56.9	0.20%	56.8	55.8	-1.80%
SUBTOTALS FOR: MP_EXPORT		775	774.6	0.00%	775	776.4	0.20%	775	772	-0.40%	775	775.8	0.10%	775	775.2	0.00%	775	771.9	-0.40%	775	778.4	0.40%
		Difference =	-0.3	**-0.40%**	Difference =	1.4	**1.40%**	Difference =	-3	**-4.00%**	Difference =	0.9	**1.70%**	Difference =	0.3	**0.30%**	Difference =	-3.1	**-3.10%**	Difference =	3.5	**3.50%**
60105 PR ISLD3	61950 BYRON 3	-198.1	-184	-7.10%	-198.1	-214.4	8.20%	-198.1	-190.9	-3.70%	-198.1	-202.9	2.40%	-198.1	-194.6	-1.80%	-198.1	-189.2	-4.50%	-198.1	-203.6	2.80%
60304 EAU CL 3	92494 ARP 345	95.2	91.5	-3.90%	95.2	87.8	-7.80%	95.2	99.7	4.70%	95.2	92.4	-3.00%	95.2	90.1	-5.40%	95.2	99.3	4.30%	95.2	92.3	-3.10%
SUBTOTALS FOR: MWSI		-102.9	-92.5	-10.10%	-102.9	-126.5	23.00%	-102.9	-91.2	-11.40%	-102.9	-110.5	7.40%	-102.9	-104.5	1.60%	-102.9	-89.8	-12.70%	-102.9	-111.3	8.20%
		Difference =	10.4	[redacted]	Difference =	-23.7	**-23.70%**	Difference =	11.7	[redacted]	Difference =	-7.6	**-15.30%**	Difference =	-1.7	**-1.70%**	Difference =	13.1	[redacted]	Difference =	-8.5	**-8.50%**
66756 SQBUTTE4	63049 STANTON4	-34.1	-32.3	-5.30%	-34.1	-31.7	-7.20%	-34.1	-32.8	-3.90%	-34.1	-33.2	-2.70%	-34.1	-31.8	-6.80%	-34.1	-32	-6.20%	-34.1	-34.8	1.80%
66756 SQBUTTE4	66751 CENTER 4	-40.7	-41.5	2.00%	-40.7	-41.9	3.20%	-40.7	-40.4	-0.70%	-40.7	-41.1	1.10%	-40.7	-41.7	2.60%	-40.7	-40.9	0.60%	-40.7	-42.1	3.60%
66756 SQBUTTE4	66791 CENTER 3	87	86	-1.10%	87	85.8	-1.40%	87	85.4	-1.80%	87	86.6	-0.50%	87	85.7	-1.50%	87	85.1	-2.10%	87	89.1	2.40%
63041 COAL CR4	63042 COAL TP4	-23.1	-23.3	0.60%	-23.1	-23.4	0.90%	-23.1	-23.1	0.00%	-23.1	-23.2	0.30%	-23.1	-23.3	0.80%	-23.1	-23.2	0.10%	-23.1	-23.3	0.70%
63041 COAL CR4	63049 STANTON4	-125	-126	0.80%	-125	-126.5	1.20%	-125	-125.1	0.10%	-125	-125.5	0.40%	-125	-126.3	1.00%	-125	-125.3	0.30%	-125	-125.8	0.70%
63041 COAL CR4	63381 UNDERWD4	144.2	145.4	0.80%	144.2	145.9	1.20%	144.2	144.4	0.10%	144.2	144.8	0.40%	144.2	145.7	1.00%	144.2	144.6	0.30%	144.2	145.2	0.70%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	136	137.4	1.00%	136	137.3	1.00%	136	139.9	2.90%	136	136.4	0.30%	136	137.7	1.30%	136	140.2	3.10%	136	133.8	-1.50%
67105 LELANDO3	67160 GROTON 3	259.7	258.1	-0.60%	259.7	257.5	-0.80%	259.7	257.7	-0.80%	259.7	259.1	-0.20%	259.7	257.7	-0.70%	259.7	258.8	-0.30%	259.7	256.6	-1.20%
67101 ANTELOP3	67120 BRDLAND3	195.4	195.2	-0.10%	195.4	194.9	-0.20%	195.4	195.9	0.30%	195.4	195.3	0.00%	195.4	195.2	-0.10%	195.4	196.7	0.70%	195.4	193	-1.20%
63361 BIGSTN3	**66600 BLAIR 3**	-57.9	-27.5	-52.60%	-57.9	-18.7	-67.70%	-57.9	-25.2	-56.60%	-57.9	-39.2	-32.40%	-57.9	-17.9	-69.10%	-57.9	-13.2	-77.30%	-57.9	-30.9	-46.70%
66554 MORRIS 4	66550 GRANITF4	19.9	26.3	32.30%	19.9	28.4	42.80%	19.9	26.1	30.90%	19.9	26.3	32.30%	19.9	28.7	44.10%	19.9	28.5	42.90%	19.9	18.5	-7.30%
63336 AUDUBON4	63053 HUBBARD4	118.7	122.5	3.20%	118.7	124	4.50%	118.7	120.9	1.80%	118.7	120.7	1.60%	118.7	123.5	4.10%	118.7	121.3	2.20%	118.7	115.4	-2.80%
66521 SULLYBT4	66519 OAHE 4	-67.4	-66.5	-1.20%	-67.4	-66.6	-1.10%	-67.4	-64.6	-4.10%	-67.4	-67.1	-0.40%	-67.4	-66.3	-1.60%	-67.4	-64.5	-4.30%	-67.4	-69.3	2.90%
63052 INMAN 4	61611 WINGRIV4	105.6	111.6	5.70%	105.6	113.9	7.80%	105.6	109.7	3.80%	105.6	108.8	3.00%	105.6	113.3	7.30%	105.6	110.4	4.50%	105.6	86.3	-18.40%
66470 BISON 4	66497 MAURINE4	0.1	0.7	376.40%	0.1	0.7	359.00%	0.1	2.7	999.00%	0.1	0.3	106.60%	0.1	0.8	461.20%	0.1	1.7	999.00%	0.1	-0.6	-535.40%
66716 LAPORTE7	61640 BADOURA7	0.8	1.7	117.50%	0.8	2	167.00%	0.8	1.2	58.40%	0.8	1.3	64.50%	0.8	1.9	151.40%	0.8	1.3	68.80%	0.8	1.1	39.30%
63222 ALEXAND7	60144 DGLASCO7	34.5	36	4.20%	34.5	36.5	5.90%	34.5	35.5	2.90%	34.5	35.5	2.90%	34.5	36.4	5.50%	34.5	35.7	3.40%	34.5	27.6	-20.00%
67327 ELLENDL7	67401 ABDNJCT7	-3.3	-2.8	-15.80%	-3.3	-2.7	-17.50%	-3.3	-2.4	-28.30%	-3.3	-3	-10.10%	-3.3	-2.6	-21.20%	-3.3	-2.4	-28.40%	-3.3	-4.9	47.50%
66432 EDGELEY7	66534 ORDWAY 7	-17.4	-17.6	1.50%	-17.4	-17.8	2.60%	-17.4	-17.2	-0.70%	-17.4	-17.5	0.50%	-17.4	-17.7	1.80%	-17.4	-17	-2.20%	-17.4	-19.2	10.50%
66438 FORMAN 7	66522 SUMMIT-7	-19.9	-19.5	-1.90%	-19.9	-19.5	-2.10%	-19.9	-19.2	-3.50%	-19.9	-19.6	-1.50%	-19.9	-19.4	-2.60%	-19.9	-18.4	-7.60%	-19.9	-21.6	8.60%
63311 CANBY 4	66550 GRANITF4	103.7	117.7	13.40%	103.7	122.3	17.90%	103.7	116.7	12.50%	103.7	115.1	11.00%	103.7	122.3	17.90%	103.7	121.1	16.70%	103.7	117.5	13.20%
62006 KERKHO 7	62005 KERKHOT7	9.9	10.8	9.60%	9.9	11.1	12.80%	9.9	10.8	9.20%	9.9	11.3	14.90%	9.9	11.2	13.50%	9.9	11.1	12.60%	9.9	7.5	-23.70%
66752 DRAYTON4	67557 LETELER4	-236.4	-232.2	-1.80%	-236.4	-230.4	-2.50%	-236.4	-234.2	-0.90%	-236.4	-234.4	-0.80%	-236.4	-231	-2.30%	-236.4	-233.5	-1.20%	-236.4	-238.5	0.90%
63379 RUGBY 4	67523 GLENBOR4	42.6	45.9	7.60%	42.6	47.3	11.10%	42.6	43.6	2.30%	42.6	44.2	3.70%	42.6	46.7	9.70%	42.6	44.2	3.70%	42.6	43.4	1.80%
SUBTOTALS FOR: NDEX		624.6	697.6	11.70%	624.6	720.3	15.30%	624.6	697.8	11.70%	624.6	673.6	7.80%	624.6	720.6	15.40%	624.6	722	15.60%	624.6	615.6	-1.40%
		Difference =	73	[redacted]	Difference =	95.7	[redacted]	Difference =	73.2	[redacted]	Difference =	49	[redacted]	Difference =	96.1	[redacted]	Difference =	97.5	[redacted]	Difference =	-9	**-9.00%**
36406 WEMPL; B	39058 PAD 345	634.3	635.9	0.30%	634.3	637.3	0.50%	634.3	631.8	-0.40%	634.3	635.5	0.20%	634.3	636.5	0.30%	634.3	631.7	-0.40%	634.3	636.2	0.30%
SUBTOTALS FOR: NI_WUMS		634.3	635.9	0.30%	634.3	637.3	0.50%	634.3	631.8	-0.40%	634.3	635.5	0.20%	634.3	636.5	0.30%	634.3	631.7	-0.40%	634.3	636.2	0.30%
		Difference =	1.7	**2.20%**	Difference =	3	**3.00%**	Difference =	-2.4	**-3.20%**	Difference =	1.3	**2.50%**	Difference =	2.2	**2.20%**	Difference =	-2.6	**-2.60%**	Difference =	2	**2.00%**
60105 PR ISLD3	61950 BYRON 3	-198.1	-184	-7.10%	-198.1	-214.4	8.20%	-198.1	-190.9	-3.70%	-198.1	-202.9	2.40%	-198.1	-194.6	-1.80%	-198.1	-189.2	-4.50%	-198.1	-203.6	2.80%
SUBTOTALS FOR: PRI-BYN		-198.1	-184	-7.10%	-198.1	-214.4	8.20%	-198.1	-190.9	-3.70%	-198.1	-202.9	2.40%	-198.1	-194.6	-1.80%	-198.1	-189.2	-4.50%	-198.1	-203.6	2.80%
		Difference =	14.2	[redacted]	Difference =	-16.3	**-16.30%**	Difference =	7.2	[redacted]	Difference =	-4.8	**-9.50%**	Difference =	3.5	**3.50%**	Difference =	9	[redacted]	Difference =	-5.5	**-5.50%**
36382 QUAD ;	34036 ROCK CK3	509.1	511.1	0.40%	509.1	511	0.40%	509.1	508.4	-0.10%	509.1	509.9	0.20%	509.1	510.9	0.40%	509.1	508.4	-0.10%	509.1	510.2	0.20%
SUBTOTALS FOR: QUAD-ROCKC		509.1	511.1	0.40%	509.1	511	0.40%	509.1	508.4	-0.10%	509.1	509.9	0.20%	509.1	510.9	0.40%	509.1	508.4	-0.10%	509.1	510.2	0.20%
		Difference =	2	**2.70%**	Difference =	1.9	**1.90%**	Difference =	-0.7	**-1.00%**	Difference =	0.8	**1.70%**	Difference =	1.9	**1.90%**	Difference =	-0.7	**-0.70%**	Difference =	1.1	**1.10%**
36382 QUAD ;	64405 SUB 91 3	555.3	555.6	0.10%	555.3	555.1	0.00%	555.3	555.7	0.10%	555.3	555.5	0.00%	555.3	555.4	0.00%	555.3	557.7	0.40%	555.3	555.6	0.00%
64400 MECCORD3	64403 E MOLIN3	275.8	275.8	0.00%	275.8	275.4	-0.10%	275.8	276.3	0.20%	275.8	275.8	0.00%	275.8	275.6	-0.10%	275.8	277.7	0.70%	275.8	275.8	0.00%
SUBTOTALS FOR: QUADCITY_W		831.1	831.4	0.00%	831.1	830.5	-0.10%	831.1	832	0.10%	831.1	831.3	0.00%	831.1	831	0.00%	831.1	835.5	0.50%	831.1	831.4	0.00%

Distribution Factor Analysis

Transmission Alternative 4

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
		Difference =	0.3	**0.50%**	Difference =	-0.6	**-0.60%**	Difference =	0.9	**1.20%**	Difference =	0.3	**0.50%**	Difference =	-0.1	**-0.10%**	Difference =	4.4	**4.40%**	Difference =	0.3	**0.30%**
64831 GENTLMN3	64943 REDWILO3	277.1	277.9	0.30%	277.1	277.9	0.30%	277.1	274.1	-1.10%	277.1	277	0.00%	277.1	278	0.30%	277.1	278.1	0.40%	277.1	276.7	-0.10%
SUBTOTALS FOR: WNE_WKS		277.1	277.9	0.30%	277.1	277.9	0.30%	277.1	274.1	-1.10%	277.1	277	0.00%	277.1	278	0.30%	277.1	278.1	0.40%	277.1	276.7	-0.10%
		Difference =	0.8	**1.10%**	Difference =	0.8	**0.80%**	Difference =	-2.9	**-3.90%**	Difference =	0	**-0.10%**	Difference =	0.9	**0.90%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-34.1	-32.3	-5.30%	-34.1	-31.7	-7.20%	-34.1	-32.8	-3.90%	-34.1	-33.2	-2.70%	-34.1	-31.8	-6.80%	-34.1	-32	-6.20%	-34.1	-34.8	1.80%
66756 SQBUTTE4	66751 CENTER 4	-40.7	-41.5	2.00%	-40.7	-41.9	3.20%	-40.7	-40.4	-0.70%	-40.7	-41.1	1.10%	-40.7	-41.7	2.60%	-40.7	-40.9	0.60%	-40.7	-42.1	3.60%
66756 SQBUTTE4	66791 CENTER 3	87	86	-1.10%	87	85.8	-1.40%	87	85.4	-1.80%	87	86.6	-0.50%	87	85.7	-1.50%	87	85.1	-2.10%	87	89.1	2.40%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	321	320.5	-0.20%	321	313.5	-2.30%	321	325.4	1.40%	321	318.1	-0.90%	321	317.7	-1.00%	321	325.4	1.40%	321	317.9	-1.00%
60105 PR ISLD3	61950 BYRON 3	-198.1	-184	-7.10%	-198.1	-214.4	8.20%	-198.1	-190.9	-3.70%	-198.1	-202.9	2.40%	-198.1	-194.6	-1.80%	-198.1	-189.2	-4.50%	-198.1	-203.6	2.80%
60192 BLUE LK3	60050 WLMRTHTP	-485	-494.5	2.00%	-485	-506.3	4.40%	-485	-483.4	-0.30%	-485	-490	1.00%	-485	-487.5	0.50%	-485	-481.7	-0.70%	-485	-492.5	1.50%
60187 AS KING7	60325 WILOWRV7	129	129.2	0.20%	129	128	-0.80%	129	129.5	0.40%	129	128.6	-0.30%	129	128.7	-0.20%	129	129.5	0.40%	129	128.7	-0.20%
60238 REDROCK7	68966 GLENMONT	50.4	50.7	0.60%	50.4	48.8	-3.20%	50.4	50.9	1.10%	50.4	49.9	-0.90%	50.4	49.9	-1.00%	50.4	50.9	1.10%	50.4	50.1	-0.50%
62234 LKMARN 7	60276 AIRLAKE7	53.5	53.3	-0.30%	53.5	54.5	1.80%	53.5	53.4	-0.20%	53.5	53.6	0.20%	53.5	39.1	-26.90%	53.5	53.3	-0.30%	53.5	53.7	0.40%
SUBTOTALS FOR: MNEX (INFO)		-129.3	-124.8	-3.50%	-129.3	-175.9	36.00%	-129.3	-115.1	-11.00%	-129.3	-142.7	10.30%	-129.3	-146.7	13.40%	-129.3	-111.7	-13.70%	-129.3	-145.6	12.60%
		Difference =	4.5	**5.90%**	Difference =	-46.6	**-46.60%**	Difference =	14.3	**19.00%**	Difference =	-13.4	**-26.70%**	Difference =	-17.4	**-17.40%**	Difference =	17.7	**17.70%**	Difference =	-16.3	**-16.30%**

Distribution Factor Analysis

Transmission Alternative 5

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definitior			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	382.8	391.3	2.20%	382.8	390.7	2.10%	382.8	375.9	-1.80%	382.8	385.7	0.80%	382.8	390.8	2.10%	382.8	375.1	-2.00%	382.8	386	0.80%
SUBTOTALS FOR: ARN-HAZLTN		382.8	391.3	2.20%	382.8	390.7	2.10%	382.8	375.9	-1.80%	382.8	385.7	0.80%	382.8	390.8	2.10%	382.8	375.1	-2.00%	382.8	386	0.80%
		Difference =	8.6	[redacted]	Difference =	7.9	[redacted]	Difference =	-6.9	**-9.20%**	Difference =	2.9	[redacted]	Difference =	8	[redacted]	Difference =	-7.6	**-7.60%**	Difference =	3.2	**3.20%**
64786 COOPER 3	59199 ST JOE 3	54	54.9	1.80%	54	54.6	1.20%	54	48.5	-10.10%	54	53.5	-0.80%	54	54.8	1.50%	54	54.7	1.40%	54	53.1	-1.70%
64786 COOPER 3	96039 7FAIRPT	63.1	63.8	1.20%	63.1	63.6	0.80%	63.1	58.9	-6.60%	63.1	62.8	-0.40%	63.1	63.7	1.00%	63.1	64.5	2.20%	63.1	62.5	-1.00%
SUBTOTALS FOR: COOPER_S		117	118.7	1.50%	117	118.2	1.00%	117	107.4	-8.20%	117	116.4	-0.60%	117	118.5	1.20%	117	119.2	1.90%	117	115.5	-1.30%
		Difference =	1.7	**2.20%**	Difference =	1.2	**1.20%**	Difference =	-9.6	**-12.80%**	Difference =	-0.7	**-1.30%**	Difference =	1.5	**1.50%**	Difference =	2.2	**2.20%**	Difference =	-1.5	**-1.50%**
60304 EAU CL 3	92494 ARP 345	93.9	90.6	-3.50%	93.9	87.1	-7.20%	93.9	98.9	5.30%	93.9	91.2	-2.80%	93.9	89.3	-4.90%	93.9	98.7	5.20%	93.9	91.3	-2.80%
SUBTOTALS FOR: ECL-ARP		93.9	90.6	-3.50%	93.9	87.1	-7.20%	93.9	98.9	5.30%	93.9	91.2	-2.80%	93.9	89.3	-4.90%	93.9	98.7	5.20%	93.9	91.3	-2.80%
		Difference =	-3.3	**-4.30%**	Difference =	-6.7	**-6.70%**	Difference =	5	[redacted]	Difference =	-2.6	**-5.30%**	Difference =	-4.6	**-4.60%**	Difference =	4.9	**4.90%**	Difference =	-2.6	**-2.60%**
65351 S3451 3	65354 S3454 3	81.9	82.5	0.70%	81.9	82.1	0.30%	81.9	88.8	8.40%	81.9	81.7	-0.30%	81.9	82.1	0.20%	81.9	83.4	1.80%	81.9	81.8	-0.20%
65351 S3451 3	65359 S3459 3	29.6	31.2	5.20%	29.6	30.8	3.80%	29.6	36.9	24.60%	29.6	29.6	-0.30%	29.6	30.8	3.80%	29.6	33.7	13.60%	29.6	29.6	-0.30%
65451 S1251 5	65497 S1297 5	39.6	39.8	0.70%	39.6	39.8	0.50%	39.6	40.8	3.20%	39.6	39.5	0.00%	39.6	39.8	0.50%	39.6	40.5	2.40%	39.6	39.5	0.00%
SUBTOTALS FOR: FT CAL_S		151.1	153.5	1.60%	151.1	152.7	1.00%	151.1	166.6	10.20%	151.1	150.8	-0.20%	151.1	152.6	1.00%	151.1	157.6	4.30%	151.1	150.9	-0.20%
		Difference =	2.4	**3.10%**	Difference =	1.6	**1.60%**	Difference =	15.4	[redacted]	Difference =	-0.3	**-0.70%**	Difference =	1.5	**1.50%**	Difference =	6.4	[redacted]	Difference =	-0.3	**-0.30%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.5	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.9	0.00%	273.8	274	0.00%	273.8	268.6	-1.90%	273.8	273.9	0.00%	273.8	274	0.00%	273.8	274.3	0.20%	273.8	273.9	0.00%
64831 GENTLMN3	64984 SWEET W3	328.2	328.3	0.00%	328.2	328.3	0.10%	328.2	321.9	-1.90%	328.2	328.3	0.00%	328.2	328.3	0.00%	328.2	328.7	0.20%	328.2	328.2	0.00%
64831 GENTLMN3	64943 REDWILO3	276.9	277.8	0.30%	276.9	277.7	0.30%	276.9	274	-1.00%	276.9	276.9	0.00%	276.9	277.9	0.30%	276.9	278	0.40%	276.9	276.6	-0.10%
SUBTOTALS FOR: GGS		1356.6	1357.7	0.10%	1356.6	1357.7	0.10%	1356.6	1337.9	-1.40%	1356.6	1356.9	0.00%	1356.6	1357.9	0.10%	1356.6	1358.8	0.20%	1356.6	1356.4	0.00%
		Difference =	1.1	**1.40%**	Difference =	1.1	**1.10%**	Difference =	-18.7	**-25.00%**	Difference =	0.3	**0.50%**	Difference =	1.2	**1.20%**	Difference =	2.2	**2.20%**	Difference =	-0.2	**-0.20%**
64933 PAULINE3	64902 MOORE 3	55.6	56.7	2.00%	55.6	56.8	2.20%	55.6	54	-2.90%	55.6	55.9	0.60%	55.6	56.9	2.30%	55.6	58.1	4.50%	55.6	55.6	0.00%
64839 GR ISLD4	64780 COLMB W4	100	99.7	-0.30%	100	99.9	-0.10%	100	96.1	-3.90%	100	100.1	0.10%	100	99.9	-0.10%	100	99.8	-0.20%	100	100	0.00%
66571 GR ISLD3	64896 MCCOOL 3	145.1	147.8	1.80%	145.1	147.9	1.90%	145.1	146.8	1.10%	145.1	145.8	0.50%	145.1	148.2	2.10%	145.1	150.7	3.80%	145.1	145.1	0.00%
SUBTOTALS FOR: GRIS_LNC		300.7	304.2	1.20%	300.7	304.6	1.30%	300.7	296.8	-1.30%	300.7	301.8	0.40%	300.7	304.9	1.40%	300.7	308.5	2.60%	300.7	300.7	0.00%
		Difference =	3.5	**4.60%**	Difference =	3.8	**3.80%**	Difference =	-3.9	**-5.20%**	Difference =	1.1	**2.20%**	Difference =	4.2	**4.20%**	Difference =	7.8	[redacted]	Difference =	0	**0.00%**
57981 LACYGNE7	57965 W.GRDNR7	577.8	577.7	0.00%	577.8	577.8	0.00%	577.8	578.8	0.20%	577.8	578.1	0.00%	577.8	577.8	0.00%	577.8	579	0.20%	577.8	578.2	0.10%
57981 LACYGNE7	57968 STILWEL7	720.5	720.6	0.00%	720.5	720.7	0.00%	720.5	721	0.10%	720.5	720.8	0.00%	720.5	720.6	0.00%	720.5	721.4	0.10%	720.5	720.9	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.4	1298.2	0.00%	1298.4	1298.5	0.00%	1298.4	1299.8	0.10%	1298.4	1298.8	0.00%	1298.4	1298.4	0.00%	1298.4	1300.3	0.20%	1298.4	1299.2	0.10%
		Difference =	-0.1	**-0.20%**	Difference =	0.2	**0.20%**	Difference =	1.4	**1.80%**	Difference =	0.5	**0.90%**	Difference =	0	**0.00%**	Difference =	2	**2.00%**	Difference =	0.8	**0.80%**
62234 LKMARN 7	60276 AIRLAKE7	53.9	53.7	-0.40%	53.9	54.9	1.80%	53.9	53.8	-0.30%	53.9	54	0.20%	53.9	39.5	-26.80%	53.9	53.7	-0.40%	53.9	54.1	0.40%
SUBTOTALS FOR: LKM-WFB		53.9	53.7	-0.40%	53.9	54.9	1.80%	53.9	53.8	-0.30%	53.9	54	0.20%	53.9	39.5	-26.80%	53.9	53.7	-0.40%	53.9	54.1	0.40%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.4	**-14.40%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-144	-144.5	0.30%	-144	-144.7	0.50%	-144	-144.2	0.20%	-144	-144.2	0.20%	-144	-144.6	0.40%	-144	-144.3	0.20%	-144	-144.2	0.10%
60173 ROSEAUN2	67564 DORSEY 2	1137.2	-1144.2	0.60%	1137.2	-1147.4	0.90%	1137.2	-1140.4	0.30%	-1137.2	-1140.5	0.30%	-1137.2	-1146.1	0.80%	-1137.2	-1141.6	0.40%	-1137.2	-1136	-0.10%
66752 DRAYTON4	67557 LETELER4	-235.1	-230.9	-1.80%	-235.1	-229.2	-2.50%	-235.1	-232.8	-1.00%	-235.1	-233.2	-0.80%	-235.1	-229.8	-2.30%	-235.1	-232.1	-1.30%	-235.1	-236.9	0.80%
63379 RUGBY 4	67523 GLENBOR4	41.4	44.7	7.80%	41.4	46.1	11.30%	41.4	42.4	2.40%	41.4	43	3.80%	41.4	45.5	9.90%	41.4	42.9	3.50%	41.4	42.3	2.00%
SUBTOTALS FOR: MHEX_N		1474.9	-1475	0.00%	1474.9	-1475.2	0.00%	1474.9	-1475	0.00%	-1474.9	-1474.9	0.00%	-1474.9	-1475	0.00%	-1474.9	-1475.1	0.00%	-1474.9	-1474.8	0.00%
		Difference =	-0.1	**-0.20%**	Difference =	-0.3	**-0.30%**	Difference =	-0.2	**-0.20%**	Difference =	0	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.10%**
67576 RICHER 4	60175 ROSEAU 4	146.5	147	0.30%	146.5	147.2	0.50%	146.5	146.7	0.20%	146.5	146.7	0.20%	146.5	147.1	0.40%	146.5	146.8	0.20%	146.5	146.6	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1153.9	1161.2	0.60%	1153.9	1164.4	0.90%	1153.9	1157.2	0.30%	1153.9	1157.3	0.30%	1153.9	1163.1	0.80%	1153.9	1158.5	0.40%	1153.9	1152.7	-0.10%
67557 LETELER4	66752 DRAYTON4	239.5	235.2	-1.80%	239.5	233.4	-2.60%	239.5	237.1	-1.00%	239.5	237.5	-0.80%	239.5	234	-2.30%	239.5	236.3	-1.30%	239.5	241.4	0.80%
67523 GLENBOR4	63379 RUGBY 4	-41.1	-44.2	7.70%	-41.1	-45.7	11.20%	-41.1	-42.1	2.40%	-41.1	-42.6	3.70%	-41.1	-45.1	9.80%	-41.1	-42.5	3.50%	-41.1	-41.9	2.00%
SUBTOTALS FOR: MHEX_S		1498.8	1499.1	0.00%	1498.8	1499.3	0.00%	1498.8	1499	0.00%	1498.8	1498.9	0.00%	1498.8	1499.1	0.00%	1498.8	1499.1	0.00%	1498.8	1498.8	0.00%
		Difference =	0.3	**0.40%**	Difference =	0.5	**0.50%**	Difference =	0.2	**0.30%**	Difference =	0.1	**0.20%**	Difference =	0.3	**0.30%**	Difference =	0.3	**0.30%**	Difference =	0	**0.00%**
68613 AUBURNT4	67525 RESTON 4	42.3	42.1	-0.30%	42.3	42.1	-0.50%	42.3	42.2	-0.10%	42.3	42.2	-0.20%	42.3	42.1	-0.40%	42.3	42.2	-0.10%	42.3	42.3	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.5	-90.5	-0.10%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%	-90.5	-90.5	-0.10%	-90.5	-90.5	-0.10%	-90.5	-90.5	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.2	-1.20%	-6.3	-6.2	-1.70%	-6.3	-6.3	-0.40%	-6.3	-6.3	-0.60%	-6.3	-6.2	-1.60%	-6.3	-6.3	-0.80%	-6.3	-6.3	0.10%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.5	-0.10%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0.1	**0.10%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.1	-42	-0.30%	-42.1	-41.9	-0.50%	-42.1	-42	-0.10%	-42.1	-42	-0.20%	-42.1	-41.9	-0.40%	-42.1	-42.1	-0.10%	-42.1	-42.1	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.3	91.3	-0.10%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%	91.3	91.3	-0.10%	91.3	91.3	-0.10%	91.3	91.3	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.4	-1.20%	6.5	6.4	-1.60%	6.5	6.5	-0.40%	6.5	6.5	-0.60%	6.5	6.4	-1.50%	6.5	6.5	-0.80%	6.5	6.5	0.10%
SUBTOTALS FOR: MH_SPC_W		55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.7	0.00%	55.7	55.7	-0.10%	55.7	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	-0.1	**-0.10%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 5

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	10.5	6	-42.50%	10.5	6.1	-42.20%	10.5	14.5	38.10%	10.5	9.7	-7.80%	10.5	6.2	-40.50%	10.5	17.7	68.70%	10.5	9.8	-7.00%
SUBTOTALS FOR: MNTZUMA_W		10.5	6	-42.50%	10.5	6.1	-42.20%	10.5	14.5	38.10%	10.5	9.7	-7.80%	10.5	6.2	-40.50%	10.5	17.7	68.70%	10.5	9.8	-7.00%
		Difference =	-4.5	**-5.90%**	Difference =	-4.4	**-4.40%**	Difference =	4	[redacted]	Difference =	-0.8	**-1.60%**	Difference =	-4.2	**-4.20%**	Difference =	7.2	[redacted]	Difference =	-0.7	**-0.70%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.7	-0.10%	-74.8	-74.7	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.6	-0.20%	-74.8	-74.8	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.5	139.2	-0.20%	139.5	139.1	-0.30%	139.5	139.3	-0.10%	139.5	139.4	-0.10%	139.5	139.1	-0.30%	139.5	139.3	-0.20%	139.5	140.2	0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.8	135.5	-0.20%	135.8	135.4	-0.30%	135.8	135.6	-0.10%	135.8	135.7	-0.10%	135.8	135.4	-0.30%	135.8	135.5	-0.20%	135.8	136.5	0.50%
61626 BOSWELL4	61627 SHANNON4	87.7	88.2	0.70%	87.7	88.5	0.90%	87.7	88	0.40%	87.7	87.9	0.20%	87.7	88.4	0.80%	87.7	88.1	0.50%	87.7	86.2	-1.60%
61615 ARROWHD4	61614 98L TAP4	56.1	54.7	-2.30%	56.1	54.5	-2.70%	56.1	54.5	-2.80%	56.1	55.7	-0.60%	56.1	54.5	-2.70%	56.1	54.3	-3.20%	56.1	58.6	4.60%
61615 ARROWHD4	61554 AWHD1JCT	154.9	154.8	-0.10%	154.9	154.7	-0.20%	154.9	154.6	-0.20%	154.9	154.9	0.00%	154.9	154.7	-0.10%	154.9	154.6	-0.20%	154.9	155.6	0.40%
61615 ARROWHD4	61556 AWHD2JCT	160.3	160.2	-0.10%	160.3	160.1	-0.20%	160.3	160	-0.20%	160.3	160.3	0.00%	160.3	160.1	-0.10%	160.3	160	-0.20%	160.3	161	0.40%
61615 ARROWHD4	61624 FORBES 4	-110.6	-110.9	0.30%	-110.6	-110.4	-0.20%	-110.6	-111.8	1.00%	-110.6	-110.5	-0.10%	-110.6	-110.8	0.10%	-110.6	-111.9	1.10%	-110.6	-110.3	-0.30%
61615 ARROWHD4	63055 BEARCK 4	56.2	57.4	2.30%	56.2	58.9	5.00%	56.2	56.1	-0.10%	56.2	57.2	1.80%	56.2	58.2	3.60%	56.2	56.3	0.20%	56.2	55.1	-1.80%
SUBTOTALS FOR: MP_EXPORT		776.9	776.2	-0.10%	776.9	777.9	0.10%	776.9	773.5	-0.40%	776.9	777.6	0.10%	776.9	776.7	0.00%	776.9	773.3	-0.50%	776.9	780.1	0.40%
		Difference =	-0.6	**-0.80%**	Difference =	1	**1.00%**	Difference =	-3.4	**-4.50%**	Difference =	0.7	**1.50%**	Difference =	-0.1	**-0.10%**	Difference =	-3.6	**-3.60%**	Difference =	3.2	**3.20%**
60105 PR ISLD3	61950 BYRON 3	-202.4	-187.3	-7.50%	-202.4	-217.4	7.50%	-202.4	-194.1	-4.10%	-202.4	-206.7	2.20%	-202.4	-197.6	-2.30%	-202.4	-191.9	-5.20%	-202.4	-207.1	2.40%
60304 EAU CL 3	92494 ARP 345	93.9	90.6	-3.50%	93.9	87.1	-7.20%	93.9	98.9	5.30%	93.9	91.2	-2.80%	93.9	89.3	-4.90%	93.9	98.7	5.20%	93.9	91.3	-2.80%
SUBTOTALS FOR: MWSI		-108.5	-96.7	-10.90%	-108.5	-130.3	20.10%	-108.5	-95.2	-12.20%	-108.5	-115.5	6.50%	-108.5	-108.4	-0.10%	-108.5	-93.2	-14.10%	-108.5	-115.9	6.80%
		Difference =	11.8	[redacted]	Difference =	-21.8	**-21.80%**	Difference =	13.3	[redacted]	Difference =	-7	**-14.10%**	Difference =	0.1	**0.10%**	Difference =	15.3	[redacted]	Difference =	-7.4	**-7.40%**
66756 SQBUTTE4	63049 STANTON4	-36.7	-34.7	-5.40%	-36.7	-34	-7.20%	-36.7	-35.1	-4.20%	-36.7	-35.7	-2.60%	-36.7	-34.1	-6.90%	-36.7	-34.5	-5.90%	-36.7	-37.1	1.20%
66756 SQBUTTE4	66751 CENTER 4	-41	-41.7	1.80%	-41	-42.2	2.90%	-41	-40.7	-0.90%	-41	-41.4	1.00%	-41	-41.9	2.30%	-41	-40.8	-0.60%	-41	-42.4	3.40%
66756 SQBUTTE4	66791 CENTER 3	89.9	88.7	-1.40%	89.9	88.4	-1.60%	89.9	88	-2.10%	89.9	89.4	-0.60%	89.9	88.3	-1.80%	89.9	87.5	-2.70%	89.9	91.8	2.10%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.3	0.50%	-23.2	-23.4	0.90%	-23.2	-23.2	-0.10%	-23.2	-23.2	0.30%	-23.2	-23.3	0.70%	-23.2	-23.2	0.00%	-23.2	-23.3	0.60%
63041 COAL CR4	63049 STANTON4	-124.9	-125.9	0.80%	-124.9	-126.4	1.20%	-124.9	-125	0.10%	-124.9	-125.4	0.40%	-124.9	-126.1	1.00%	-124.9	-125.1	0.20%	-124.9	-125.7	0.60%
63041 COAL CR4	63381 UNDERWD4	144.2	145.3	0.80%	144.2	145.8	1.10%	144.2	144.3	0.10%	144.2	144.7	0.40%	144.2	145.6	1.00%	144.2	144.4	0.20%	144.2	145.1	0.60%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	132.6	134.3	1.30%	132.6	134.3	1.30%	132.6	137	3.30%	132.6	133.1	0.40%	132.6	134.8	1.60%	132.6	137.3	3.60%	132.6	130.9	-1.30%
67105 LELANDO3	67160 GROTON 3	255.8	254.6	-0.50%	255.8	254.2	-0.60%	255.8	254.3	-0.60%	255.8	255.4	-0.10%	255.8	254.4	-0.50%	255.8	255.5	-0.10%	255.8	253.2	-1.00%
67101 ANTELOP3	67120 BRDLAND3	194	193.9	-0.10%	194	193.6	-0.20%	194	194.7	0.30%	194	194	0.00%	194	193.9	-0.10%	194	195.4	0.70%	194	191.8	-1.10%
63314 BIGSTON4	66503 BLAIR 4	-1.4	26.9	-999.00%	-1.4	35.4	-999.00%	-1.4	28.2	-999.00%	-1.4	17.3	-999.00%	-1.4	35.9	-999.00%	-1.4	39.2	-999.00%	-1.4	24.5	-999.00%
63320 6MI GRV4	**66550 GRANITF4**	15.2	21.1	39.50%	15.2	23.1	52.20%	15.2	20.9	38.00%	15.2	21.2	39.70%	15.2	23.3	53.90%	15.2	23.1	52.50%	15.2	13.1	-13.30%
63336 AUDUBON4	63053 HUBBARD4	115.6	119.6	3.50%	115.6	121.2	4.90%	115.6	118.1	2.10%	115.6	117.7	1.80%	115.6	120.8	4.40%	115.6	118.6	2.60%	115.6	112.3	-2.90%
66521 SULLYBT4	66519 OAHE 4	-70.2	-69.1	-1.60%	-70.2	-69.1	-1.60%	-70.2	-67.2	-4.40%	-70.2	-69.8	-0.60%	-70.2	-68.8	-2.00%	-70.2	-67	-4.70%	-70.2	-71.8	2.30%
63052 INMAN 4	61611 WINGRIV4	99.7	106.1	6.50%	99.7	108.6	8.90%	99.7	104.3	4.60%	99.7	103	3.30%	99.7	108	8.30%	99.7	105.4	5.70%	99.7	80.6	-19.20%
66470 BISON 4	66497 MAURINE4	-1.1	-0.4	-61.20%	-1.1	-0.4	-61.40%	-1.1	1.6	-249.20%	-1.1	-0.9	-18.90%	-1.1	-0.3	-75.30%	-1.1	0.6	-158.70%	-1.1	-1.7	57.10%
66716 LAPORTE7	61640 BADOURA7	0.3	1.2	328.60%	0.3	1.6	465.40%	0.3	0.8	172.80%	0.3	0.8	178.20%	0.3	1.5	422.40%	0.3	0.8	170.20%	0.3	0.4	50.70%
63222 ALEXAND7	60144 DGLASCO7	33	34.5	4.80%	33	35.2	6.70%	33	34.1	3.60%	33	34	3.20%	33	35	6.30%	33	34.4	4.30%	33	26.1	-20.80%
67327 ELLENDL7	67401 ABDNJCT7	-6	-5.3	-12.90%	-6	-5.1	-14.80%	-6	-4.8	-20.50%	-6	-5.6	-7.20%	-6	-5	-17.00%	-6	-4.2	-29.70%	-6	-7.4	22.60%
66432 EDGELEY7	66534 ORDWAY 7	-19.2	-19.2	0.20%	-19.2	-19.3	0.90%	-19.2	-18.8	-1.90%	-19.2	-19.2	0.00%	-19.2	-19.2	0.10%	-19.2	-18.5	-3.60%	-19.2	-20.9	8.90%
66438 FORMAN 7	66522 SUMMIT-7	-22.2	-21.7	-2.50%	-22.2	-21.6	-2.90%	-22.2	-21.3	-4.10%	-22.2	-21.9	-1.60%	-22.2	-21.5	-3.40%	-22.2	-20.4	-8.20%	-22.2	-23.8	7.10%
63311 CANBY 4	66550 GRANITF4	89.3	103.3	15.60%	89.3	107.8	20.70%	89.3	102.5	14.80%	89.3	100.4	12.40%	89.3	107.9	20.80%	89.3	106.9	19.80%	89.3	102.8	15.10%
62006 KERKHO 7	62005 KERKHOT7	9.3	10.1	9.50%	9.3	10.4	12.50%	9.3	10.1	9.10%	9.3	10.7	15.10%	9.3	10.5	13.20%	9.3	10.4	12.50%	9.3	6.8	-26.30%
66752 DRAYTON4	67557 LETELER4	-239.5	-235.2	-1.80%	-239.5	-233.4	-2.60%	-239.5	-237.1	-1.00%	-239.5	-237.5	-0.80%	-239.5	-234	-2.30%	-239.5	-236.3	-1.30%	-239.5	-241.4	0.80%
63379 RUGBY 4	67523 GLENBOR4	41.4	44.7	7.80%	41.4	46.1	11.30%	41.4	42.4	2.40%	41.4	43	3.80%	41.4	45.5	9.90%	41.4	42.9	3.50%	41.4	42.3	2.00%
SUBTOTALS FOR: NDEX		626.3	699.7	11.70%	626.3	722.5	15.30%	626.3	699.8	11.70%	626.3	675.6	7.90%	626.3	722.8	15.40%	626.3	724.1	15.60%	626.3	617.8	-1.40%
		Difference =	73.3	[redacted]	Difference =	96.1	[redacted]	Difference =	73.5	[redacted]	Difference =	49.3	[redacted]	Difference =	96.4	[redacted]	Difference =	97.8	[redacted]	Difference =	-8.5	**-8.50%**
36406 WEMPL; B	39058 PAD 345	635.4	636.7	0.20%	635.4	638	0.40%	635.4	632.6	-0.40%	635.4	636.4	0.20%	635.4	637.2	0.30%	635.4	632.3	-0.50%	635.4	637.1	0.30%
SUBTOTALS FOR: NI_WUMS		635.4	636.7	0.20%	635.4	638	0.40%	635.4	632.6	-0.40%	635.4	636.4	0.20%	635.4	637.2	0.30%	635.4	632.3	-0.50%	635.4	637.1	0.30%
		Difference =	1.4	**1.80%**	Difference =	2.7	**2.70%**	Difference =	-2.8	**-3.70%**	Difference =	1.1	**2.20%**	Difference =	1.8	**1.80%**	Difference =	-3.1	**-3.10%**	Difference =	1.8	**1.80%**
60105 PR ISLD3	61950 BYRON 3	-202.4	-187.3	-7.50%	-202.4	-217.4	7.50%	-202.4	-194.1	-4.10%	-202.4	-206.7	2.20%	-202.4	-197.6	-2.30%	-202.4	-191.9	-5.20%	-202.4	-207.1	2.40%
SUBTOTALS FOR: PRI-BYN		-202.4	-187.3	-7.50%	-202.4	-217.4	7.50%	-202.4	-194.1	-4.10%	-202.4	-206.7	2.20%	-202.4	-197.6	-2.30%	-202.4	-191.9	-5.20%	-202.4	-207.1	2.40%
		Difference =	15.1	[redacted]	Difference =	-15.1	**-15.10%**	Difference =	8.3	[redacted]	Difference =	-4.4	**-8.80%**	Difference =	4.7	**4.70%**	Difference =	10.4	[redacted]	Difference =	-4.8	**-4.80%**
36382 QUAD ;	34036 ROCK CK3	509.5	510.9	0.30%	509.5	510.9	0.30%	509.5	508.1	-0.30%	509.5	509.8	0.10%	509.5	511.1	0.30%	509.5	508.6	-0.20%	509.5	510.5	0.20%
SUBTOTALS FOR: QUAD-ROCKC		509.5	510.9	0.30%	509.5	510.9	0.30%	509.5	508.1	-0.30%	509.5	509.8	0.10%	509.5	511.1	0.30%	509.5	508.6	-0.20%	509.5	510.5	0.20%
		Difference =	1.4	**1.80%**	Difference =	1.4	**1.40%**	Difference =	-1.4	**-1.90%**	Difference =	0.3	**0.60%**	Difference =	1.6	**1.60%**	Difference =	-0.9	**-0.90%**	Difference =	1	**1.00%**
36382 QUAD ;	64405 SUB 91 3	554.7	555	0.10%	554.7	554.5	0.00%	554.7	555.1	0.10%	554.7	554.9	0.00%	554.7	554.8	0.00%	554.7	557.1	0.40%	554.7	554.9	0.00%
64400 MECCORD3	64403 E MOLIN3	275.2	275.4	0.00%	275.2	274.9	-0.10%	275.2	275.8	0.20%	275.2	275.3	0.00%	275.2	275.2	0.00%	275.2	277.2	0.70%	275.2	275.3	0.00%
SUBTOTALS FOR: QUADCITY_W		829.9	830.4	0.10%	829.9	829.4	-0.10%	829.9	830.9	0.10%	829.9	830.2	0.00%	829.9	830	0.00%	829.9	834.3	0.50%	829.9	830.2	0.00%

Distribution Factor Analysis

Transmission Alternative 5

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
		Difference =	0.5	**0.60%**	Difference =	-0.5	**-0.50%**	Difference =	1	**1.30%**	Difference =	0.3	**0.60%**	Difference =	0	**0.00%**	Difference =	4.4	**4.40%**	Difference =	0.3	**0.30%**
64831 GENTLMN3	64943 REDWILO3	276.9	277.8	0.30%	276.9	277.7	0.30%	276.9	274	-1.00%	276.9	276.9	0.00%	276.9	277.9	0.30%	276.9	278	0.40%	276.9	276.6	-0.10%
SUBTOTALS FOR: WNE_WKS		276.9	277.8	0.30%	276.9	277.7	0.30%	276.9	274	-1.00%	276.9	276.9	0.00%	276.9	277.9	0.30%	276.9	278	0.40%	276.9	276.6	-0.10%
		Difference =	0.9	**1.20%**	Difference =	0.8	**0.80%**	Difference =	-2.9	**-3.80%**	Difference =	0	**0.00%**	Difference =	1	**1.00%**	Difference =	1	**1.00%**	Difference =	-0.3	**-0.30%**
66756 SQBUTTE4	63049 STANTON4	-36.7	-34.7	-5.40%	-36.7	-34	-7.20%	-36.7	-35.1	-4.20%	-36.7	-35.7	-2.60%	-36.7	-34.1	-6.90%	-36.7	-34.5	-5.90%	-36.7	-37.1	1.20%
66756 SQBUTTE4	66751 CENTER 4	-41	-41.7	1.80%	-41	-42.2	2.90%	-41	-40.7	-0.90%	-41	-41.4	1.00%	-41	-41.9	2.30%	-41	-40.8	-0.60%	-41	-42.4	3.40%
66756 SQBUTTE4	66791 CENTER 3	89.9	88.7	-1.40%	89.9	88.4	-1.60%	89.9	88	-2.10%	89.9	89.4	-0.60%	89.9	88.3	-1.80%	89.9	87.5	-2.70%	89.9	91.8	2.10%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	319.3	319.2	0.00%	319.3	312.5	-2.10%	319.3	324.3	1.60%	319.3	316.6	-0.80%	319.3	316.6	-0.80%	319.3	324.5	1.60%	319.3	316.6	-0.80%
60105 PR ISLD3	61950 BYRON 3	-202.4	-187.3	-7.50%	-202.4	-217.4	7.50%	-202.4	-194.1	-4.10%	-202.4	-206.7	2.20%	-202.4	-197.6	-2.30%	-202.4	-191.9	-5.20%	-202.4	-207.1	2.40%
60192 BLUE LK3	60050 WLMRTHTP	-500.2	-508.4	1.60%	-500.2	-520	3.90%	-500.2	-497.2	-0.60%	-500.2	-504.7	0.90%	-500.2	-501	0.20%	-500.2	-494.9	-1.10%	-500.2	-506.8	1.30%
60187 AS KING7	60325 WILOWRV7	128.8	129	0.20%	128.8	127.9	-0.70%	128.8	129.4	0.50%	128.8	128.4	-0.30%	128.8	128.6	-0.10%	128.8	129.4	0.50%	128.8	128.5	-0.20%
60238 REDROCK7	68966 GLENMONT	50.2	50.6	0.70%	50.2	48.7	-3.00%	50.2	50.8	1.20%	50.2	49.8	-0.90%	50.2	49.8	-0.80%	50.2	50.9	1.30%	50.2	50	-0.40%
62234 LKMARN 7	60276 AIRLAKE7	53.9	53.7	-0.40%	53.9	54.9	1.80%	53.9	53.8	-0.30%	53.9	54	0.20%	53.9	39.5	-26.80%	53.9	53.7	-0.40%	53.9	54.1	0.40%
SUBTOTALS FOR: MNEX (INFO)		-150.4	-143.1	-4.80%	-150.4	-193.5	28.60%	-150.4	-133	-11.60%	-150.4	-162.7	8.20%	-150.4	-164.2	9.20%	-150.4	-128.4	-14.70%	-150.4	-164.7	9.50%
		Difference =	7.3	**9.60%**	Difference =	-43.1	**-43.10%**	Difference =	17.4	**23.20%**	Difference =	-12.3	**-24.60%**	Difference =	-13.8	**-13.80%**	Difference =	22	**22.00%**	Difference =	-14.3	**-14.30%**

Distribution Factor Analysis

Transmission Alternative 6

2009 Summer Peak Case

Generation to Generation Dispatch

Interface Definition			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	384.8	393.4	2.20%	384.8	392.8	2.10%	384.8	378	-1.80%	384.8	387.8	0.80%	384.8	392.8	2.10%	384.8	377.2	-2.00%	384.8	388.2	0.90%
SUBTOTALS FOR: ARN-HAZLTN		384.8	393.4	2.20%	384.8	392.8	2.10%	384.8	378	-1.80%	384.8	387.8	0.80%	384.8	392.8	2.10%	384.8	377.2	-2.00%	384.8	388.2	0.90%
		Difference =	8.7		Difference =	8		Difference =	-6.8	**-9.10%**	Difference =	3		Difference =	8		Difference =	-7.6	**-7.60%**	Difference =	3.4	**3.40%**
64786 COOPER 3	59199 ST JOE 3	54.2	55.1	1.70%	54.2	54.9	1.40%	54.2	48.7	-10.10%	54.2	53.8	-0.70%	54.2	55.1	1.70%	54.2	54.8	1.20%	54.2	53.2	-1.80%
64786 COOPER 3	96039 7FAIRPT	63.2	64	1.10%	63.2	63.9	1.00%	63.2	59.1	-6.60%	63.2	63	-0.40%	63.2	64	1.10%	63.2	64.6	2.10%	63.2	62.6	-1.00%
SUBTOTALS FOR: COOPER_S		117.4	119.1	1.40%	117.4	118.8	1.20%	117.4	107.8	-8.20%	117.4	116.8	-0.50%	117.4	119.1	1.40%	117.4	119.4	1.70%	117.4	115.8	-1.40%
		Difference =	1.7	**2.20%**	Difference =	1.4	**1.40%**	Difference =	-9.6	**-12.80%**	Difference =	-0.6	**-1.20%**	Difference =	1.7	**1.70%**	Difference =	2	**2.00%**	Difference =	-1.6	**-1.60%**
60304 EAU CL 3	92494 ARP 345	92.4	89.1	-3.60%	92.4	85.6	-7.40%	92.4	97.4	5.40%	92.4	89.7	-2.90%	92.4	87.8	-5.00%	92.4	97.2	5.20%	92.4	89.7	-3.00%
SUBTOTALS FOR: ECL-ARP		92.4	89.1	-3.60%	92.4	85.6	-7.40%	92.4	97.4	5.40%	92.4	89.7	-2.90%	92.4	87.8	-5.00%	92.4	97.2	5.20%	92.4	89.7	-3.00%
		Difference =	-3.3	**-4.40%**	Difference =	-6.8	**-6.80%**	Difference =	5		Difference =	-2.7	**-5.30%**	Difference =	-4.6	**-4.60%**	Difference =	4.8	**4.80%**	Difference =	-2.7	**-2.70%**
65351 S3451 3	65354 S3454 3	82.3	82.8	0.70%	82.3	82.6	0.30%	82.3	89.2	8.40%	82.3	82	-0.30%	82.3	82.5	0.30%	82.3	83.7	1.70%	82.3	82.1	-0.20%
65351 S3451 3	65359 S3459 3	30.2	31.8	5.20%	30.2	31.4	4.00%	30.2	37.5	24.20%	30.2	30.2	-0.20%	30.2	31.4	3.90%	30.2	34.2	13.20%	30.2	30.1	-0.40%
65451 S1251 5	65497 S1297 5	39.7	40	0.70%	39.7	39.9	0.60%	39.7	40.9	3.20%	39.7	39.7	0.00%	39.7	39.9	0.60%	39.7	40.6	2.30%	39.7	39.6	-0.10%
SUBTOTALS FOR: FT CAL_S		152.2	154.6	1.60%	152.2	153.9	1.10%	152.2	167.6	10.10%	152.2	151.9	-0.20%	152.2	153.8	1.10%	152.2	158.5	4.20%	152.2	151.8	-0.20%
		Difference =	2.4	**3.20%**	Difference =	1.7	**1.70%**	Difference =	15.4		Difference =	-0.3	**-0.60%**	Difference =	1.6	**1.60%**	Difference =	6.4		Difference =	-0.4	**-0.40%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.8	0.00%	157.9	157.9	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	268.6	-1.90%	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	274.3	0.20%	273.8	273.9	0.00%
64831 GENTLMN3	64984 SWEET W3	328.1	328.2	0.00%	328.1	328.3	0.00%	328.1	321.8	-1.90%	328.1	328.2	0.00%	328.1	328.3	0.00%	328.1	328.7	0.20%	328.1	328.2	0.00%
64831 GENTLMN3	64943 REDWILO3	277	277.9	0.30%	277	277.9	0.30%	277	274.1	-1.00%	277	277	0.00%	277	278	0.40%	277	278	0.40%	277	276.6	-0.10%
SUBTOTALS FOR: GGS		1356.6	1357.6	0.10%	1356.6	1357.7	0.10%	1356.6	1337.8	-1.40%	1356.6	1356.8	0.00%	1356.6	1357.8	0.10%	1356.6	1358.7	0.20%	1356.6	1356.3	0.00%
		Difference =	1.1	**1.40%**	Difference =	1.1	**1.10%**	Difference =	-18.7	**-25.00%**	Difference =	0.3	**0.60%**	Difference =	1.2	**1.20%**	Difference =	2.2	**2.20%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	55.7	56.8	2.00%	55.7	56.9	2.10%	55.7	54.1	-2.90%	55.7	56	0.60%	55.7	57	2.30%	55.7	58.2	4.40%	55.7	55.7	0.00%
64839 GR ISLD4	64780 COLMB.W4	99.8	99.5	-0.30%	99.8	99.6	-0.20%	99.8	95.9	-3.90%	99.8	99.9	0.10%	99.8	99.6	-0.20%	99.8	99.6	-0.20%	99.8	99.8	0.00%
66571 GR ISLD3	64896 MCCOOL 3	145.4	148.1	1.80%	145.4	148.2	1.90%	145.4	147.1	1.10%	145.4	146.1	0.50%	145.4	148.5	2.10%	145.4	150.9	3.80%	145.4	145.4	0.00%
SUBTOTALS FOR: GRIS_LNC		300.9	304.4	1.20%	300.9	304.7	1.30%	300.9	297	-1.30%	300.9	302	0.40%	300.9	305.1	1.40%	300.9	308.6	2.60%	300.9	300.9	0.00%
		Difference =	3.5	**4.60%**	Difference =	3.8	**3.80%**	Difference =	-3.9	**-5.20%**	Difference =	1.1	**2.20%**	Difference =	4.2	**4.20%**	Difference =	7.7		Difference =	0	**0.00%**
57981 LACYGNE7	57965 W.GRDNR7	577.8	577.7	0.00%	577.8	577.8	0.00%	577.8	578.8	0.20%	577.8	578	0.00%	577.8	577.7	0.00%	577.8	579	0.20%	577.8	578.3	0.10%
57981 LACYGNE7	57968 STILWEL7	720.6	720.6	0.00%	720.6	720.7	0.00%	720.6	721	0.10%	720.6	720.8	0.00%	720.6	720.6	0.00%	720.6	721.4	0.10%	720.6	721	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.4	1298.3	0.00%	1298.4	1298.5	0.00%	1298.4	1299.8	0.10%	1298.4	1298.8	0.00%	1298.4	1298.3	0.00%	1298.4	1300.4	0.20%	1298.4	1299.3	0.10%
		Difference =	-0.1	**-0.10%**	Difference =	0.1	**0.10%**	Difference =	1.4	**1.90%**	Difference =	0.4	**0.80%**	Difference =	-0.1	**-0.10%**	Difference =	2	**2.00%**	Difference =	0.9	**0.90%**
62234 LKMARN 7	60276 AIRLAKE7	53.8	53.6	-0.40%	53.8	54.7	1.80%	53.8	53.6	-0.30%	53.8	53.9	0.20%	53.8	39.3	-26.90%	53.8	53.6	-0.40%	53.8	54	0.40%
SUBTOTALS FOR: LKM-WFB		53.8	53.6	-0.40%	53.8	54.7	1.80%	53.8	53.6	-0.30%	53.8	53.9	0.20%	53.8	39.3	-26.90%	53.8	53.6	-0.40%	53.8	54	0.40%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.4	**-14.40%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-144	-144.4	0.30%	-144	-144.6	0.50%	-144	-144.2	0.10%	-144	-144.2	0.20%	-144	-144.6	0.40%	-144	-144.3	0.20%	-144	-144.1	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1136.8	-1143.8	0.60%	1136.8	-1146.8	0.90%	-1136.8	-1139.9	0.30%	-1136.8	-1140.1	0.30%	1136.8	-1145.7	0.80%	-1136.8	-1140.8	0.40%	1136.8	-1135.3	-0.10%
66752 DRAYTON4	67557 LETELER4	-235.8	-231.7	-1.70%	-235.8	-230	-2.40%	-235.8	-233.6	-0.90%	-235.8	-233.9	-0.80%	-235.8	-230.6	-2.20%	-235.8	-233	-1.20%	-235.8	-237.8	0.90%
63379 RUGBY 4	67523 GLENBOR4	41.7	44.9	7.60%	41.7	46.4	11.10%	41.7	42.7	2.30%	41.7	43.3	3.70%	41.7	45.8	9.70%	41.7	43.1	3.20%	41.7	42.5	1.90%
SUBTOTALS FOR: MHEX_N		-1474.8	-1475	0.00%	1474.8	-1475.1	0.00%	-1474.8	-1475	0.00%	-1474.8	-1475	0.00%	1474.8	-1475	0.00%	-1474.8	-1474.9	0.00%	1474.8	-1474.7	0.00%
		Difference =	-0.2	**-0.30%**	Difference =	-0.3	**-0.30%**	Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.30%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	0.1	**0.10%**
67576 RICHER 4	60175 ROSEAU 4	146.4	146.9	0.30%	146.4	147.1	0.50%	146.4	146.6	0.10%	146.4	146.7	0.20%	146.4	147.1	0.40%	146.4	146.7	0.20%	146.4	146.6	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1153.5	1160.7	0.60%	1153.5	1163.8	0.90%	1153.5	1156.7	0.30%	1153.5	1156.9	0.30%	1153.5	1162.6	0.80%	1153.5	1157.7	0.40%	1153.5	1152	-0.10%
67557 LETELER4	66752 DRAYTON4	240.2	236	-1.80%	240.2	234.2	-2.50%	240.2	237.9	-0.90%	240.2	238.3	-0.80%	240.2	234.8	-2.20%	240.2	237.3	-1.20%	240.2	242.3	0.90%
67523 GLENBOR4	63379 RUGBY 4	-41.4	-44.5	7.50%	-41.4	-45.9	11.00%	-41.4	-42.3	2.30%	-41.4	-42.9	3.60%	-41.4	-45.4	9.60%	-41.4	-42.7	3.20%	-41.4	-42.1	1.80%
SUBTOTALS FOR: MHEX_S		1498.8	1499.1	0.00%	1498.8	1499.2	0.00%	1498.8	1498.9	0.00%	1498.8	1499	0.00%	1498.8	1499.1	0.00%	1498.8	1498.9	0.00%	1498.8	1498.7	0.00%
		Difference =	0.4	**0.50%**	Difference =	0.5	**0.50%**	Difference =	0.2	**0.30%**	Difference =	0.2	**0.40%**	Difference =	0.4	**0.40%**	Difference =	0.2	**0.20%**	Difference =	0	**0.00%**
68613 AUBURNT4	67525 RESTON 4	42.3	42.1	-0.30%	42.3	42.1	-0.50%	42.3	42.2	-0.10%	42.3	42.2	-0.20%	42.3	42.1	-0.40%	42.3	42.2	-0.20%	42.3	42.3	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.5	-90.5	-0.10%	-90.5	-90.4	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%	-90.5	-90.5	-0.10%	-90.5	-90.5	0.00%	-90.5	-90.5	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.2	-1.20%	-6.3	-6.2	-1.70%	-6.3	-6.3	-0.50%	-6.3	-6.3	-0.50%	-6.3	-6.2	-1.50%	-6.3	-6.3	-0.60%	-6.3	-6.3	0.10%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.1	-42	-0.30%	-42.1	-41.9	-0.50%	-42.1	-42	-0.10%	-42.1	-42	-0.20%	-42.1	-41.9	-0.40%	-42.1	-42	-0.20%	-42.1	-42.1	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.3	91.3	-0.10%	91.3	91.2	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%	91.3	91.3	-0.10%	91.3	91.3	0.00%	91.3	91.3	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.4	-1.20%	6.5	6.4	-1.70%	6.5	6.5	-0.50%	6.5	6.5	-0.50%	6.5	6.4	-1.50%	6.5	6.5	-0.60%	6.5	6.5	0.10%
SUBTOTALS FOR: MH_SPC_W		55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 6

2009 Summer Peak Case

Generation to Generation Dispatcl

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	9.2	4.7	-49.30%	9.2	4.7	-48.80%	9.2	13.1	43.20%	9.2	8.3	-9.30%	9.2	4.9	-47.10%	9.2	16.4	78.80%	9.2	8.5	-7.50%
SUBTOTALS FOR: MNTZUMA_W		9.2	4.7	-49.30%	9.2	4.7	-48.80%	9.2	13.1	43.20%	9.2	8.3	-9.30%	9.2	4.9	-47.10%	9.2	16.4	78.80%	9.2	8.5	-7.50%
		Difference =	-4.5	**-6.00%**	Difference =	-4.5	**-4.50%**	Difference =	4	[redacted]	Difference =	-0.9	**-1.70%**	Difference =	-4.3	**-4.30%**	Difference =	7.2	[redacted]	Difference =	-0.7	**-0.70%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.5	139.2	-0.20%	139.5	139.1	-0.30%	139.5	139.3	-0.10%	139.5	139.4	-0.10%	139.5	139.1	-0.30%	139.5	139.3	-0.20%	139.5	140.2	0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.8	135.5	-0.20%	135.8	135.4	-0.30%	135.8	135.6	-0.10%	135.8	135.7	-0.10%	135.8	135.4	-0.30%	135.8	135.6	-0.20%	135.8	136.5	0.50%
61626 BOSWELL4	61627 SHANNON4	87.6	88.2	0.60%	87.6	88.4	0.90%	87.6	88	0.40%	87.6	87.8	0.20%	87.6	88.3	0.80%	87.6	88.1	0.50%	87.6	86.2	-1.70%
61615 ARROWHD4	61614 98L TAP4	56.4	55.1	-2.30%	56.4	54.9	-2.60%	56.4	54.8	-2.70%	56.4	56	-0.50%	56.4	54.9	-2.60%	56.4	54.6	-3.10%	56.4	59	4.70%
61615 ARROWHD4	61554 AWHD1JCT	155	154.9	-0.10%	155	154.8	-0.20%	155	154.7	-0.20%	155	155	0.00%	155	154.8	-0.10%	155	154.7	-0.20%	155	155.7	0.50%
61615 ARROWHD4	61556 AWHD2JCT	160.4	160.3	-0.10%	160.4	160.2	-0.20%	160.4	160.1	-0.20%	160.4	160.4	0.00%	160.4	160.2	-0.10%	160.4	160.1	-0.20%	160.4	161.2	0.50%
61615 ARROWHD4	61624 FORBES 4	-110.4	-110.6	0.30%	-110.4	-110.1	-0.20%	-110.4	-111.5	1.00%	-110.4	-110.2	-0.10%	-110.4	-110.5	0.10%	-110.4	-111.6	1.10%	-110.4	-110	-0.30%
61615 ARROWHD4	63055 BEARCK 4	56.2	57.5	2.20%	56.2	59	4.90%	56.2	56.2	-0.20%	56.2	57.3	1.80%	56.2	58.2	3.50%	56.2	56.3	0.20%	56.2	55.2	-1.90%
SUBTOTALS FOR: MP_EXPORT		777.7	777.1	-0.10%	777.7	778.8	0.10%	777.7	774.4	-0.40%	777.7	778.5	0.10%	777.7	777.6	0.00%	777.7	774.1	-0.50%	777.7	781.1	0.40%
		Difference =	-0.6	**-0.80%**	Difference =	1	**1.00%**	Difference =	-3.4	**-4.50%**	Difference =	0.8	**1.50%**	Difference =	-0.1	**-0.10%**	Difference =	-3.6	**-3.60%**	Difference =	3.4	**3.40%**
60105 PR ISLD3	61950 BYRON 3	-204.7	-189.6	-7.40%	-204.7	-219.8	7.40%	-204.7	-196.4	-4.00%	-204.7	-209	2.10%	-204.7	-200.1	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.7	2.40%
60304 EAU CL 3	92494 ARP 345	92.4	89.1	-3.60%	92.4	85.6	-7.40%	92.4	97.4	5.40%	92.4	89.7	-2.90%	92.4	87.8	-5.00%	92.4	97.2	5.20%	92.4	89.7	-3.00%
SUBTOTALS FOR: MWSI		-112.3	-100.6	-10.50%	-112.3	-134.2	19.50%	-112.3	-99.1	-11.80%	-112.3	-119.3	6.20%	-112.3	-112.3	0.00%	-112.3	-97	-13.70%	-112.3	-120	6.90%
		Difference =	11.8	[redacted]	Difference =	-21.9	**-21.90%**	Difference =	13.2	[redacted]	Difference =	-7	**-14.00%**	Difference =	0.1	**0.10%**	Difference =	15.3	[redacted]	Difference =	-7.7	**-7.70%**
66756 SQBUTTE4	63049 STANTON4	-37.4	-35.5	-5.00%	-37.4	-34.8	-6.80%	-37.4	-35.9	-3.90%	-37.4	-36.5	-2.40%	-37.4	-34.9	-6.50%	-37.4	-35.4	-5.30%	-37.4	-38	1.60%
66756 SQBUTTE4	66751 CENTER 4	-41.8	-42.6	1.90%	-41.8	-43	3.00%	-41.8	-41.5	-0.70%	-41.8	-42.2	1.10%	-41.8	-42.8	2.50%	-41.8	-41.6	-0.40%	-41.8	-43.3	3.60%
66756 SQBUTTE4	66791 CENTER 3	91.3	90.3	-1.20%	91.3	90.1	-1.40%	91.3	89.6	-1.90%	91.3	90.9	-0.50%	91.3	90	-1.50%	91.3	89.2	-2.40%	91.3	93.4	2.30%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.4	0.60%	-23.2	-23.4	0.90%	-23.2	-23.2	-0.10%	-23.2	-23.3	0.30%	-23.2	-23.4	0.70%	-23.2	-23.2	0.00%	-23.2	-23.4	0.70%
63041 COAL CR4	63049 STANTON4	-125.2	-126.2	0.80%	-125.2	-126.7	1.20%	-125.2	-125.3	0.10%	-125.2	-125.7	0.40%	-125.2	-126.5	1.00%	-125.2	-125.4	0.20%	-125.2	-126	0.60%
63041 COAL CR4	63381 UNDERWD4	144.5	145.6	0.80%	144.5	146.2	1.10%	144.5	144.6	0.10%	144.5	145.1	0.40%	144.5	145.9	1.00%	144.5	144.7	0.10%	144.5	145.5	0.70%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	-0.10%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	131.4	133	1.30%	131.4	133	1.20%	131.4	135.7	3.30%	131.4	131.9	0.40%	131.4	133.4	1.60%	131.4	135.9	3.40%	131.4	129.5	-1.40%
67105 LELANDO3	67160 GROTON 3	253.9	252.6	-0.50%	253.9	252.1	-0.70%	253.9	252.3	-0.60%	253.9	253.5	-0.20%	253.9	252.3	-0.60%	253.9	253.3	-0.20%	253.9	251.1	-1.10%
67101 ANTELOP3	67120 BRDLAND3	192.6	192.3	-0.10%	192.6	192	-0.30%	192.6	193.1	0.20%	192.6	192.5	-0.10%	192.6	192.3	-0.20%	192.6	193.7	0.60%	192.6	190.2	-1.30%
63314 BIGSTON4	66503 BLAIR 4	-14.5	11.1	-176.60%	-14.5	18.7	-228.60%	-14.5	12.7	-187.20%	-14.5	1.9	-113.10%	-14.5	19.2	-232.10%	-14.5	22.9	-257.70%	-14.5	9	-162.10%
63320 6MI GRV4	**66550 GRANITF4**	31.7	41.3	30.50%	31.7	44.4	40.20%	31.7	41	29.30%	31.7	40.6	28.00%	31.7	44.8	41.20%	31.7	44.4	40.20%	31.7	31.9	0.70%
63336 AUDUBON4	63053 HUBBARD4	114.1	117.9	3.30%	114.1	119.4	4.70%	114.1	116.3	2.00%	114.1	116	1.70%	114.1	118.9	4.30%	114.1	117	2.50%	114.1	110.3	-3.30%
66521 SULLYBT4	66519 OAHE 4	-71.4	-70.4	-1.40%	-71.4	-70.4	-1.40%	-71.4	-68.4	-4.20%	-71.4	-71.1	-0.50%	-71.4	-70.1	-1.80%	-71.4	-68.3	-4.30%	-71.4	-73.2	2.50%
63052 INMAN 4	61611 WINGRIV4	99.4	105.8	6.40%	99.4	108.1	8.80%	99.4	103.9	4.50%	99.4	102.6	3.20%	99.4	107.6	8.20%	99.4	105.1	5.70%	99.4	80.1	-19.40%
66470 BISON 4	66497 MAURINE4	-1.5	-0.9	-42.30%	-1.5	-0.9	-42.00%	-1.5	1.2	-178.40%	-1.5	-1.3	-12.50%	-1.5	-0.7	-52.00%	-1.5	0.2	-110.00%	-1.5	-2.2	45.90%
66716 LAPORTE7	61640 BADOURA7	-0.1	0.8	-999.00%	-0.1	1.2	-999.00%	-0.1	0.4	-622.40%	-0.1	0.4	-650.80%	-0.1	1.1	-999.00%	-0.1	0.5	-810.90%	-0.1	0	-46.30%
63222 ALEXAND7	60144 DGLASCO7	32.8	34.3	4.70%	32.8	34.9	6.50%	32.8	33.9	3.40%	32.8	33.8	3.10%	32.8	34.8	6.10%	32.8	34.2	4.30%	32.8	25.8	-21.20%
67327 ELLENDL7	67401 ABDNJCT7	-6.8	-6.1	-10.30%	-6.8	-6	-11.60%	-6.8	-5.6	-17.10%	-6.8	-6.4	-5.60%	-6.8	-5.9	-13.60%	-6.8	-5.1	-25.00%	-6.8	-8.3	21.40%
66432 EDGELEY7	66534 ORDWAY 7	-20.1	-20.3	0.70%	-20.1	-20.4	1.50%	-20.1	-19.9	-1.40%	-20.1	-20.2	0.30%	-20.1	-20.3	0.70%	-20.1	-19.5	-3.20%	-20.1	-22	9.10%
66438 FORMAN 7	66522 SUMMIT-7	-23.1	-22.7	-2.10%	-23.1	-22.6	-2.20%	-23.1	-22.3	-3.60%	-23.1	-22.8	-1.30%	-23.1	-22.5	-2.80%	-23.1	-21.4	-7.40%	-23.1	-24.8	7.20%
63311 CANBY 4	66550 GRANITF4	80.1	93.1	16.30%	80.1	97.4	21.60%	80.1	92.5	15.40%	80.1	90.4	12.80%	80.1	97.5	21.70%	80.1	96.6	20.60%	80.1	92.5	15.50%
62006 KERKHO 7	62005 KERKHOT7	23.7	25.6	8.00%	23.7	26.3	10.70%	23.7	25.5	7.30%	23.7	26.1	9.90%	23.7	26.3	10.90%	23.7	26.1	9.70%	23.7	23.8	0.20%
66752 DRAYTON4	67557 LETELER4	-240.2	-236	-1.80%	-240.2	-234.2	-2.50%	-240.2	-237.9	-0.90%	-240.2	-238.3	-0.80%	-240.2	-234.8	-2.20%	-240.2	-237.3	-1.20%	-240.2	-242.3	0.90%
63379 RUGBY 4	67523 GLENBOR4	41.7	44.9	7.60%	41.7	46.4	11.10%	41.7	42.7	2.30%	41.7	43.3	3.70%	41.7	45.8	9.70%	41.7	43.1	3.20%	41.7	42.5	1.90%
SUBTOTALS FOR: NDEX		623.6	696.6	11.70%	623.6	719.3	15.30%	623.6	696.8	11.70%	623.6	672.7	7.90%	623.6	719.6	15.40%	623.6	721.2	15.60%	623.6	614	-1.50%
		Difference =	73	[redacted]	Difference =	95.7	[redacted]	Difference =	73.2	[redacted]	Difference =	49.1	[redacted]	Difference =	96	[redacted]	Difference =	97.6	[redacted]	Difference =	-9.6	**-9.60%**
36406 WEMPL; B	39058 PAD 345	636.1	637.5	0.20%	636.1	638.8	0.40%	636.1	633.4	-0.40%	636.1	637.3	0.20%	636.1	638	0.30%	636.1	633.1	-0.50%	636.1	637.9	0.30%
SUBTOTALS FOR: NI_WUMS		636.1	637.5	0.20%	636.1	638.8	0.40%	636.1	633.4	-0.40%	636.1	637.3	0.20%	636.1	638	0.30%	636.1	633.1	-0.50%	636.1	637.9	0.30%
		Difference =	1.4	**1.90%**	Difference =	2.7	**2.70%**	Difference =	-2.7	**-3.60%**		1.2	2.30%	Difference =	1.9	**1.90%**	Difference =	-3	**-3.00%**	Difference =	1.8	**1.80%**
60105 PR ISLD3	61950 BYRON 3	-204.7	-189.6	-7.40%	-204.7	-219.8	7.40%	-204.7	-196.4	-4.00%	-204.7	-209	2.10%	-204.7	-200.1	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.7	2.40%
SUBTOTALS FOR: PRI-BYN		-204.7	-189.6	-7.40%	-204.7	-219.8	7.40%	-204.7	-196.4	-4.00%	-204.7	-209	2.10%	-204.7	-200.1	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.7	2.40%
		Difference =	15.1	[redacted]	Difference =	-15.1	**-15.10%**	Difference =	8.3	[redacted]	Difference =	-4.3	**-8.60%**	Difference =	4.6	**4.60%**	Difference =	10.5	[redacted]	Difference =	-5	**-5.00%**
36382 QUAD ;	34036 ROCK CK3	509.8	511.6	0.40%	509.8	511.3	0.30%	509.8	508.6	-0.20%	509.8	510.5	0.10%	509.8	511.2	0.30%	509.8	509.2	-0.10%	509.8	510.7	0.20%
SUBTOTALS FOR: QUAD-ROCKC		509.8	511.6	0.40%	509.8	511.3	0.30%	509.8	508.6	-0.20%	509.8	510.5	0.10%	509.8	511.2	0.30%	509.8	509.2	-0.10%	509.8	510.7	0.20%
		Difference =	1.8	**2.40%**	Difference =	1.6	**1.60%**	Difference =	-1.2	**-1.60%**	Difference =	0.7	**1.40%**	Difference =	1.5	**1.50%**	Difference =	-0.5	**-0.50%**	Difference =	0.9	**0.90%**
36382 QUAD ;	64405 SUB 91 3	554.5	554.9	0.10%	554.5	554.4	0.00%	554.5	555	0.10%	554.5	554.8	0.00%	554.5	554.6	0.00%	554.5	557	0.40%	554.5	554.8	0.00%
64400 MECCORD3	64403 E MOLIN3	275.1	275.2	0.00%	275.1	274.8	-0.10%	275.1	275.6	0.20%	275.1	275.2	0.10%	275.1	275	0.00%	275.1	277.1	0.70%	275.1	275.2	0.00%
SUBTOTALS FOR: QUADCITY_W		829.6	830	0.10%	829.6	829.1	-0.10%	829.6	830.6	0.10%	829.6	830	0.10%	829.6	829.6	0.00%	829.6	834.1	0.50%	829.6	829.9	0.00%

Distribution Factor Analysis

Transmission Alternative 6

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
		Difference =	0.4	**0.60%**	Difference =	-0.4	**-0.40%**	Difference =	1	**1.30%**	Difference =	0.4	**0.80%**	Difference =	0	**0.00%**	Difference =	4.5	**4.50%**	Difference =	0.4	**0.40%**
64831 GENTLMN3	64943 REDWILO3	277	277.9	0.30%	277	277.9	0.30%	277	274.1	-1.00%	277	277	0.00%	277	278	0.40%	277	278	0.40%	277	276.6	-0.10%
SUBTOTALS FOR: WNE_WKS		277	277.9	0.30%	277	277.9	0.30%	277	274.1	-1.00%	277	277	0.00%	277	278	0.40%	277	278	0.40%	277	276.6	-0.10%
		Difference =	0.9	**1.20%**	Difference =	0.9	**0.90%**	Difference =	-2.9	**-3.80%**	Difference =	0	**0.10%**	Difference =	1	**1.00%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-37.4	-35.5	-5.00%	-37.4	-34.8	-6.80%	-37.4	-35.9	-3.90%	-37.4	-36.5	-2.40%	-37.4	-34.9	-6.50%	-37.4	-35.4	-5.30%	-37.4	-38	1.60%
66756 SQBUTTE4	66751 CENTER 4	-41.8	-42.6	1.90%	-41.8	-43	3.00%	-41.8	-41.5	-0.70%	-41.8	-42.2	1.10%	-41.8	-42.8	2.50%	-41.8	-41.6	-0.40%	-41.8	-43.3	3.60%
66756 SQBUTTE4	66791 CENTER 3	91.3	90.3	-1.20%	91.3	90.1	-1.40%	91.3	89.6	-1.90%	91.3	90.9	-0.50%	91.3	90	-1.50%	91.3	89.2	-2.40%	91.3	93.4	2.30%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	317.8	317.8	0.00%	317.8	311	-2.10%	317.8	322.9	1.60%	317.8	315.1	-0.80%	317.8	315.1	-0.80%	317.8	323	1.60%	317.8	315	-0.90%
60105 PR ISLD3	61950 BYRON 3	-204.7	-189.6	-7.40%	-204.7	-219.8	7.40%	-204.7	-196.4	-4.00%	-204.7	-209	2.10%	-204.7	-200.1	-2.30%	-204.7	-194.2	-5.10%	-204.7	-209.7	2.40%
60192 BLUE LK3	60050 WLMRTHTP	-496.1	-504.2	1.60%	-496.1	-515.7	4.00%	-496.1	-493.1	-0.60%	-496.1	-500.4	0.90%	-496.1	-496.8	0.20%	-496.1	-490.6	-1.10%	-496.1	-502.7	1.30%
60187 AS KING7	60325 WILOWRV7	128.6	128.9	0.20%	128.6	127.7	-0.70%	128.6	129.2	0.50%	128.6	128.3	-0.30%	128.6	128.4	-0.10%	128.6	129.3	0.50%	128.6	128.3	-0.20%
60238 REDROCK7	68966 GLENMONT	50	50.4	0.80%	50	48.5	-3.00%	50	50.6	1.20%	50	49.6	-0.90%	50	49.6	-0.80%	50	50.7	1.30%	50	49.8	-0.40%
62234 LKMARN 7	60276 AIRLAKE7	53.8	53.6	-0.40%	53.8	54.7	1.80%	53.8	53.6	-0.30%	53.8	53.9	0.20%	53.8	39.3	-26.90%	53.8	53.6	-0.40%	53.8	54	0.40%
SUBTOTALS FOR: MNEX (INFO)		-150.6	-143.2	-4.90%	-150.6	-193.6	28.60%	-150.6	-133.2	-11.50%	-150.6	-162.6	8.00%	-150.6	-164.4	9.20%	-150.6	-128.3	-14.80%	-150.6	-165.2	9.70%
		Difference =	7.3	**9.60%**	Difference =	-43.1	**-43.10%**	Difference =	17.4	[redacted]	Difference =	-12	**-24.00%**	Difference =	-13.8	**-13.80%**	Difference =	22.3	**22.30%**	Difference =	-14.7	**-14.70%**

Distribution Factor Analysis

Transmission Alternative 7

2009 Summer Peak Case

Generation to Generation Dispatch

Interface Definition From Bus	To Bus	Base Case with Xmsn	CMMPA BGSII Case at 76 MW	Difference	Base Case with Xmsn	GRE BGSII Case at 100 MW	Difference	Base Case with Xmsn	HCPD BGSII Case at 75 MW	Difference	Base Case with Xmsn	HUC BGSII Case at 50 MW	Difference	Base Case with Xmsn	MMPA BGSII Case at 100 MW	Difference	Base Case with Xmsn	MRES BGSII Case at 100 MW	Difference	Base Case with Xmsn	OTP BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	383.7	392.3	2.20%	383.7	391.7	2.10%	383.7	376.9	-1.80%	383.7	386.6	0.70%	383.7	391.7	2.10%	383.7	376.1	-2.00%	383.7	387.1	0.90%
SUBTOTALS FOR: ARN-HAZLTN		383.7	392.3	2.20%	383.7	391.7	2.10%	383.7	376.9	-1.80%	383.7	386.6	0.70%	383.7	391.7	2.10%	383.7	376.1	-2.00%	383.7	387.1	0.90%
		Difference =	8.6		Difference =	8		Difference =	-6.8	**-9.10%**	Difference =	2.9		Difference =	8		Difference =	-7.7	**-7.70%**	Difference =	3.4	**3.40%**
64786 COOPER 3	59199 ST JOE 3	54.3	55.1	1.50%	54.3	54.9	1.10%	54.3	48.7	-10.20%	54.3	53.8	-0.90%	54.3	55.1	1.50%	54.3	55	1.40%	54.3	53.2	-1.90%
64786 COOPER 3	96039 7FAIRPT	63.3	63.9	1.00%	63.3	63.8	0.80%	63.3	59.1	-6.70%	63.3	63	-0.50%	63.3	64	1.00%	63.3	64.7	2.20%	63.3	62.6	-1.10%
SUBTOTALS FOR: COOPER_S		117.6	119	1.20%	117.6	118.7	0.90%	117.6	107.8	-8.30%	117.6	116.8	-0.60%	117.6	119.1	1.30%	117.6	119.7	1.80%	117.6	115.8	-1.50%
		Difference =	1.4	**1.90%**	Difference =	1.1	**1.10%**	Difference =	-9.8	**-13.00%**	Difference =	-0.8	**-1.50%**	Difference =	1.5	**1.50%**	Difference =	2.1	**2.10%**	Difference =	-1.8	**-1.80%**
60304 EAU CL 3	92494 ARP 345	93.4	90.1	-3.50%	93.4	86.7	-7.20%	93.4	98.3	5.30%	93.4	90.8	-2.80%	93.4	88.8	-4.80%	93.4	98.3	5.30%	93.4	90.7	-2.90%
SUBTOTALS FOR: ECL-ARP		93.4	90.1	-3.50%	93.4	86.7	-7.20%	93.4	98.3	5.30%	93.4	90.8	-2.80%	93.4	88.8	-4.80%	93.4	98.3	5.30%	93.4	90.7	-2.90%
		Difference =	-3.3	**-4.30%**	Difference =	-6.7	**-6.70%**	Difference =	5		Difference =	-2.6	**-5.20%**	Difference =	-4.5	**-4.50%**	Difference =	4.9	**4.90%**	Difference =	-2.7	**-2.70%**
65351 S3451 3	65354 S3454 3	82.4	82.9	0.60%	82.4	82.6	0.20%	82.4	89.3	8.30%	82.4	82.1	-0.30%	82.4	82.6	0.20%	82.4	83.9	1.80%	82.4	82.2	-0.30%
65351 S3451 3	65359 S3459 3	30.2	31.7	4.90%	30.2	31.3	3.70%	30.2	37.5	24.10%	30.2	30.1	-0.30%	30.2	31.4	3.80%	30.2	34.2	13.30%	30.2	30	-0.60%
65451 S1251 5	65497 S1297 5	39.7	39.9	0.70%	39.7	39.9	0.50%	39.7	40.9	3.10%	39.7	39.6	0.00%	39.7	39.9	0.60%	39.7	40.6	2.40%	39.7	39.6	-0.10%
SUBTOTALS FOR: FT CAL_S		152.3	154.5	1.50%	152.3	153.8	1.00%	152.3	167.7	10.10%	152.3	151.9	-0.20%	152.3	153.8	1.00%	152.3	158.7	4.20%	152.3	151.8	-0.30%
		Difference =	2.3	**3.00%**	Difference =	1.5	**1.50%**	Difference =	15.4		Difference =	-0.4	**-0.70%**	Difference =	1.6	**1.60%**	Difference =	6.4		Difference =	-0.4	**-0.40%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	155.9	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	156.4	-0.90%	157.8	157.9	0.00%	157.8	157.8	0.00%	157.8	157.9	0.00%	157.8	157.8	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	268.5	-1.90%	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	274.2	0.20%	273.8	273.8	0.00%
64831 GENTLMN3	64984 SWEET W3	328.1	328.2	0.00%	328.1	328.2	0.10%	328.1	321.8	-1.90%	328.1	328.2	0.00%	328.1	328.2	0.00%	328.1	328.6	0.20%	328.1	328.1	0.00%
64831 GENTLMN3	64943 REDWILO3	277	277.8	0.30%	277	277.7	0.30%	277	274	-1.10%	277	276.9	0.00%	277	277.9	0.30%	277	278	0.40%	277	276.5	-0.20%
SUBTOTALS FOR: GGS		1356.4	1357.4	0.10%	1356.4	1357.5	0.10%	1356.4	1337.6	-1.40%	1356.4	1356.6	0.00%	1356.4	1357.6	0.10%	1356.4	1358.5	0.20%	1356.4	1356.1	0.00%
		Difference =	1	**1.40%**	Difference =	1.1	**1.10%**	Difference =	-18.8	**-25.00%**	Difference =	0.2	**0.50%**	Difference =	1.2	**1.20%**	Difference =	2.2	**2.20%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	55.5	56.6	2.00%	55.5	56.7	2.20%	55.5	53.9	-2.90%	55.5	55.8	0.60%	55.5	56.8	2.30%	55.5	58	4.40%	55.5	55.5	0.00%
64839 GR ISLD4	64780 COLMB W4	99.7	99.5	-0.20%	99.7	99.6	-0.10%	99.7	95.8	-3.90%	99.7	99.8	0.10%	99.7	99.6	-0.10%	99.7	99.5	-0.20%	99.7	99.8	0.00%
66571 GR ISLD3	64896 MCCOOL 3	145	147.6	1.80%	145	147.8	1.90%	145	146.6	1.10%	145	145.7	0.50%	145	148	2.10%	145	150.5	3.80%	145	145	0.00%
SUBTOTALS FOR: GRIS_LNC		300.2	303.7	1.20%	300.2	304	1.30%	300.2	296.3	-1.30%	300.2	301.3	0.40%	300.2	304.4	1.40%	300.2	308	2.60%	300.2	300.2	0.00%
		Difference =	3.5	**4.80%**	Difference =	3.8	**3.80%**	Difference =	-3.9	**-5.20%**	Difference =	1.1	**2.20%**	Difference =	4.2	**4.20%**	Difference =	7.7		Difference =	0	**0.00%**
57981 LACYGNE7	57965 W.GRDNR7	577.7	577.7	0.00%	577.7	577.8	0.00%	577.7	578.7	0.20%	577.7	578	0.00%	577.7	577.7	0.00%	577.7	578.9	0.20%	577.7	578.2	0.10%
57981 LACYGNE7	57968 STILWEL7	720.5	720.6	0.00%	720.5	720.7	0.00%	720.5	721	0.10%	720.5	720.7	0.00%	720.5	720.6	0.00%	720.5	721.3	0.10%	720.5	720.9	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.2	1298.3	0.00%	1298.2	1298.5	0.00%	1298.2	1299.7	0.10%	1298.2	1298.7	0.00%	1298.2	1298.2	0.00%	1298.2	1300.2	0.10%	1298.2	1299.2	0.10%
		Difference =	0	**0.00%**	Difference =	0.2	**0.20%**	Difference =	1.5	**1.90%**	Difference =	0.5	**1.00%**	Difference =	0	**0.00%**	Difference =	1.9	**1.90%**	Difference =	0.9	**0.90%**
62234 LKMARN 7	60276 AIRLAKE7	53.7	53.5	-0.40%	53.7	54.7	1.70%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	53.9	0.40%
SUBTOTALS FOR: LKM-WFB		53.7	53.5	-0.40%	53.7	54.7	1.70%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	53.9	0.40%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.5	**-14.50%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-143.8	-144.3	0.30%	-143.8	-144.5	0.50%	-143.8	-144	0.10%	-143.8	-144	0.20%	-143.8	-144.4	0.40%	-143.8	-144.1	0.20%	-143.8	-144	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1134.8	-1141.6	0.60%	1134.8	-1144.6	0.90%	-1134.8	-1137.7	0.30%	-1134.8	-1137.9	0.30%	-1134.8	-1143.4	0.80%	1134.8	-1138.6	0.30%	-1134.8	-1133.2	-0.10%
66752 DRAYTON4	67557 LETELER4	-237.1	-233.1	-1.70%	-237.1	-231.5	-2.40%	-237.1	-235	-0.90%	-237.1	-235.3	-0.80%	-237.1	-232	-2.10%	-237.1	-234.4	-1.20%	-237.1	-239.1	0.90%
63379 RUGBY 4	67523 GLENBOR4	40.9	44	7.70%	40.9	45.4	11.20%	40.9	41.8	2.30%	40.9	42.3	3.60%	40.9	44.9	9.80%	40.9	42.2	3.20%	40.9	41.6	1.90%
SUBTOTALS FOR: MHEX_N		-1474.8	-1475	0.00%	1474.8	-1475	0.00%	-1474.8	-1474.9	0.00%	-1474.8	-1474.9	0.00%	-1474.8	-1475	0.00%	1474.8	-1474.9	0.00%	-1474.8	-1474.7	0.00%
		Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	-0.1	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	0	**0.00%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	146.3	146.7	0.30%	146.3	146.9	0.50%	146.3	146.5	0.10%	146.3	146.5	0.20%	146.3	146.9	0.40%	146.3	146.5	0.20%	146.3	146.4	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1151.4	1158.4	0.60%	1151.4	1161.5	0.90%	1151.4	1154.4	0.30%	1151.4	1154.6	0.30%	1151.4	1160.4	0.80%	1151.4	1155.4	0.30%	1151.4	1149.8	-0.10%
67557 LETELER4	66752 DRAYTON4	241.6	237.4	-1.70%	241.6	235.7	-2.40%	241.6	239.4	-0.90%	241.6	239.7	-0.80%	241.6	236.3	-2.20%	241.6	238.7	-1.20%	241.6	243.7	0.90%
67523 GLENBOR4	63379 RUGBY 4	-40.5	-43.6	7.60%	-40.5	-45	11.10%	-40.5	-41.4	2.20%	-40.5	-42	3.60%	-40.5	-44.4	9.70%	-40.5	-41.8	3.20%	-40.5	-41.3	1.90%
SUBTOTALS FOR: MHEX_S		1498.8	1499	0.00%	1498.8	1499.1	0.00%	1498.8	1498.8	0.00%	1498.8	1498.9	0.00%	1498.8	1499.1	0.00%	1498.8	1498.8	0.00%	1498.8	1498.7	0.00%
		Difference =	0.3	**0.40%**	Difference =	0.4	**0.40%**	Difference =	0.1	**0.10%**	Difference =	0.1	**0.20%**	Difference =	0.3	**0.30%**	Difference =	0.1	**0.10%**	Difference =	-0.1	**-0.10%**
68613 AUBURNT4	67525 RESTON 4	42.3	42.2	-0.30%	42.3	42.1	-0.50%	42.3	42.3	-0.10%	42.3	42.2	-0.10%	42.3	42.1	-0.40%	42.3	42.2	-0.20%	42.3	42.3	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.6	-90.5	-0.10%	-90.6	-90.5	-0.10%	-90.6	-90.5	0.00%	-90.6	-90.5	0.00%	-90.6	-90.5	-0.10%	-90.6	-90.5	0.00%	-90.6	-90.5	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.3	-1.20%	-6.3	-6.2	-1.70%	-6.3	-6.3	-0.50%	-6.3	-6.3	-0.50%	-6.3	-6.2	-1.60%	-6.3	-6.3	-0.60%	-6.3	-6.3	0.10%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.1	-42	-0.30%	-42.1	-41.9	-0.50%	-42.1	-42.1	-0.10%	-42.1	-42.1	-0.10%	-42.1	-42	-0.40%	-42.1	-42.1	-0.20%	-42.1	-42.1	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.4	91.3	-0.10%	91.4	91.3	-0.10%	91.4	91.3	0.00%	91.4	91.3	0.00%	91.4	91.3	-0.10%	91.4	91.3	0.00%	91.4	91.3	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.5	-1.10%	6.5	6.4	-1.70%	6.5	6.5	-0.50%	6.5	6.5	-0.50%	6.5	6.4	-1.50%	6.5	6.5	-0.60%	6.5	6.5	0.10%
SUBTOTALS FOR: MH_SPC_W		55.8	55.8	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 7

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	9.6	5.1	-46.50%	9.6	5.2	-46.00%	9.6	13.6	41.50%	9.6	8.7	-9.20%	9.6	5.3	-45.20%	9.6	16.9	76.00%	9.6	9	-6.60%
SUBTOTALS FOR: MNTZUMA_W		9.6	5.1	-46.50%	9.6	5.2	-46.00%	9.6	13.6	41.50%	9.6	8.7	-9.20%	9.6	5.3	-45.20%	9.6	16.9	76.00%	9.6	9	-6.60%
		Difference =	-4.5	**-5.90%**	Difference =	-4.4	**-4.40%**	Difference =	4	[redacted]	Difference =	-0.9	**-1.80%**	Difference =	-4.3	**-4.30%**	Difference =	7.3	[redacted]	Difference =	-0.6	**-0.60%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.7	-0.20%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.6	139.3	-0.20%	139.6	139.1	-0.30%	139.6	139.4	-0.10%	139.6	139.5	-0.10%	139.6	139.2	-0.30%	139.6	139.3	-0.20%	139.6	140.3	0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.8	135.5	-0.20%	135.8	135.4	-0.30%	135.8	135.6	-0.10%	135.8	135.7	-0.10%	135.8	135.5	-0.30%	135.8	135.6	-0.20%	135.8	136.5	0.50%
61626 BOSWELL4	61627 SHANNON4	87.5	88.1	0.60%	87.5	88.3	0.90%	87.5	87.9	0.40%	87.5	87.7	0.20%	87.5	88.3	0.80%	87.5	88	0.50%	87.5	86.1	-1.60%
61615 ARROWHD4	61614 98L TAP4	56.6	55.3	-2.20%	56.6	55.1	-2.50%	56.6	55.1	-2.70%	56.6	56.3	-0.50%	56.6	55.1	-2.60%	56.6	54.8	-3.10%	56.6	59.2	4.70%
61615 ARROWHD4	61554 AWHD1JCT	155.1	154.9	-0.10%	155.1	154.8	-0.20%	155.1	154.7	-0.20%	155.1	155	0.00%	155.1	154.8	-0.10%	155.1	154.7	-0.20%	155.1	155.8	0.50%
61615 ARROWHD4	61556 AWHD2JCT	160.5	160.3	-0.10%	160.5	160.2	-0.20%	160.5	160.1	-0.20%	160.5	160.4	0.00%	160.5	160.2	-0.10%	160.5	160.1	-0.20%	160.5	161.2	0.50%
61615 ARROWHD4	61624 FORBES 4	-110.3	-110.6	0.30%	-110.3	-110.1	-0.20%	-110.3	-111.4	1.00%	-110.3	-110.2	-0.10%	-110.3	-110.5	0.10%	-110.3	-111.5	1.10%	-110.3	-110	-0.30%
61615 ARROWHD4	63055 BEARCK 4	55.8	57	2.20%	55.8	58.5	4.90%	55.8	55.6	-0.20%	55.8	56.7	1.70%	55.8	57.7	3.50%	55.8	55.8	0.10%	55.8	54.7	-1.90%
SUBTOTALS FOR: MP_EXPORT		777.5	776.9	-0.10%	777.5	778.5	0.10%	777.5	774.2	-0.40%	777.5	778.3	0.10%	777.5	777.4	0.00%	777.5	773.9	-0.50%	777.5	780.9	0.40%
		Difference =	-0.6	**-0.80%**	Difference =	1	**1.00%**	Difference =	-3.3	**-4.40%**	Difference =	0.7	**1.50%**	Difference =	-0.1	**-0.10%**	Difference =	-3.6	**-3.60%**	Difference =	3.4	**3.40%**
60105 PR ISLD3	61950 BYRON 3	-203	-187.9	-7.50%	-203	-218	7.40%	-203	-194.7	-4.10%	-203	-207.2	2.10%	-203	-198.2	-2.40%	-203	-192.4	-5.20%	-203	-208	2.40%
60304 EAU CL 3	92494 ARP 345	93.4	90.1	-3.50%	93.4	86.7	-7.20%	93.4	98.3	5.30%	93.4	90.8	-2.80%	93.4	88.8	-4.80%	93.4	98.3	5.30%	93.4	90.7	-2.90%
SUBTOTALS FOR: MWSI		-109.7	-97.8	-10.80%	-109.7	-131.4	19.80%	-109.7	-96.4	-12.10%	-109.7	-116.4	6.20%	-109.7	-109.3	-0.30%	-109.7	-94.2	-14.10%	-109.7	-117.3	7.00%
		Difference =	11.9	[redacted]	Difference =	-21.7	**-21.70%**	Difference =	13.3	[redacted]	Difference =	-6.8	**-13.50%**	Difference =	0.3	**0.30%**	Difference =	15.5	[redacted]	Difference =	-7.7	**-7.70%**
66756 SQBUTTE4	63049 STANTON4	-38.1	-36.3	-4.80%	-38.1	-35.6	-6.50%	-38.1	-36.7	-3.70%	-38.1	-37.2	-2.20%	-38.1	-35.7	-6.20%	-38.1	-36.2	-5.00%	-38.1	-38.7	1.60%
66756 SQBUTTE4	66751 CENTER 4	-41.7	-42.5	1.90%	-41.7	-43	3.00%	-41.7	-41.5	-0.70%	-41.7	-42.2	1.10%	-41.7	-42.8	2.50%	-41.7	-41.6	-0.40%	-41.7	-43.2	3.60%
66756 SQBUTTE4	66791 CENTER 3	92.1	91	-1.10%	92.1	90.8	-1.30%	92.1	90.4	-1.80%	92.1	91.7	-0.40%	92.1	90.7	-1.40%	92.1	90	-2.30%	92.1	94.2	2.30%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.3	0.60%	-23.2	-23.4	0.90%	-23.2	-23.2	-0.10%	-23.2	-23.3	0.30%	-23.2	-23.4	0.70%	-23.2	-23.2	0.00%	-23.2	-23.4	0.70%
63041 COAL CR4	63049 STANTON4	-125	-125.9	0.80%	-125	-126.4	1.20%	-125	-125.1	0.10%	-125	-125.5	0.40%	-125	-126.2	1.00%	-125	-125.2	0.20%	-125	-125.8	0.60%
63041 COAL CR4	63381 UNDERWD4	144.3	145.4	0.80%	144.3	145.9	1.10%	144.3	144.4	0.10%	144.3	144.8	0.40%	144.3	145.7	1.00%	144.3	144.5	0.10%	144.3	145.2	0.70%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	130.8	132.4	1.20%	130.8	132.4	1.20%	130.8	135	3.20%	130.8	131.2	0.40%	130.8	132.8	1.50%	130.8	135.3	3.40%	130.8	128.9	-1.40%
67105 LELANDO3	67160 GROTON 3	253.7	252.4	-0.50%	253.7	251.8	-0.70%	253.7	252	-0.70%	253.7	253.2	-0.20%	253.7	252.1	-0.60%	253.7	253.1	-0.30%	253.7	250.9	-1.10%
67101 ANTELOP3	67120 BRDLAND3	192.3	192	-0.20%	192.3	191.6	-0.30%	192.3	192.7	0.20%	192.3	192.1	-0.10%	192.3	191.9	-0.20%	192.3	193.4	0.60%	192.3	189.8	-1.30%
63314 BIGSTON4	66503 BLAIR 4	-23.2	1.9	-108.10%	-23.2	9.2	-139.80%	-23.2	3.5	-115.10%	-23.2	-7.3	-68.50%	-23.2	9.7	-142.00%	-23.2	13.6	-158.60%	-23.2	0.1	-100.50%
63320 6MI GRV4	**66550 GRANITF4**	-11.8	-5	-57.70%	-11.8	-2.9	-75.50%	-11.8	-4.9	-58.30%	-11.8	-5.5	-53.50%	-11.8	-2.5	-79.00%	-11.8	-2.2	-81.20%	-11.8	-12.8	7.90%
63336 AUDUBON4	63053 HUBBARD4	112.2	116	3.30%	112.2	117.5	4.60%	112.2	114.4	1.90%	112.2	114	1.60%	112.2	117	4.20%	112.2	115	2.50%	112.2	108.5	-3.40%
66521 SULLYBT4	66519 OAHE 4	-71.9	-70.9	-1.40%	-71.9	-70.9	-1.30%	-71.9	-68.9	-4.10%	-71.9	-71.6	-0.40%	-71.9	-70.6	-1.70%	-71.9	-68.8	-4.20%	-71.9	-73.6	2.50%
63052 INMAN 4	61611 WINGRIV4	97.2	103.4	6.40%	97.2	105.7	8.80%	97.2	101.5	4.50%	97.2	100.2	3.20%	97.2	105.1	8.20%	97.2	102.7	5.70%	97.2	77.8	-19.90%
66470 BISON 4	66497 MAURINE4	-1.7	-1.1	-36.00%	-1.7	-1.1	-35.20%	-1.7	1	-155.70%	-1.7	-1.6	-9.90%	-1.7	-1	-44.40%	-1.7	-0.1	-96.00%	-1.7	-2.4	40.70%
66716 LAPORTE7	61640 BADOURA7	-0.5	0.3	-163.70%	-0.5	0.7	-233.30%	-0.5	-0.1	-81.20%	-0.5	-0.1	-84.80%	-0.5	0.6	-210.50%	-0.5	0	-106.10%	-0.5	-0.5	-5.60%
63222 ALEXAND7	60144 DGLASCO7	30.9	32.3	4.70%	30.9	32.9	6.50%	30.9	31.9	3.40%	30.9	31.8	3.00%	30.9	32.8	6.10%	30.9	32.2	4.30%	30.9	23.9	-22.60%
67327 ELLENDL7	67401 ABDNJCT7	-7.1	-6.5	-9.50%	-7.1	-6.4	-10.70%	-7.1	-6	-16.10%	-7.1	-6.8	-5.00%	-7.1	-6.3	-12.60%	-7.1	-5.5	-23.50%	-7.1	-8.6	20.40%
66432 EDGELEY7	66534 ORDWAY 7	-20.4	-20.5	0.70%	-20.4	-20.7	1.60%	-20.4	-20.1	-1.30%	-20.4	-20.4	0.40%	-20.4	-20.5	0.80%	-20.4	-19.7	-3.00%	-20.4	-22.2	9.00%
66438 FORMAN 7	66522 SUMMIT-7	-23.4	-23	-1.90%	-23.4	-23	-2.10%	-23.4	-22.6	-3.50%	-23.4	-23.2	-1.20%	-23.4	-22.8	-2.60%	-23.4	-21.7	-7.20%	-23.4	-25.1	7.10%
63311 CANBY 4	66550 GRANITF4	73.6	86.2	17.20%	73.6	90.4	22.80%	73.6	85.6	16.40%	73.6	83.5	13.50%	73.6	90.4	23.00%	73.6	89.6	21.80%	73.6	85.9	16.70%
62006 KERKHO 7	62005 KERKHOT7	16.5	17.9	8.60%	16.5	18.3	11.40%	16.5	17.8	8.00%	16.5	18.4	11.50%	16.5	18.4	11.70%	16.5	18.2	10.70%	16.5	16.3	-0.90%
66752 DRAYTON4	67557 LETELER4	-241.6	-237.4	-1.70%	-241.6	-235.7	-2.40%	-241.6	-239.4	-0.90%	-241.6	-239.7	-0.80%	-241.6	-236.3	-2.20%	-241.6	-238.7	-1.20%	-241.6	-243.7	0.90%
63379 RUGBY 4	67523 GLENBOR4	40.9	44	7.70%	40.9	45.4	11.20%	40.9	41.8	2.30%	40.9	42.3	3.60%	40.9	44.9	9.80%	40.9	42.2	3.20%	40.9	41.6	1.90%
63320 6MI GRV4	**63050 WILLMAR4**	78	83	6.50%	78	84.8	8.80%	78	82.3	5.50%	78	82.6	6.00%	78	84.7	8.70%	78	83.6	7.30%	78	79.9	2.50%
SUBTOTALS FOR: NDEX		624.2	697.4	11.70%	624.2	720.1	15.40%	624.2	697.5	11.70%	624.2	673.4	7.90%	624.2	720.4	15.40%	624.2	722	15.70%	624.2	614.8	-1.50%
		Difference =	73.2	[redacted]	Difference =	95.9	[redacted]	Difference =	73.3	[redacted]	Difference =	49.1	[redacted]	Difference =	96.2	[redacted]	Difference =	97.8	[redacted]	Difference =	-9.4	**-9.40%**
36406 WEMPL; B	39058 PAD 345	635.7	637.2	0.20%	635.7	638.5	0.40%	635.7	633	-0.40%	635.7	636.8	0.20%	635.7	637.5	0.30%	635.7	632.6	-0.50%	635.7	637.5	0.30%
SUBTOTALS FOR: NI_WUMS		635.7	637.2	0.20%	635.7	638.5	0.40%	635.7	633	-0.40%	635.7	636.8	0.20%	635.7	637.5	0.30%	635.7	632.6	-0.50%	635.7	637.5	0.30%
		Difference =	1.4	**1.90%**	Difference =	2.7	**2.70%**	Difference =	-2.7	**-3.70%**	Difference =	1.1	**2.20%**	Difference =	1.8	**1.80%**	Difference =	-3.1	**-3.10%**	Difference =	1.8	**1.80%**
60105 PR ISLD3	61950 BYRON 3	-203	-187.9	-7.50%	-203	-218	7.40%	-203	-194.7	-4.10%	-203	-207.2	2.10%	-203	-198.2	-2.40%	-203	-192.4	-5.20%	-203	-208	2.40%
SUBTOTALS FOR: PRI-BYN		-203	-187.9	-7.50%	-203	-218	7.40%	-203	-194.7	-4.10%	-203	-207.2	2.10%	-203	-198.2	-2.40%	-203	-192.4	-5.20%	-203	-208	2.40%
		Difference =	15.1	[redacted]	Difference =	-15	**-15.00%**	Difference =	8.3	[redacted]	Difference =	-4.2	**-8.40%**	Difference =	4.8	**4.80%**	Difference =	10.6	[redacted]	Difference =	-5	**-5.00%**
36382 QUAD ;	34036 ROCK CK3	509.6	511.4	0.30%	509.6	511.3	0.30%	509.6	508.5	-0.20%	509.6	510.3	0.10%	509.6	511.3	0.30%	509.6	508.6	-0.20%	509.6	510.4	0.10%
SUBTOTALS FOR: QUAD-ROCKC		509.6	511.4	0.30%	509.6	511.3	0.30%	509.6	508.5	-0.20%	509.6	510.3	0.10%	509.6	511.3	0.30%	509.6	508.6	-0.20%	509.6	510.4	0.10%
		Difference =	1.8	**2.30%**	Difference =	1.6	**1.60%**	Difference =	-1.1	**-1.40%**	Difference =	0.7	**1.30%**	Difference =	1.6	**1.60%**	Difference =	-1	**-1.00%**	Difference =	0.7	**0.70%**
36382 QUAD ;	64405 SUB 91 3	554.5	554.9	0.10%	554.5	554.3	0.00%	554.5	554.9	0.10%	554.5	554.7	0.00%	554.5	554.6	0.00%	554.5	557	0.50%	554.5	554.8	0.00%
64400 MECCORD3	64403 E MOLIN3	275.1	275.2	0.00%	275.1	274.7	-0.10%	275.1	275.6	0.20%	275.1	275.2	0.00%	275.1	275	0.00%	275.1	277.1	0.70%	275.1	275.2	0.00%

Distribution Factor Analysis

Transmission Alternative 7

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W	829.6	830	0.10%	829.6	829	-0.10%	829.6	830.6	0.10%	829.6	829.8	0.00%	829.6	829.5	0.00%	829.6	834.1	0.50%	829.6	829.9	0.00%
	Difference =	0.5	**0.60%**	Difference =	-0.6	**-0.60%**	Difference =	1	**1.30%**	Difference =	0.3	**0.50%**	Difference =	0	**0.00%**	Difference =	4.5	**4.50%**	Difference =	0.4	**0.40%**
64831 GENTLMN3 64943 REDWILO3	277	277.8	0.30%	277	277.7	0.30%	277	274	-1.10%	277	276.9	0.00%	277	277.9	0.30%	277	278	0.40%	277	276.5	-0.20%
SUBTOTALS FOR: WNE_WKS	277	277.8	0.30%	277	277.7	0.30%	277	274	-1.10%	277	276.9	0.00%	277	277.9	0.30%	277	278	0.40%	277	276.5	-0.20%
	Difference =	0.8	**1.10%**	Difference =	0.8	**0.80%**	Difference =	-2.9	**-3.90%**	Difference =	0	**-0.10%**	Difference =	0.9	**0.90%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4 63049 STANTON4	-38.1	-36.3	-4.80%	-38.1	-35.6	-6.50%	-38.1	-36.7	-3.70%	-38.1	-37.2	-2.20%	-38.1	-35.7	-6.20%	-38.1	-36.2	-5.00%	-38.1	-38.7	1.60%
66756 SQBUTTE4 66751 CENTER 4	-41.7	-42.5	1.90%	-41.7	-43	3.00%	-41.7	-41.5	-0.70%	-41.7	-42.2	1.10%	-41.7	-42.8	2.50%	-41.7	-41.6	-0.40%	-41.7	-43.2	3.60%
66756 SQBUTTE4 66791 CENTER 3	92.1	91	-1.10%	92.1	90.8	-1.30%	92.1	90.4	-1.80%	92.1	91.7	-0.40%	92.1	90.7	-1.40%	92.1	90	-2.30%	92.1	94.2	2.30%
SUBTOTALS FOR: Y2DC	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3 60304 EAU CL 3	318.9	318.9	0.00%	318.9	312.1	-2.10%	318.9	323.9	1.60%	318.9	316.3	-0.80%	318.9	316.2	-0.80%	318.9	324.1	1.70%	318.9	316.1	-0.90%
60105 PR ISLD3 61950 BYRON 3	-203	-187.9	-7.50%	-203	-218	7.40%	-203	-194.7	-4.10%	-203	-207.2	2.10%	-203	-198.2	-2.40%	-203	-192.4	-5.20%	-203	-208	2.40%
60192 BLUE LK3 60050 WLMRTHTP	-494.1	-502	1.60%	-494.1	-513.5	3.90%	-494.1	-490.9	-0.60%	-494.1	-498.3	0.90%	-494.1	-494.6	0.10%	-494.1	-488.5	-1.10%	-494.1	-500.6	1.30%
60187 AS KING7 60325 WILOWRV7	128.8	129	0.20%	128.8	127.9	-0.70%	128.8	129.4	0.50%	128.8	128.4	-0.30%	128.8	128.6	-0.10%	128.8	129.4	0.50%	128.8	128.5	-0.20%
60238 REDROCK7 68966 GLENMONT	50.2	50.6	0.80%	50.2	48.7	-3.00%	50.2	50.8	1.20%	50.2	49.8	-0.80%	50.2	49.8	-0.80%	50.2	50.8	1.30%	50.2	50	-0.40%
62234 LKMARN 7 60276 AIRLAKE7	53.7	53.5	-0.40%	53.7	54.7	1.70%	53.7	53.6	-0.30%	53.7	53.8	0.20%	53.7	39.3	-26.90%	53.7	53.5	-0.40%	53.7	53.9	0.40%
SUBTOTALS FOR: MNEX (INFO)	-145.6	-137.9	-5.30%	-145.6	-188.2	29.30%	-145.6	-128	-12.10%	-145.6	-157.2	8.00%	-145.6	-158.9	9.10%	-145.6	-123	-15.50%	-145.6	-160.1	10.00%
	Difference =	7.7	**10.10%**	Difference =	-42.6	**-42.60%**	Difference =	17.6	**23.40%**	Difference =	-11.7	**-23.30%**	Difference =	-13.3	**-13.30%**	Difference =	22.6	**22.60%**	Difference =	-14.6	**-14.60%**

Distribution Factor Analysis

Transmission Alternative 8

2009 Summer Peak Case

Generation to Generation Dispatch

Interface Definition			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	382.2	390.6	2.20%	382.2	389.9	2.00%	382.2	375.2	-1.80%	382.2	384.8	0.70%	382.2	390	2.00%	382.2	374.4	-2.00%	382.2	385.5	0.90%
SUBTOTALS FOR: ARN-HAZLTN		382.2	390.6	2.20%	382.2	389.9	2.00%	382.2	375.2	-1.80%	382.2	384.8	0.70%	382.2	390	2.00%	382.2	374.4	-2.00%	382.2	385.5	0.90%
		Difference =	8.4		Difference =	7.7		Difference =	-7		Difference =	2.6		Difference =	7.7		Difference =	-7.8	**-7.80%**	Difference =	3.3	**3.30%**
64786 COOPER 3	59199 ST JOE 3	53.8	54.8	1.80%	53.8	54.5	1.30%	53.8	48.4	-10.20%	53.8	53.6	-0.50%	53.8	54.8	1.70%	53.8	54.5	1.30%	53.8	52.8	-1.90%
64786 COOPER 3	96039 7FAIRPT	63	63.7	1.20%	63	63.5	0.90%	63	58.8	-6.60%	63	62.8	-0.30%	63	63.7	1.10%	63	64.4	2.20%	63	62.3	-1.10%
SUBTOTALS FOR: COOPER_S		116.8	118.6	1.50%	116.8	118.1	1.10%	116.8	107.2	-8.20%	116.8	116.4	-0.40%	116.8	118.5	1.40%	116.8	118.9	1.80%	116.8	115.1	-1.50%
		Difference =	1.7	**2.30%**	Difference =	1.2	**1.20%**	Difference =	-9.6	**-12.80%**	Difference =	-0.4	**-0.90%**	Difference =	1.6	**1.60%**	Difference =	2.1	**2.10%**	Difference =	-1.7	**-1.70%**
60304 EAU CL 3	92494 ARP 345	94.7	91.6	-3.30%	94.7	88.2	-6.90%	94.7	99.8	5.40%	94.7	92.3	-2.50%	94.7	90.3	-4.60%	94.7	99.6	5.30%	94.7	92	-2.80%
SUBTOTALS FOR: ECL-ARP		94.7	91.6	-3.30%	94.7	88.2	-6.90%	94.7	99.8	5.40%	94.7	92.3	-2.50%	94.7	90.3	-4.60%	94.7	99.6	5.30%	94.7	92	-2.80%
		Difference =	-3.1	**-4.10%**	Difference =	-6.5	**-6.50%**	Difference =	5.2		Difference =	-2.4	**-4.70%**	Difference =	-4.3	**-4.30%**	Difference =	5		Difference =	-2.7	**-2.70%**
65351 S3451 3	65354 S3454 3	82.3	82.8	0.70%	82.3	82.5	0.30%	82.3	89.2	8.40%	82.3	82.1	-0.20%	82.3	82.5	0.30%	82.3	83.7	1.80%	82.3	82.1	-0.20%
65351 S3451 3	65359 S3459 3	29.8	31.4	5.20%	29.8	31	3.80%	29.8	37.1	24.50%	29.8	29.8	0.00%	29.8	31	3.90%	29.8	33.8	13.30%	29.8	29.7	-0.60%
65451 S1251 5	65497 S1297 5	39.6	39.9	0.70%	39.6	39.8	0.60%	39.6	40.8	3.20%	39.6	39.6	0.00%	39.6	39.8	0.60%	39.6	40.5	2.30%	39.6	39.6	-0.10%
SUBTOTALS FOR: FT CAL_S		151.7	154.1	1.60%	151.7	153.3	1.00%	151.7	167.1	10.20%	151.7	151.5	-0.10%	151.7	153.3	1.00%	151.7	158	4.20%	151.7	151.3	-0.30%
		Difference =	2.4	**3.20%**	Difference =	1.6	**1.60%**	Difference =	15.5		Difference =	-0.2	**-0.40%**	Difference =	1.6	**1.60%**	Difference =	6.4		Difference =	-0.4	**-0.40%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	155.9	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	156.4	-0.90%	157.8	157.9	0.00%	157.8	157.8	0.00%	157.8	157.9	0.00%	157.8	157.8	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.8	0.00%	273.8	273.9	0.00%	273.8	268.5	-1.90%	273.8	273.8	0.00%	273.8	273.9	0.00%	273.8	274.2	0.20%	273.8	273.8	0.00%
64831 GENTLMN3	64984 SWEET W3	328.1	328.1	0.00%	328.1	328.2	0.00%	328.1	321.8	-1.90%	328.1	328.1	0.00%	328.1	328.2	0.00%	328.1	328.6	0.20%	328.1	328.1	0.00%
64831 GENTLMN3	64943 REDWILO3	276.6	277.5	0.30%	276.6	277.5	0.30%	276.6	273.7	-1.10%	276.6	276.7	0.00%	276.6	277.6	0.40%	276.6	277.6	0.40%	276.6	276.2	-0.10%
SUBTOTALS FOR: GGS		1356.1	1357.1	0.10%	1356.1	1357.1	0.10%	1356.1	1337.3	-1.40%	1356.1	1356.3	0.00%	1356.1	1357.3	0.10%	1356.1	1358.2	0.20%	1356.1	1355.8	0.00%
		Difference =	1	**1.40%**	Difference =	1.1	**1.10%**	Difference =	-18.8	**-25.00%**	Difference =	0.3	**0.50%**	Difference =	1.2	**1.20%**	Difference =	2.1	**2.10%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	55.2	56.3	2.00%	55.2	56.3	2.10%	55.2	53.6	-3.00%	55.2	55.5	0.50%	55.2	56.5	2.30%	55.2	57.6	4.40%	55.2	55.2	0.00%
64839 GR ISLD4	64780 COLMB.W4	99.8	99.5	-0.30%	99.8	99.6	-0.20%	99.8	95.9	-3.90%	99.8	99.9	0.10%	99.8	99.6	-0.20%	99.8	99.6	-0.20%	99.8	99.8	0.00%
66571 GR ISLD3	64896 MCCOOL 3	144.3	146.9	1.80%	144.3	147	1.90%	144.3	145.9	1.10%	144.3	145	0.50%	144.3	147.2	2.00%	144.3	149.7	3.70%	144.3	144.2	-0.10%
SUBTOTALS FOR: GRIS_LNC		299.3	302.7	1.10%	299.3	303	1.20%	299.3	295.3	-1.30%	299.3	300.3	0.30%	299.3	303.3	1.40%	299.3	306.9	2.60%	299.3	299.2	0.00%
		Difference =	3.4	**4.50%**	Difference =	3.7	**3.70%**	Difference =	-3.9	**-5.30%**	Difference =	1	**2.00%**	Difference =	4	**4.00%**	Difference =	7.7		Difference =	-0.1	**-0.10%**
57981 LACYGNE7	57965 W.GRDNR7	577.9	577.7	0.00%	577.9	577.8	0.00%	577.9	578.8	0.20%	577.9	578	0.00%	577.9	577.7	0.00%	577.9	579	0.20%	577.9	578.3	0.10%
57981 LACYGNE7	57968 STILWEL7	720.6	720.6	0.00%	720.6	720.7	0.00%	720.6	721	0.10%	720.6	720.7	0.00%	720.6	720.6	0.00%	720.6	721.4	0.10%	720.6	721	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.4	1298.3	0.00%	1298.4	1298.5	0.00%	1298.4	1299.8	0.10%	1298.4	1298.7	0.00%	1298.4	1298.3	0.00%	1298.4	1300.4	0.20%	1298.4	1299.3	0.10%
		Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.10%**	Difference =	1.4	**1.80%**	Difference =	0.3	**0.70%**	Difference =	-0.1	**-0.10%**	Difference =	2	**2.00%**	Difference =	0.9	**0.90%**
62234 LKMARN 7	60276 AIRLAKE7	53.6	53.4	-0.40%	53.6	54.6	1.70%	53.6	53.5	-0.30%	53.6	53.7	0.10%	53.6	39.2	-27.00%	53.6	53.4	-0.40%	53.6	53.8	0.40%
SUBTOTALS FOR: LKM-WFB		53.6	53.4	-0.40%	53.6	54.6	1.70%	53.6	53.5	-0.30%	53.6	53.7	0.10%	53.6	39.2	-27.00%	53.6	53.4	-0.40%	53.6	53.8	0.40%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.5	**-14.50%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-143.7	-144.1	0.30%	-143.7	-144.3	0.40%	-143.7	-143.9	0.10%	-143.7	-143.9	0.10%	-143.7	-144.2	0.40%	-143.7	-143.9	0.20%	-143.7	-143.8	0.10%
60173 ROSEAUN2	67564 DORSEY 2	1132.4	-1139	0.60%	1132.4	-1141.9	0.80%	1132.4	-1135.1	0.20%	1132.4	-1135.3	0.30%	1132.4	-1140.8	0.70%	-1132.4	-1136	0.30%	1132.4	-1130.7	-0.10%
66752 DRAYTON4	67557 LETELER4	-238.5	-234.6	-1.60%	-238.5	-233	-2.30%	-238.5	-236.5	-0.90%	-238.5	-236.9	-0.70%	-238.5	-233.6	-2.10%	-238.5	-235.9	-1.10%	-238.5	-240.6	0.90%
63379 RUGBY 4	67523 GLENBOR4	39.8	42.9	7.70%	39.8	44.3	11.20%	39.8	40.7	2.20%	39.8	41.2	3.50%	39.8	43.7	9.70%	39.8	41	3.10%	39.8	40.5	1.80%
SUBTOTALS FOR: MHEX_N		1474.8	-1474.9	0.00%	1474.8	-1475	0.00%	1474.8	-1474.8	0.00%	1474.8	-1474.8	0.00%	1474.8	-1475	0.00%	-1474.8	-1474.8	0.00%	1474.8	-1474.6	0.00%
		Difference =	-0.1	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	0	**-0.10%**	Difference =	0	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	0	**0.00%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	146.1	146.6	0.30%	146.1	146.8	0.50%	146.1	146.3	0.10%	146.1	146.3	0.20%	146.1	146.7	0.40%	146.1	146.4	0.20%	146.1	146.3	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1149	1155.7	0.60%	1149	1158.7	0.90%	1149	1151.8	0.20%	1149	1152	0.30%	1149	1157.6	0.80%	1149	1152.7	0.30%	1149	1147.3	-0.10%
67557 LETELER4	66752 DRAYTON4	243.1	239	-1.70%	243.1	237.3	-2.30%	243.1	240.9	-0.90%	243.1	241.3	-0.70%	243.1	237.9	-2.10%	243.1	240.3	-1.10%	243.1	245.2	0.90%
67523 GLENBOR4	63379 RUGBY 4	-39.5	-42.5	7.60%	-39.5	-43.8	11.10%	-39.5	-40.3	2.20%	-39.5	-40.8	3.50%	-39.5	-43.3	9.60%	-39.5	-40.7	3.10%	-39.5	-40.2	1.80%
SUBTOTALS FOR: MHEX_S		1498.6	1498.9	0.00%	1498.6	1499	0.00%	1498.6	1498.7	0.00%	1498.6	1498.7	0.00%	1498.6	1499	0.00%	1498.6	1498.7	0.00%	1498.6	1498.5	0.00%
		Difference =	0.2	**0.30%**	Difference =	0.4	**0.40%**	Difference =	0.1	**0.10%**	Difference =	0.1	**0.20%**	Difference =	0.3	**0.30%**	Difference =	0.1	**0.10%**	Difference =	-0.1	**-0.10%**
68613 AUBURNT4	67525 RESTON 4	42.4	42.2	-0.30%	42.4	42.2	-0.40%	42.4	42.3	-0.10%	42.4	42.3	-0.10%	42.4	42.2	-0.40%	42.4	42.3	-0.10%	42.4	42.4	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.6	-90.5	-0.10%	-90.6	-90.5	-0.10%	-90.6	-90.6	0.00%	-90.6	-90.5	0.00%	-90.6	-90.5	-0.10%	-90.6	-90.5	0.00%	-90.6	-90.6	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.4	-6.3	-1.20%	-6.4	-6.3	-1.70%	-6.4	-6.3	-0.40%	-6.4	-6.3	-0.50%	-6.4	-6.3	-1.50%	-6.4	-6.3	-0.60%	-6.4	-6.4	0.10%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.2	-42.1	-0.30%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.1	-0.10%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.2	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.4	91.3	-0.10%	91.4	91.3	-0.10%	91.4	91.4	0.00%	91.4	91.3	0.00%	91.4	91.3	-0.10%	91.4	91.3	0.00%	91.4	91.4	0.00%
67515 RALL 4	68630 EBCAMPB4	6.6	6.5	-1.10%	6.6	6.5	-1.60%	6.6	6.5	-0.40%	6.6	6.5	-0.50%	6.6	6.5	-1.40%	6.6	6.5	-0.60%	6.6	6.6	0.10%
SUBTOTALS FOR: MH_SPC_W		55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis

Transmission Alternative 8

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	10.7	6.3	-40.90%	10.7	6.5	-39.40%	10.7	14.8	38.30%	10.7	9.8	-7.70%	10.7	6.5	-38.90%	10.7	18.1	69.60%	10.7	10.1	-5.60%
SUBTOTALS FOR: MNTZUMA_W		10.7	6.3	-40.90%	10.7	6.5	-39.40%	10.7	14.8	38.30%	10.7	9.8	-7.70%	10.7	6.5	-38.90%	10.7	18.1	69.60%	10.7	10.1	-5.60%
		Difference =	-4.4	**-5.70%**	Difference =	-4.2	**-4.20%**	Difference =	4.1	[redacted]	Difference =	-0.8	**-1.70%**	Difference =	-4.2	**-4.20%**	Difference =	7.4	[redacted]	Difference =	-0.6	**-0.60%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.6	64.5	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.5	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.8	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.8	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.7	139.4	-0.20%	139.7	139.3	-0.30%	139.7	139.5	-0.10%	139.7	139.6	-0.10%	139.7	139.3	-0.30%	139.7	139.4	-0.20%	139.7	140.4	0.50%
61626 BOSWELL4	61625 BLCKBRY4	136	135.7	-0.20%	136	135.6	-0.30%	136	135.8	-0.10%	136	135.9	-0.10%	136	135.6	-0.30%	136	135.7	-0.20%	136	136.7	0.50%
61626 BOSWELL4	61627 SHANNON4	87.3	87.8	0.60%	87.3	88.1	0.90%	87.3	87.7	0.40%	87.3	87.5	0.20%	87.3	88	0.80%	87.3	87.8	0.50%	87.3	85.9	-1.60%
61615 ARROWHD4	61614 98L TAP4	57	55.8	-2.20%	57	55.6	-2.40%	57	55.5	-2.60%	57	56.8	-0.50%	57	55.6	-2.50%	57	55.3	-3.00%	57	59.7	4.70%
61615 ARROWHD4	61554 AWHD1JCT	155.1	155	-0.10%	155.1	154.9	-0.20%	155.1	154.8	-0.20%	155.1	155.1	0.00%	155.1	154.9	-0.10%	155.1	154.8	-0.20%	155.1	155.8	0.50%
61615 ARROWHD4	61556 AWHD2JCT	160.6	160.4	-0.10%	160.6	160.3	-0.20%	160.6	160.2	-0.20%	160.6	160.5	0.00%	160.6	160.3	-0.10%	160.6	160.2	-0.20%	160.6	161.3	0.50%
61615 ARROWHD4	61624 FORBES 4	-110.4	-110.7	0.20%	-110.4	-110.1	-0.20%	-110.4	-111.5	1.00%	-110.4	-110.2	-0.10%	-110.4	-110.5	0.10%	-110.4	-111.6	1.10%	-110.4	-110	-0.30%
61615 ARROWHD4	63055 BEARCK 4	55.1	56.3	2.10%	55.1	57.8	4.80%	55.1	55	-0.30%	55.1	56	1.60%	55.1	57	3.40%	55.1	55.1	0.00%	55.1	54	-2.00%
SUBTOTALS FOR: MP_EXPORT		777.5	776.9	-0.10%	777.5	778.5	0.10%	777.5	774.1	-0.40%	777.5	778.2	0.10%	777.5	777.3	0.00%	777.5	773.9	-0.50%	777.5	780.9	0.40%
		Difference =	-0.6	**-0.80%**	Difference =	1	**1.00%**	Difference =	-3.4	**-4.50%**	Difference =	0.7	**1.40%**	Difference =	-0.2	**-0.20%**	Difference =	-3.6	**-3.60%**	Difference =	3.4	**3.40%**
60105 PR ISLD3	61950 BYRON 3	-200.5	-185.1	-7.60%	-200.5	-215.2	7.40%	-200.5	-192	-4.20%	-200.5	-204.3	1.90%	-200.5	-195.4	-2.50%	-200.5	-189.7	-5.40%	-200.5	-205.3	2.40%
60304 EAU CL 3	92494 ARP 345	94.7	91.6	-3.30%	94.7	88.2	-6.90%	94.7	99.8	5.40%	94.7	92.3	-2.50%	94.7	90.3	-4.60%	94.7	99.6	5.30%	94.7	92	-2.80%
SUBTOTALS FOR: MWSI		-105.8	-93.6	-11.60%	-105.8	-127.1	20.10%	-105.8	-92.2	-12.80%	-105.8	-112	5.90%	-105.8	-105	-0.70%	-105.8	-90.1	-14.90%	-105.8	-113.3	7.10%
		Difference =	12.2	[redacted]	Difference =	-21.3	**-21.30%**	Difference =	13.6	[redacted]	Difference =	-6.3	**-12.50%**	Difference =	0.8	**0.80%**	Difference =	15.7	[redacted]	Difference =	-7.5	**-7.50%**
66756 SQBUTTE4	63049 STANTON4	-38.7	-36.9	-4.60%	-38.7	-36.3	-6.20%	-38.7	-37.3	-3.50%	-38.7	-37.9	-2.10%	-38.7	-36.4	-5.90%	-38.7	-36.8	-4.80%	-38.7	-39.3	1.60%
66756 SQBUTTE4	*66751 CENTER 4*	-41.5	-42.3	1.90%	-41.5	-42.8	3.00%	-41.5	-41.2	-0.70%	-41.5	-42	1.00%	-41.5	-42.5	2.40%	-41.5	-41.4	-0.50%	-41.5	-43	3.60%
66756 SQBUTTE4	66791 CENTER 3	92.4	91.4	-1.10%	92.4	91.3	-1.30%	92.4	90.8	-1.80%	92.4	92.1	-0.40%	92.4	91.2	-1.40%	92.4	90.4	-2.20%	92.4	94.6	2.30%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.3	0.50%	-23.2	-23.4	0.80%	-23.2	-23.2	-0.10%	-23.2	-23.2	0.30%	-23.2	-23.3	0.70%	-23.2	-23.2	0.00%	-23.2	-23.3	0.70%
63041 COAL CR4	63049 STANTON4	-124.7	-125.6	0.70%	-124.7	-126.1	1.10%	-124.7	-124.8	0.10%	-124.7	-125.1	0.40%	-124.7	-125.9	0.90%	-124.7	-124.8	0.10%	-124.7	-125.5	0.60%
63041 COAL CR4	63381 UNDERWD4	143.9	145	0.70%	143.9	145.5	1.10%	143.9	144	0.00%	143.9	144.5	0.40%	143.9	145.3	0.90%	143.9	144.1	0.10%	143.9	144.9	0.70%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELAND03	66506 FTTHOMP3	130.3	131.9	1.20%	130.3	131.8	1.20%	130.3	134.5	3.20%	130.3	130.8	0.40%	130.3	132.3	1.50%	130.3	134.7	3.40%	130.3	128.4	-1.50%
67105 LELAND03	67160 GROTON 3	254.1	252.8	-0.50%	254.1	252.3	-0.70%	254.1	252.5	-0.60%	254.1	253.6	-0.20%	254.1	252.5	-0.60%	254.1	253.5	-0.20%	254.1	251.3	-1.10%
67101 ANTELOP3	67120 BRDLAND3	192.4	192.1	-0.20%	192.4	191.8	-0.30%	192.4	192.8	0.20%	192.4	192.2	-0.10%	192.4	192	-0.20%	192.4	193.5	0.60%	192.4	189.9	-1.30%
63314 BIGSTON4	66503 BLAIR 4	-25.8	-0.9	-96.40%	-25.8	6.4	-124.60%	-25.8	0.8	-102.90%	-25.8	-10.1	-60.60%	-25.8	6.9	-126.70%	-25.8	10.8	-141.90%	-25.8	-2.6	-90.00%
63320 6MI GRV4	**66550 GRANITF4**	-20	-13.8	-31.10%	-20	-11.9	-40.50%	-20	-13.5	-32.30%	-20	-14.6	-27.00%	-20	-11.5	-42.50%	-20	-10.9	-45.30%	-20	-21.2	5.90%
63336 AUDUBON4	63053 HUBBARD4	110.9	114.6	3.30%	110.9	116	4.60%	110.9	113	1.90%	110.9	112.6	1.50%	110.9	115.6	4.20%	110.9	113.6	2.40%	110.9	107.1	-3.40%
66521 SULLYBT4	66519 OAHE 4	-72.2	-71.2	-1.30%	-72.2	-71.3	-1.30%	-72.2	-69.2	-4.10%	-72.2	-71.9	-0.40%	-72.2	-70.9	-1.70%	-72.2	-69.2	-4.20%	-72.2	-73.9	2.50%
63052 INMAN 4	61611 WINGRIV4	95.2	101.3	6.40%	95.2	103.6	8.80%	95.2	99.5	4.50%	95.2	98.2	3.10%	95.2	103	8.20%	95.2	100.6	5.70%	95.2	75.9	-20.30%
66470 BISON 4	66497 MAURINE4	-1.9	-1.3	-32.10%	-1.9	-1.3	-31.10%	-1.9	0.8	-140.30%	-1.9	-1.7	-8.90%	-1.9	-1.2	-39.40%	-1.9	-0.3	-85.90%	-1.9	-2.6	36.90%
66716 LAPORTE7	61640 BADOURA7	-0.8	0	-103.70%	-0.8	0.4	-147.20%	-0.8	-0.4	-51.20%	-0.8	-0.4	-52.40%	-0.8	0.3	-133.00%	-0.8	-0.3	-66.70%	-0.8	-0.8	-3.20%
63222 ALEXAND7	60144 DGLASCO7	30.7	32.2	4.70%	30.7	32.8	6.50%	30.7	31.8	3.40%	30.7	31.7	3.10%	30.7	32.6	6.10%	30.7	32.1	4.30%	30.7	23.8	-22.60%
67327 ELLENDL7	67401 ABDNJCT7	-7.3	-6.6	-9.20%	-7.3	-6.5	-10.30%	-7.3	-6.1	-15.70%	-7.3	-6.9	-4.70%	-7.3	-6.4	-12.20%	-7.3	-5.6	-23.00%	-7.3	-8.7	20.10%
66432 EDGELEY7	66534 ORDWAY 7	-20.3	-20.5	0.70%	-20.3	-20.6	1.50%	-20.3	-20.1	-1.30%	-20.3	-20.4	0.40%	-20.3	-20.5	0.80%	-20.3	-19.7	-3.10%	-20.3	-22.2	9.00%
66438 FORMAN 7	66522 SUMMIT-7	-23.5	-23	-1.90%	-23.5	-23	-2.10%	-23.5	-22.7	-3.40%	-23.5	-23.2	-1.10%	-23.5	-22.9	-2.60%	-23.5	-21.8	-7.20%	-23.5	-25.2	7.10%
63311 CANBY 4	66550 GRANITF4	73.5	86.1	17.30%	73.5	90.3	22.90%	73.5	85.5	16.40%	73.5	83.3	13.40%	73.5	90.4	23.00%	73.5	89.5	21.90%	73.5	85.8	16.80%
62006 KERKHO 7	62005 KERKHOT7	16.5	17.9	8.50%	16.5	18.3	11.20%	16.5	17.8	7.90%	16.5	18.3	11.20%	16.5	18.4	11.60%	16.5	18.2	10.60%	16.5	16.3	-0.90%
66752 DRAYTON4	67557 LETELER4	-243.1	-239	-1.70%	-243.1	-237.3	-2.30%	-243.1	-240.9	-0.90%	-243.1	-241.3	-0.70%	-243.1	-237.9	-2.10%	-243.1	-240.3	-1.10%	-243.1	-245.2	0.90%
63379 RUGBY 4	67523 GLENBOR4	39.8	42.9	7.70%	39.8	44.3	11.20%	39.8	40.7	2.20%	39.8	41.2	3.50%	39.8	43.7	9.70%	39.8	41	3.10%	39.8	40.5	1.80%
63320 6MI GRV4	**63050 WILLMAR4**	95.8	102.2	6.70%	95.8	104.6	9.10%	95.8	101.1	5.50%	95.8	102.2	6.70%	95.8	104.4	9.00%	95.8	102.7	7.20%	95.8	98.3	2.60%
SUBTOTALS FOR: NDEX		624.4	697.6	11.70%	624.4	720.4	15.40%	624.4	697.7	11.70%	624.4	673.6	7.90%	624.4	720.7	15.40%	624.4	722.2	15.70%	624.4	615	-1.50%
		Difference =	73.2	[redacted]	Difference =	96	[redacted]	Difference =	73.4	[redacted]	Difference =	49.2	[redacted]	Difference =	96.3	[redacted]	Difference =	97.8	[redacted]	Difference =	-9.4	**-9.40%**
36406 WEMPL; B	39058 PAD 345	635.3	636.5	0.20%	635.3	637.9	0.40%	635.3	632.4	-0.40%	635.3	636.2	0.20%	635.3	637	0.30%	635.3	632.1	-0.50%	635.3	637	0.30%
SUBTOTALS FOR: NI_WUMS		635.3	636.5	0.20%	635.3	637.9	0.40%	635.3	632.4	-0.40%	635.3	636.2	0.20%	635.3	637	0.30%	635.3	632.1	-0.50%	635.3	637	0.30%
		Difference =	1.3	**1.70%**	Difference =	2.6	**2.60%**	Difference =	-2.8	**-3.80%**	Difference =	1	**1.90%**	Difference =	1.7	**1.70%**	Difference =	-3.1	**-3.10%**	Difference =	1.8	**1.80%**
60105 PR ISLD3	61950 BYRON 3	-200.5	-185.1	-7.60%	-200.5	-215.2	7.40%	-200.5	-192	-4.20%	-200.5	-204.3	1.90%	-200.5	-195.4	-2.50%	-200.5	-189.7	-5.40%	-200.5	-205.3	2.40%
SUBTOTALS FOR: PRI-BYN		-200.5	-185.1	-7.60%	-200.5	-215.2	7.40%	-200.5	-192	-4.20%	-200.5	-204.3	1.90%	-200.5	-195.4	-2.50%	-200.5	-189.7	-5.40%	-200.5	-205.3	2.40%
		Difference =	15.3	[redacted]	Difference =	-14.8	**-14.80%**	Difference =	8.4	**11.20%**	Difference =	-3.9	**-7.80%**	Difference =	5.1	[redacted]	Difference =	10.7	[redacted]	Difference =	-4.9	**-4.90%**
36382 QUAD ;	34036 ROCK CK3	509.7	510.9	0.20%	509.7	510.7	0.20%	509.7	508	-0.30%	509.7	510.1	0.10%	509.7	510.8	0.20%	509.7	508.6	-0.20%	509.7	510.4	0.10%
SUBTOTALS FOR: QUAD-ROCKC		509.7	510.9	0.20%	509.7	510.7	0.20%	509.7	508	-0.30%	509.7	510.1	0.10%	509.7	510.8	0.20%	509.7	508.6	-0.20%	509.7	510.4	0.10%
		Difference =	1.2	**1.60%**	Difference =	1.1	**1.10%**	Difference =	-1.6	**-2.20%**	Difference =	0.4	**0.90%**	Difference =	1.1	**1.10%**	Difference =	-1.1	**-1.10%**	Difference =	0.7	**0.70%**
36382 QUAD ;	64405 SUB 91 3	554.6	555	0.10%	554.6	554.4	0.00%	554.6	555.1	0.10%	554.6	554.8	0.00%	554.6	554.7	0.00%	554.6	557.1	0.50%	554.6	554.9	0.00%
64400 MECCORD3	64403 E MOLIN3	275.2	275.3	0.00%	275.2	274.9	-0.10%	275.2	275.8	0.20%	275.2	275.3	0.00%	275.2	275.1	0.00%	275.2	277.2	0.70%	275.2	275.3	0.00%

Distribution Factor Analysis

Transmission Alternative 8

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W		829.8	830.3	0.10%	829.8	829.3	-0.10%	829.8	830.8	0.10%	829.8	830.1	0.00%	829.8	829.9	0.00%	829.8	834.4	0.50%	829.8	830.2	0.00%
		Difference =	0.4	**0.60%**	Difference =	-0.5	**-0.50%**	Difference =	1	**1.30%**	Difference =	0.2	**0.50%**	Difference =	0	**0.00%**	Difference =	4.5	**4.50%**	Difference =	0.3	**0.30%**
64831 GENTLMN3	64943 REDWILO3	276.6	277.5	0.30%	276.6	277.5	0.30%	276.6	273.7	-1.10%	276.6	276.7	0.00%	276.6	277.6	0.40%	276.6	277.6	0.40%	276.6	276.2	-0.10%
SUBTOTALS FOR: WNE_WKS		276.6	277.5	0.30%	276.6	277.5	0.30%	276.6	273.7	-1.10%	276.6	276.7	0.00%	276.6	277.6	0.40%	276.6	277.6	0.40%	276.6	276.2	-0.10%
		Difference =	0.9	**1.20%**	Difference =	0.8	**0.80%**	Difference =	-2.9	**-3.90%**	Difference =	0.1	**0.10%**	Difference =	1	**1.00%**	Difference =	1	**1.00%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-38.7	-36.9	-4.60%	-38.7	-36.3	-6.20%	-38.7	-37.3	-3.50%	-38.7	-37.9	-2.10%	-38.7	-36.4	-5.90%	-38.7	-36.8	-4.80%	-38.7	-39.3	1.60%
66756 SQBUTTE4	66751 CENTER 4	-41.5	-42.3	1.90%	-41.5	-42.8	3.00%	-41.5	-41.2	-0.70%	-41.5	-42	1.00%	-41.5	-42.5	2.40%	-41.5	-41.4	-0.50%	-41.5	-43	3.60%
66756 SQBUTTE4	66791 CENTER 3	92.4	91.4	-1.10%	92.4	91.3	-1.30%	92.4	90.8	-1.80%	92.4	92.1	-0.40%	92.4	91.2	-1.40%	92.4	90.4	-2.20%	92.4	94.6	2.30%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	320.1	320.3	0.00%	320.1	313.6	-2.00%	320.1	325.3	1.60%	320.1	317.7	-0.80%	320.1	317.7	-0.80%	320.1	325.5	1.70%	320.1	317.4	-0.90%
60105 PR ISLD3	61950 BYRON 3	-200.5	-185.1	-7.60%	-200.5	-215.2	7.40%	-200.5	-192	-4.20%	-200.5	-204.3	1.90%	-200.5	-195.4	-2.50%	-200.5	-189.7	-5.40%	-200.5	-205.3	2.40%
60192 BLUE LK3	60050 WLMRTHTP	-490.5	-498.2	1.60%	-490.5	-509.6	3.90%	-490.5	-487.2	-0.70%	-490.5	-494.3	0.80%	-490.5	-490.7	0.00%	-490.5	-484.6	-1.20%	-490.5	-496.9	1.30%
60187 AS KING7	60325 WILOWRV7	128.9	129.2	0.20%	128.9	128.1	-0.70%	128.9	129.6	0.50%	128.9	128.6	-0.30%	128.9	128.8	-0.10%	128.9	129.6	0.50%	128.9	128.7	-0.20%
60238 REDROCK7	68966 GLENMONT	50.5	50.9	0.80%	50.5	49.1	-2.90%	50.5	51.2	1.30%	50.5	50.2	-0.70%	50.5	50.2	-0.70%	50.5	51.2	1.40%	50.5	50.3	-0.40%
62234 LKMARN 7	60276 AIRLAKE7	53.6	53.4	-0.40%	53.6	54.6	1.70%	53.6	53.5	-0.30%	53.6	53.7	0.10%	53.6	39.2	-27.00%	53.6	53.4	-0.40%	53.6	53.8	0.40%
SUBTOTALS FOR: MNEX (INFO)		-137.7	-129.5	-6.00%	-137.7	-179.6	30.40%	-137.7	-119.7	-13.10%	-137.7	-148.5	7.80%	-137.7	-150.2	9.00%	-137.7	-114.6	-16.80%	-137.7	-152	10.40%
		Difference =	8.2	**10.80%**	Difference =	-41.8	**-41.80%**	Difference =	18	**24.00%**	Difference =	-10.8	**-21.50%**	Difference =	-12.4	**-12.40%**	Difference =	23.1	**23.10%**	Difference =	-14.3	**-14.30%**

Distribution Factor Analysis

Transmission Alternative 9

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definitior			CMMPA		GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	382.3	390.5	2.10%	382.3	389.6	1.90%	382.3	375.1	-1.90%	382.3	384.8	0.70%	382.3	389.8	2.00%	382.3	374.3	-2.10%	382.3	385.4	0.80%
SUBTOTALS FOR: ARN-HAZLTN		382.3	390.5	2.10%	382.3	389.6	1.90%	382.3	375.1	-1.90%	382.3	384.8	0.70%	382.3	389.8	2.00%	382.3	374.3	-2.10%	382.3	385.4	0.80%
		Difference =	8.2		Difference =	7.2		Difference =	-7.2	**-9.60%**	Difference =	2.5		Difference =	7.5		Difference =	-8	**-8.00%**	Difference =	3.1	**3.10%**
64786 COOPER 3	59199 ST JOE 3	53.8	54.7	1.60%	53.8	54.5	1.30%	53.8	48.4	-10.10%	53.8	53.5	-0.50%	53.8	54.6	1.50%	53.8	54.5	1.40%	53.8	52.8	-1.80%
64786 COOPER 3	96039 7FAIRPT	63	63.6	1.10%	63	63.5	0.80%	63	58.8	-6.60%	63	62.8	-0.20%	63	63.6	1.00%	63	64.4	2.20%	63	62.3	-1.00%
SUBTOTALS FOR: COOPER_S		116.8	118.3	1.30%	116.8	118	1.00%	116.8	107.2	-8.20%	116.8	116.3	-0.30%	116.8	118.2	1.20%	116.8	118.9	1.80%	116.8	115.2	-1.40%
		Difference =	1.5	**2.00%**	Difference =	1.2	**1.20%**	Difference =	-9.5	**-12.70%**	Difference =	-0.4	**-0.80%**	Difference =	1.4	**1.40%**	Difference =	2.2	**2.20%**	Difference =	-1.6	**-1.60%**
60304 EAU CL 3	92494 ARP 345	95	92.1	-3.10%	95	88.9	-6.40%	95	100.2	5.50%	95	92.7	-2.40%	95	90.9	-4.30%	95	100.1	5.40%	95	92.5	-2.60%
SUBTOTALS FOR: ECL-ARP		95	92.1	-3.10%	95	88.9	-6.40%	95	100.2	5.50%	95	92.7	-2.40%	95	90.9	-4.30%	95	100.1	5.40%	95	92.5	-2.60%
		Difference =	-2.9	**-3.80%**	Difference =	-6.1	**-6.10%**	Difference =	5.3	**7.00%**	Difference =	-2.2	**-4.50%**	Difference =	-4.1	**-4.10%**	Difference =	5.1		Difference =	-2.4	**-2.40%**
65351 S3451 3	65354 S3454 3	82	82.5	0.70%	82	82.2	0.30%	82	88.9	8.50%	82	81.8	-0.20%	82	82.2	0.20%	82	83.5	1.80%	82	81.8	-0.20%
65351 S3451 3	65359 S3459 3	29.6	31	4.90%	29.6	30.7	3.60%	29.6	36.9	24.70%	29.6	29.6	0.00%	29.6	30.7	3.70%	29.6	33.6	13.50%	29.6	29.4	-0.60%
65451 S1251 5	65497 S1297 5	39.5	39.8	0.70%	39.5	39.7	0.50%	39.5	40.8	3.20%	39.5	39.5	0.00%	39.5	39.8	0.50%	39.5	40.5	2.40%	39.5	39.5	-0.10%
SUBTOTALS FOR: FT CAL_S		151.1	153.4	1.50%	151.1	152.6	1.00%	151.1	166.6	10.20%	151.1	150.9	-0.10%	151.1	152.6	1.00%	151.1	157.5	4.30%	151.1	150.7	-0.30%
		Difference =	2.3	**3.00%**	Difference =	1.5	**1.50%**	Difference =	15.5		Difference =	-0.2	**-0.40%**	Difference =	1.5	**1.50%**	Difference =	6.4		Difference =	-0.4	**-0.40%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	156	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.9	157.8	0.00%	157.9	157.9	0.00%	157.9	156.4	-0.90%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%	157.9	157.9	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	268.5	-1.90%	273.8	273.9	0.00%	273.8	273.9	0.00%	273.8	274.2	0.20%	273.8	273.8	0.00%
64831 GENTLMN3	64984 SWEET W3	328.1	328.2	0.00%	328.1	328.2	0.00%	328.1	321.8	-1.90%	328.1	328.2	0.00%	328.1	328.2	0.00%	328.1	328.6	0.20%	328.1	328.2	0.00%
64831 GENTLMN3	64943 REDWILO3	276.8	277.6	0.30%	276.8	277.5	0.30%	276.8	273.8	-1.10%	276.8	276.8	0.00%	276.8	277.6	0.30%	276.8	277.7	0.30%	276.8	276.3	-0.20%
SUBTOTALS FOR: GGS		1356.3	1357.2	0.10%	1356.3	1357.3	0.10%	1356.3	1337.5	-1.40%	1356.3	1356.5	0.00%	1356.3	1357.4	0.10%	1356.3	1358.4	0.20%	1356.3	1356	0.00%
		Difference =	1	**1.30%**	Difference =	1	**1.00%**	Difference =	-18.8	**-25.10%**	Difference =	0.3	**0.60%**	Difference =	1.1	**1.10%**	Difference =	2.1	**2.10%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	55.4	56.4	1.90%	55.4	56.5	2.00%	55.4	53.7	-3.00%	55.4	55.7	0.60%	55.4	56.6	2.10%	55.4	57.8	4.30%	55.4	55.3	-0.10%
64839 GR ISLD4	64780 COLMB.W4	99.9	99.6	-0.20%	99.9	99.7	-0.10%	99.9	96	-3.90%	99.9	99.9	0.10%	99.9	99.7	-0.10%	99.9	99.7	-0.20%	99.9	99.9	0.00%
66571 GR ISLD3	64896 MCCOOL 3	144.7	147.2	1.70%	144.7	147.2	1.70%	144.7	146.2	1.00%	144.7	145.4	0.50%	144.7	147.5	1.90%	144.7	150	3.60%	144.7	144.6	-0.10%
SUBTOTALS FOR: GRIS_LNC		300	303.2	1.10%	300	303.4	1.10%	300	295.9	-1.40%	300	301.1	0.40%	300	303.8	1.30%	300	307.4	2.50%	300	299.8	-0.10%
		Difference =	3.2	**4.30%**	Difference =	3.4	**3.40%**	Difference =	-4.1	**-5.50%**	Difference =	1.1	**2.20%**	Difference =	3.8	**3.80%**	Difference =	7.5		Difference =	-0.2	**-0.20%**
57981 LACYGNE7	57965 W.GRDNR7	577.9	577.8	0.00%	577.9	577.8	0.00%	577.9	578.8	0.20%	577.9	578	0.00%	577.9	577.8	0.00%	577.9	579	0.20%	577.9	578.3	0.10%
57981 LACYGNE7	57968 STILWEL7	720.5	720.6	0.00%	720.5	720.7	0.00%	720.5	721	0.10%	720.5	720.7	0.00%	720.5	720.6	0.00%	720.5	721.4	0.10%	720.5	721	0.10%
SUBTOTALS FOR: LACYGNE_N		1298.4	1298.4	0.00%	1298.4	1298.5	0.00%	1298.4	1299.8	0.10%	1298.4	1298.8	0.00%	1298.4	1298.4	0.00%	1298.4	1300.4	0.20%	1298.4	1299.3	0.10%
		Difference =	0	**0.00%**	Difference =	0.1	**0.10%**	Difference =	1.4	**1.80%**	Difference =	0.4	**0.70%**	Difference =	0	**0.00%**	Difference =	2	**2.00%**	Difference =	0.9	**0.90%**
62234 LKMARN 7	60276 AIRLAKE7	53.4	53.1	-0.50%	53.4	54.3	1.70%	53.4	53.2	-0.30%	53.4	53.4	0.10%	53.4	38.9	-27.10%	53.4	53.2	-0.40%	53.4	53.6	0.30%
SUBTOTALS FOR: LKM-WFB		53.4	53.1	-0.50%	53.4	54.3	1.70%	53.4	53.2	-0.30%	53.4	53.4	0.10%	53.4	38.9	-27.10%	53.4	53.2	-0.40%	53.4	53.6	0.30%
		Difference =	-0.2	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.10%**	Difference =	-14.4	**-14.40%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-143.7	-144.1	0.30%	-143.7	-144.3	0.40%	-143.7	-143.9	0.10%	-143.7	-143.9	0.10%	-143.7	-144.2	0.40%	-143.7	-143.9	0.20%	-143.7	-143.8	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1132.8	-1139	0.50%	1132.8	-1141.8	0.80%	1132.8	-1135.4	0.20%	-1132.8	-1135.8	0.30%	1132.8	-1140.7	0.70%	1132.8	-1136.2	0.30%	1132.8	-1131	-0.20%
66752 DRAYTON4	67557 LETELER4	-238.2	-234.6	-1.50%	-238.2	-233.1	-2.10%	-238.2	-236.3	-0.80%	-238.2	-236.5	-0.70%	-238.2	-233.6	-1.90%	-238.2	-235.8	-1.00%	-238.2	-240.4	0.90%
63379 RUGBY 4	67523 GLENBOR4	40	42.8	7.10%	40	44.1	10.40%	40	40.7	1.80%	40	41.4	3.50%	40	43.6	9.10%	40	41	2.60%	40	40.6	1.50%
SUBTOTALS FOR: MHEX_N		-1474.7	-1474.9	0.00%	1474.7	-1475	0.00%	1474.7	-1474.9	0.00%	-1474.7	-1474.8	0.00%	1474.7	-1474.9	0.00%	1474.7	-1474.9	0.00%	1474.7	-1474.6	0.00%
		Difference =	-0.2	**-0.20%**	Difference =	-0.3	**-0.30%**	Difference =	-0.1	**-0.20%**	Difference =	-0.1	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.10%**
67576 RICHER 4	60175 ROSEAU 4	146.1	146.6	0.30%	146.1	146.8	0.40%	146.1	146.3	0.10%	146.1	146.4	0.10%	146.1	146.7	0.40%	146.1	146.4	0.20%	146.1	146.3	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1149.4	1155.8	0.60%	1149.4	1158.6	0.80%	1149.4	1152.1	0.20%	1149.4	1152.5	0.30%	1149.4	1157.6	0.70%	1149.4	1152.9	0.30%	1149.4	1147.5	-0.20%
67557 LETELER4	66752 DRAYTON4	242.7	238.9	-1.50%	242.7	237.4	-2.20%	242.7	240.7	-0.80%	242.7	240.9	-0.70%	242.7	237.9	-2.00%	242.7	240.2	-1.00%	242.7	245	1.00%
67523 GLENBOR4	63379 RUGBY 4	-39.6	-42.4	7.00%	-39.6	-43.7	10.30%	-39.6	-40.4	1.80%	-39.6	-41	3.40%	-39.6	-43.2	9.00%	-39.6	-40.7	2.60%	-39.6	-40.2	1.50%
SUBTOTALS FOR: MHEX_S		1498.6	1498.9	0.00%	1498.6	1499	0.00%	1498.6	1498.8	0.00%	1498.6	1498.7	0.00%	1498.6	1499	0.00%	1498.6	1498.8	0.00%	1498.6	1498.5	0.00%
		Difference =	0.3	**0.40%**	Difference =	0.4	**0.40%**	Difference =	0.2	**0.20%**	Difference =	0.1	**0.30%**	Difference =	0.3	**0.30%**	Difference =	0.2	**0.20%**	Difference =	-0.1	**-0.10%**
68613 AUBURNT4	67525 RESTON 4	42.3	42.2	-0.30%	42.3	42.2	-0.40%	42.3	42.3	-0.10%	42.3	42.3	-0.10%	42.3	42.2	-0.40%	42.3	42.3	-0.10%	42.3	42.3	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.6	-90.5	-0.10%	-90.6	-90.5	-0.10%	-90.6	-90.6	0.00%	-90.6	-90.5	0.00%	-90.6	-90.5	-0.10%	-90.6	-90.5	0.00%	-90.6	-90.6	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.3	-6.3	-1.00%	-6.3	-6.3	-1.50%	-6.3	-6.3	-0.30%	-6.3	-6.3	-0.50%	-6.3	-6.3	-1.30%	-6.3	-6.3	-0.40%	-6.3	-6.4	0.20%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.2	-42	-0.30%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.1	-0.10%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.2	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.4	91.3	-0.10%	91.4	91.3	-0.10%	91.4	91.4	0.00%	91.4	91.3	0.00%	91.4	91.3	-0.10%	91.4	91.3	0.00%	91.4	91.4	0.00%
67515 RALL 4	68630 EBCAMPB4	6.5	6.5	-1.00%	6.5	6.5	-1.50%	6.5	6.5	-0.30%	6.5	6.5	-0.50%	6.5	6.5	-1.30%	6.5	6.5	-0.40%	6.5	6.6	0.20%
SUBTOTALS FOR: MH_SPC_W		55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.7	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%	55.7	55.8	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis
Transmission Alternative 9
2009 Summer Peak Case
Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	10.9	6.7	-38.10%	10.9	6.9	-36.30%	10.9	15.1	38.40%	10.9	10.1	-7.50%	10.9	6.9	-36.30%	10.9	18.4	69.40%	10.9	10.5	-3.60%
SUBTOTALS FOR: MNTZUMA_W		10.9	6.7	-38.10%	10.9	6.9	-36.30%	10.9	15.1	38.40%	10.9	10.1	-7.50%	10.9	6.9	-36.30%	10.9	18.4	69.40%	10.9	10.5	-3.60%
		Difference =	-4.1	**-5.40%**	Difference =	-4	**-4.00%**	Difference =	4.2	[redacted]	Difference =	-0.8	**-1.60%**	Difference =	-4	**-4.00%**	Difference =	7.5	[redacted]	Difference =	-0.4	**-0.40%**
61702 LASKIN 7	61705 BABBITT7	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.4	0.00%	63.4	63.4	0.00%	63.4	63.4	-0.10%	63.4	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.5	0.00%	64.5	64.5	0.00%	64.5	64.5	-0.10%	64.5	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.6	139.4	-0.20%	139.6	139.3	-0.30%	139.6	139.5	-0.10%	139.6	139.5	-0.10%	139.6	139.3	-0.20%	139.6	139.4	-0.10%	139.6	140.4	0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.9	135.7	-0.20%	135.9	135.6	-0.30%	135.9	135.7	-0.10%	135.9	135.8	-0.10%	135.9	135.6	-0.20%	135.9	135.7	-0.10%	135.9	136.6	0.50%
61626 BOSWELL4	61627 SHANNON4	87.4	87.9	0.60%	87.4	88.1	0.80%	87.4	87.7	0.40%	87.4	87.5	0.20%	87.4	88	0.70%	87.4	87.8	0.50%	87.4	85.9	-1.70%
61615 ARROWHD4	61614 98L TAP4	56.8	55.6	-2.10%	56.8	55.5	-2.30%	56.8	55.3	-2.50%	56.8	56.5	-0.50%	56.8	55.4	-2.40%	56.8	55.1	-2.90%	56.8	59.5	4.80%
61615 ARROWHD4	61554 AWHD1JCT	155.1	155	-0.10%	155.1	154.9	-0.10%	155.1	154.8	-0.20%	155.1	155.1	0.00%	155.1	154.9	-0.10%	155.1	154.8	-0.20%	155.1	155.8	0.50%
61615 ARROWHD4	61556 AWHD2JCT	160.5	160.4	-0.10%	160.5	160.3	-0.10%	160.5	160.2	-0.20%	160.5	160.5	0.00%	160.5	160.3	-0.10%	160.5	160.2	-0.20%	160.5	161.2	0.50%
61615 ARROWHD4	61624 FORBES 4	-110.5	-110.8	0.30%	-110.5	-110.3	-0.20%	-110.5	-111.6	1.00%	-110.5	-110.4	-0.10%	-110.5	-110.7	0.10%	-110.5	-111.7	1.10%	-110.5	-110.2	-0.30%
61615 ARROWHD4	63055 BEARCK 4	55.2	56.3	1.90%	55.2	57.7	4.50%	55.2	55	-0.40%	55.2	56.1	1.60%	55.2	57	3.20%	55.2	55.1	-0.10%	55.2	54	-2.10%
SUBTOTALS FOR: MP_EXPORT		777.1	776.4	-0.10%	777.1	778	0.10%	777.1	773.7	-0.40%	777.1	777.7	0.10%	777.1	776.9	0.00%	777.1	773.5	-0.50%	777.1	780.4	0.40%
		Difference =	-0.7	**-0.90%**	Difference =	0.9	**0.90%**	Difference =	-3.4	**-4.50%**	Difference =	0.6	**1.20%**	Difference =	-0.2	**-0.20%**	Difference =	-3.6	**-3.60%**	Difference =	3.3	**3.30%**
60105 PR ISLD3	61950 BYRON 3	-199.7	-183.9	-7.90%	-199.7	-213.8	7.00%	-199.7	-191.1	-4.30%	-199.7	-203.5	1.90%	-199.7	-194.2	-2.80%	-199.7	-188.7	-5.50%	-199.7	-204.3	2.30%
60304 EAU CL 3	92494 ARP 345	95	92.1	-3.10%	95	88.9	-6.40%	95	100.2	5.50%	95	92.7	-2.40%	95	90.9	-4.30%	95	100.1	5.40%	95	92.5	-2.60%
SUBTOTALS FOR: MWSI		-104.8	-91.8	-12.30%	-104.8	-124.9	19.20%	-104.8	-90.8	-13.30%	-104.8	-110.7	5.70%	-104.8	-103.3	-1.40%	-104.8	-88.6	-15.40%	-104.8	-111.7	6.60%
		Difference =	12.9	[redacted]	Difference =	-20.1	**-20.10%**	Difference =	14	[redacted]	Difference =	-6	**-11.90%**	Difference =	1.4	**1.40%**	Difference =	16.1	[redacted]	Difference =	-7	**-7.00%**
66756 SQBUTTE4	63049 STANTON4	-38.5	-36.8	-4.40%	-38.5	-36.2	-5.90%	-38.5	-37.2	-3.40%	-38.5	-37.7	-2.10%	-38.5	-36.3	-5.60%	-38.5	-36.7	-4.60%	-38.5	-39.2	1.80%
66756 SQBUTTE4	66751 CENTER 4	-41.5	-42.2	1.80%	-41.5	-42.7	2.80%	-41.5	-41.2	-0.80%	-41.5	-41.9	1.00%	-41.5	-42.5	2.30%	-41.5	-41.3	-0.60%	-41.5	-43	3.50%
66756 SQBUTTE4	66791 CENTER 3	92.2	91.3	-1.00%	92.2	91.1	-1.20%	92.2	90.6	-1.80%	92.2	91.8	-0.40%	92.2	91	-1.30%	92.2	90.2	-2.20%	92.2	94.4	2.30%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.3	0.50%	-23.2	-23.4	0.80%	-23.2	-23.2	-0.10%	-23.2	-23.2	0.30%	-23.2	-23.3	0.60%	-23.2	-23.2	-0.10%	-23.2	-23.3	0.60%
63041 COAL CR4	63049 STANTON4	-124.7	-125.6	0.70%	-124.7	-126	1.00%	-124.7	-124.7	0.00%	-124.7	-125.2	0.40%	-124.7	-125.8	0.90%	-124.7	-124.8	0.10%	-124.7	-125.4	0.60%
63041 COAL CR4	63381 UNDERWD4	144	145	0.70%	144	145.5	1.00%	144	144	0.00%	144	144.5	0.40%	144	145.2	0.90%	144	144.1	0.10%	144	144.9	0.60%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	-0.10%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	130.8	132.3	1.20%	130.8	132.2	1.10%	130.8	135	3.20%	130.8	131.3	0.40%	130.8	132.6	1.40%	130.8	135.1	3.30%	130.8	128.9	-1.50%
67105 LELANDO3	67160 GROTON 3	254	252.8	-0.50%	254	252.3	-0.60%	254	252.4	-0.60%	254	253.5	-0.20%	254	252.5	-0.60%	254	253.5	-0.20%	254	251.3	-1.10%
67101 ANTELOP3	67120 BRDLAND3	192.4	192.2	-0.10%	192.4	191.9	-0.30%	192.4	192.9	0.30%	192.4	192.3	-0.10%	192.4	192.1	-0.20%	192.4	193.6	0.60%	192.4	190	-1.20%
63314 BIGSTON4	66503 BLAIR 4	-24.8	-0.2	-99.30%	-24.8	7	-128.40%	-24.8	1.5	-106.20%	-24.8	-9.1	-63.20%	-24.8	7.5	-130.30%	-24.8	11.5	-146.30%	-24.8	-1.7	-93.10%
63320 6MI GRV4	**66550 GRANITF4**	-21.1	-14.4	-31.80%	-21.1	-12.3	-41.50%	-21.1	-14.3	-32.30%	-21.1	-15.7	-25.50%	-21.1	-12	-43.00%	-21.1	-11.6	-45.00%	-21.1	-22	4.40%
63336 AUDUBON4	63053 HUBBARD4	111.3	114.7	3.00%	111.3	116	4.20%	111.3	113.2	1.80%	111.3	113	1.50%	111.3	115.6	3.90%	111.3	113.8	2.20%	111.3	107.3	-3.60%
66521 SULLYBT4	66519 OAHE 4	-71.8	-70.9	-1.30%	-71.8	-71	-1.20%	-71.8	-69	-4.00%	-71.8	-71.5	-0.40%	-71.8	-70.7	-1.60%	-71.8	-68.9	-4.10%	-71.8	-73.6	2.50%
63052 INMAN 4	61611 WINGRIV4	95.8	101.5	6.00%	95.8	103.7	8.20%	95.8	99.8	4.20%	95.8	98.8	3.10%	95.8	103.1	7.70%	95.8	100.9	5.30%	95.8	76.2	-20.40%
66470 BISON 4	66497 MAURINE4	-1.7	-1.1	-33.70%	-1.7	-1.2	-32.10%	-1.7	0.9	-153.10%	-1.7	-1.5	-10.50%	-1.7	-1	-40.40%	-1.7	-0.1	-92.60%	-1.7	-2.4	40.90%
66716 LAPORTE7	61640 BADOURA7	-0.7	0	-106.40%	-0.7	0.4	-151.10%	-0.7	-0.4	-51.20%	-0.7	-0.3	-57.70%	-0.7	0.3	-136.70%	-0.7	-0.2	-67.50%	-0.7	-0.8	1.20%
63222 ALEXAND7	60144 DGLASCO7	30.9	32.3	4.40%	30.9	32.8	6.10%	30.9	31.9	3.20%	30.9	31.8	3.00%	30.9	32.7	5.80%	30.9	32.1	4.10%	30.9	23.9	-22.70%
67327 ELLENDL7	67401 ABDNJCT7	-7.1	-6.5	-9.40%	-7.1	-6.4	-10.40%	-7.1	-6	-15.80%	-7.1	-6.8	-5.00%	-7.1	-6.3	-12.20%	-7.1	-5.5	-23.20%	-7.1	-8.6	20.40%
66432 EDGELEY7	66534 ORDWAY 7	-20.3	-20.4	0.60%	-20.3	-20.6	1.30%	-20.3	-20	-1.40%	-20.3	-20.3	0.30%	-20.3	-20.4	0.70%	-20.3	-19.6	-3.20%	-20.3	-22.1	8.90%
66438 FORMAN 7	66522 SUMMIT-7	-23.4	-23	-2.00%	-23.4	-22.9	-2.10%	-23.4	-22.6	-3.50%	-23.4	-23.1	-1.20%	-23.4	-22.8	-2.60%	-23.4	-21.7	-7.20%	-23.4	-25.1	7.10%
63311 CANBY 4	66550 GRANITF4	72.5	85.5	18.00%	72.5	89.8	23.90%	72.5	84.9	17.10%	72.5	82.3	13.60%	72.5	89.9	24.00%	72.5	88.9	22.70%	72.5	85	17.30%
62006 KERKHO 7	62005 KERKHOT7	16.4	17.8	8.90%	16.4	18.3	11.90%	16.4	17.7	8.20%	16.4	18.2	11.30%	16.4	18.4	12.20%	16.4	18.2	11.10%	16.4	16.3	-0.70%
66752 DRAYTON4	67557 LETELER4	-242.7	-238.9	-1.50%	-242.7	-237.4	-2.20%	-242.7	-240.7	-0.80%	-242.7	-240.9	-0.70%	-242.7	-237.9	-2.00%	-242.7	-240.2	-1.00%	-242.7	-245	1.00%
63379 RUGBY 4	67523 GLENBOR4	40	42.8	7.10%	40	44.1	10.40%	40	40.7	1.80%	40	41.4	3.50%	40	43.6	9.10%	40	41	2.60%	40	40.6	1.50%
63320 6MI GRV4	**63050 WILLMAR4**	94.1	101.1	7.40%	94.1	103.7	10.20%	94.1	99.9	6.10%	94.1	100.5	6.80%	94.1	103.5	10.00%	94.1	101.6	7.90%	94.1	96.9	2.90%
SUBTOTALS FOR: NDEX		624.4	697.8	11.70%	624.4	720.5	15.40%	624.4	697.9	11.80%	624.4	673.7	7.90%	624.4	720.8	15.40%	624.4	722.3	15.70%	624.4	615.1	-1.50%
		Difference =	73.4	[redacted]	Difference =	96.1	[redacted]	Difference =	73.5	[redacted]	Difference =	49.3	[redacted]	Difference =	96.4	[redacted]	Difference =	97.9	[redacted]	Difference =	-9.3	**-9.30%**
36406 WEMPL; B	39058 PAD 345	635	636.3	0.20%	635	637.5	0.40%	635	632.2	-0.50%	635	636	0.20%	635	636.7	0.30%	635	631.9	-0.50%	635	636.7	0.30%
SUBTOTALS FOR: NI_WUMS		635	636.3	0.20%	635	637.5	0.40%	635	632.2	-0.50%	635	636	0.20%	635	636.7	0.30%	635	631.9	-0.50%	635	636.7	0.30%
		Difference =	1.2	1.60%	Difference =	2.4	**2.40%**	Difference =	-2.9	**-3.80%**	Difference =	1	**1.90%**	Difference =	1.7	**1.70%**	Difference =	-3.2	**-3.20%**	Difference =	1.7	**1.70%**
60105 PR ISLD3	61950 BYRON 3	-199.7	-183.9	-7.90%	-199.7	-213.8	7.00%	-199.7	-191.1	-4.30%	-199.7	-203.5	1.90%	-199.7	-194.2	-2.80%	-199.7	-188.7	-5.50%	-199.7	-204.3	2.30%
SUBTOTALS FOR: PRI-BYN		-199.7	-183.9	-7.90%	-199.7	-213.8	7.00%	-199.7	-191.1	-4.30%	-199.7	-203.5	1.90%	-199.7	-194.2	-2.80%	-199.7	-188.7	-5.50%	-199.7	-204.3	2.30%
		Difference =	15.8	[redacted]	Difference =	-14	**-14.00%**	Difference =	8.7	[redacted]	Difference =	-3.7	**-7.50%**	Difference =	5.5	[redacted]	Difference =	11	[redacted]	Difference =	-4.5	**-4.50%**
36382 QUAD ;	34036 ROCK CK3	509.7	511.2	0.30%	509.7	510.4	0.20%	509.7	507.9	-0.30%	509.7	510	0.10%	509.7	510.8	0.20%	509.7	508.3	-0.30%	509.7	509.9	0.00%
SUBTOTALS FOR: QUAD-ROCKC		509.7	511.2	0.30%	509.7	510.4	0.20%	509.7	507.9	-0.30%	509.7	510	0.10%	509.7	510.8	0.20%	509.7	508.3	-0.30%	509.7	509.9	0.00%
		Difference =	1.5	**2.00%**	Difference =	0.8	**0.80%**	Difference =	-1.7	**-2.30%**	Difference =	0.4	**0.80%**	Difference =	1.2	**1.20%**	Difference =	-1.3	**-1.30%**	Difference =	0.2	**0.20%**
36382 QUAD ;	64405 SUB 91 3	554.8	555.2	0.10%	554.8	554.6	0.00%	554.8	555.2	0.10%	554.8	555	0.00%	554.8	554.9	0.00%	554.8	557.3	0.50%	554.8	555.1	0.10%
64400 MECCORD3	64403 E MOLIN3	275.3	275.5	0.10%	275.3	275.1	-0.10%	275.3	275.9	0.20%	275.3	275.4	0.00%	275.3	275.3	0.00%	275.3	277.4	0.80%	275.3	275.5	0.10%

Distribution Factor Analysis

Transmission Alternative 9

2009 Summer Peak Case

Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W		830.1	830.7	0.10%	830.1	829.7	-0.10%	830.1	831.1	0.10%	830.1	830.4	0.00%	830.1	830.2	0.00%	830.1	834.7	0.60%	830.1	830.6	0.10%
		Difference =	0.6	**0.80%**	Difference =	-0.4	**-0.40%**	Difference =	1	**1.30%**	Difference =	0.2	**0.40%**	Difference =	0.1	**0.10%**	Difference =	4.6	**4.60%**	Difference =	0.5	**0.50%**
64831 GENTLMN3	64943 REDWILO3	276.8	277.6	0.30%	276.8	277.5	0.30%	276.8	273.8	-1.10%	276.8	276.8	0.00%	276.8	277.6	0.30%	276.8	277.7	0.30%	276.8	276.3	-0.20%
SUBTOTALS FOR: WNE_WKS		276.8	277.6	0.30%	276.8	277.5	0.30%	276.8	273.8	-1.10%	276.8	276.8	0.00%	276.8	277.6	0.30%	276.8	277.7	0.30%	276.8	276.3	-0.20%
		Difference =	0.8	**1.10%**	Difference =	0.7	**0.70%**	Difference =	-2.9	**-3.90%**	Difference =	0	**0.10%**	Difference =	0.8	**0.80%**	Difference =	0.9	**0.90%**	Difference =	-0.4	**-0.40%**
66756 SQBUTTE4	63049 STANTON4	-38.5	-36.8	-4.40%	-38.5	-36.2	-5.90%	-38.5	-37.2	-3.40%	-38.5	-37.7	-2.10%	-38.5	-36.3	-5.60%	-38.5	-36.7	-4.60%	-38.5	-39.2	1.80%
66756 SQBUTTE4	66751 CENTER 4	-41.5	-42.2	1.80%	-41.5	-42.7	2.80%	-41.5	-41.2	-0.80%	-41.5	-41.9	1.00%	-41.5	-42.5	2.30%	-41.5	-41.3	-0.60%	-41.5	-43	3.50%
66756 SQBUTTE4	66791 CENTER 3	92.2	91.3	-1.00%	92.2	91.1	-1.20%	92.2	90.6	-1.80%	92.2	91.8	-0.40%	92.2	91	-1.30%	92.2	90.2	-2.20%	92.2	94.4	2.30%
SUBTOTALS FOR: Y2DC		12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3	60304 EAU CL 3	320.7	321.1	0.10%	320.7	314.6	-1.90%	320.7	326	1.70%	320.7	318.4	-0.70%	320.7	318.5	-0.70%	320.7	326.2	1.70%	320.7	318.2	-0.80%
60105 PR ISLD3	61950 BYRON 3	-199.7	-183.9	-7.90%	-199.7	-213.8	7.00%	-199.7	-191.1	-4.30%	-199.7	-203.5	1.90%	-199.7	-194.2	-2.80%	-199.7	-188.7	-5.50%	-199.7	-204.3	2.30%
60192 BLUE LK3	60050 WLMRTHTP	-453.9	-462.9	2.00%	-453.9	-474.6	4.60%	-453.9	-454.5	0.20%	-453.9	-454.7	0.20%	-453.9	-459.6	1.30%	-453.9	-453.6	-0.10%	-453.9	-459.1	1.20%
60187 AS KING7	60325 WILOWRV7	129	129.4	0.30%	129	128.2	-0.60%	129	129.7	0.50%	129	128.7	-0.20%	129	128.9	-0.10%	129	129.7	0.50%	129	128.8	-0.20%
60238 REDROCK7	68966 GLENMONT	50.6	51	0.80%	50.6	49.1	-2.90%	50.6	51.2	1.30%	50.6	50.2	-0.70%	50.6	50.3	-0.70%	50.6	51.3	1.40%	50.6	50.4	-0.30%
62234 LKMARN 7	60276 AIRLAKE7	53.4	53.1	-0.50%	53.4	54.3	1.70%	53.4	53.2	-0.30%	53.4	53.4	0.10%	53.4	38.9	-27.10%	53.4	53.2	-0.40%	53.4	53.6	0.30%
SUBTOTALS FOR: MNEX (INFO)		-99.9	-92.3	-7.70%	-99.9	-142.1	42.20%	-99.9	-85.5	-14.50%	-99.9	-107.4	7.50%	-99.9	-117.2	17.30%	-99.9	-82	-18.00%	-99.9	-112.4	12.50%
		Difference =	7.7	**10.10%**	Difference =	-42.2	**-42.20%**	Difference =	14.4	**19.30%**	Difference =	-7.4	**-14.90%**	Difference =	-17.3	**-17.30%**	Difference =	18	**18.00%**	Difference =	-12.5	**-12.50%**

Distribution Factor Analysis

Transmission Alternative 9b

2009 Summer Peak Case

Generation to Generation Dispatcl

Interface Definitior			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
From Bus	To Bus	Base Case with Xmsn	BGSII Case at 76 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 75 MW	Difference	Base Case with Xmsn	BGSII Case at 50 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference	Base Case with Xmsn	BGSII Case at 100 MW	Difference
34093 ARNOLD 3	34018 HAZLTON3	380.6	388.7	2.10%	380.6	387.8	1.90%	380.6	373.4	-1.90%	380.6	383.3	0.70%	380.6	387.9	1.90%	380.6	372.5	-2.10%	380.6	383.8	0.80%
SUBTOTALS FOR: ARN-HAZLTN		380.6	388.7	2.10%	380.6	387.8	1.90%	380.6	373.4	-1.90%	380.6	383.3	0.70%	380.6	387.9	1.90%	380.6	372.5	-2.10%	380.6	383.8	0.80%
		Difference =	8		Difference =	7.2		Difference =	-7.3	**-9.70%**	Difference =	2.6		Difference =	7.3		Difference =	-8.1	**-8.10%**	Difference =	3.2	**3.20%**
64786 COOPER 3	59199 ST JOE 3	54.6	55.6	1.70%	54.6	55.3	1.10%	54.6	49.2	-10.00%	54.6	54.4	-0.40%	54.6	55.6	1.70%	54.6	55.3	1.30%	54.6	53.5	-2.00%
64786 COOPER 3	96039 7FAIRPT	63.5	64.3	1.10%	63.5	64	0.80%	63.5	59.4	-6.60%	63.5	63.4	-0.20%	63.5	64.2	1.10%	63.5	64.9	2.10%	63.5	62.8	-1.20%
SUBTOTALS FOR: COOPER_S		118.2	119.9	1.40%	118.2	119.3	0.90%	118.2	108.5	-8.20%	118.2	117.8	-0.30%	118.2	119.8	1.40%	118.2	120.3	1.70%	118.2	116.3	-1.60%
		Difference =	1.7	**2.20%**	Difference =	1.1	**1.10%**	Difference =	-9.7	**-12.90%**	Difference =	-0.4	**-0.70%**	Difference =	1.6	**1.60%**	Difference =	2.1	**2.10%**	Difference =	-1.8	**-1.80%**
60304 EAU CL 3	92494 ARP 345	94.7	91.9	-3.00%	94.7	88.6	-6.40%	94.7	100.1	5.70%	94.7	92.4	-2.50%	94.7	90.7	-4.20%	94.7	100	5.60%	94.7	92.2	-2.70%
SUBTOTALS FOR: ECL-ARP		94.7	91.9	-3.00%	94.7	88.6	-6.40%	94.7	100.1	5.70%	94.7	92.4	-2.50%	94.7	90.7	-4.20%	94.7	100	5.60%	94.7	92.2	-2.70%
		Difference =	-2.8	**-3.70%**	Difference =	-6.1	**-6.10%**	Difference =	5.4	**7.20%**	Difference =	-2.4	**-4.70%**	Difference =	-4	**-4.00%**	Difference =	5.3		Difference =	-2.5	**-2.50%**
65351 S3451 3	65354 S3454 3	82.8	83.3	0.70%	82.8	83	0.30%	82.8	89.7	8.30%	82.8	82.6	-0.20%	82.8	83	0.30%	82.8	84.2	1.80%	82.8	82.5	-0.30%
65351 S3451 3	65359 S3459 3	30.4	31.9	4.90%	30.4	31.5	3.40%	30.4	37.7	23.90%	30.4	30.4	0.00%	30.4	31.5	3.60%	30.4	34.4	13.00%	30.4	30.2	-0.70%
65451 S1251 5	65497 S1297 5	39.7	40	0.70%	39.7	39.9	0.50%	39.7	40.9	3.10%	39.7	39.7	0.00%	39.7	39.9	0.50%	39.7	40.6	2.30%	39.7	39.7	-0.10%
SUBTOTALS FOR: FT CAL_S		152.9	155.2	1.50%	152.9	154.3	1.00%	152.9	168.3	10.10%	152.9	152.7	-0.10%	152.9	154.4	1.00%	152.9	159.2	4.10%	152.9	152.4	-0.30%
		Difference =	2.3	**3.10%**	Difference =	1.5	**1.50%**	Difference =	15.4		Difference =	-0.2	**-0.30%**	Difference =	1.5	**1.50%**	Difference =	6.3		Difference =	-0.5	**-0.50%**
64832 GENTLMN4	64909 N.PLATT4	157.4	157.3	0.00%	157.4	157.4	0.00%	157.4	155.9	-0.90%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%	157.4	157.4	0.00%
64832 GENTLMN4	64909 N.PLATT4	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	156.4	-0.90%	157.8	157.8	0.00%	157.8	157.8	0.00%	157.8	157.9	0.00%	157.8	157.8	0.00%
64832 GENTLMN4	64909 N.PLATT4	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	160.9	-0.90%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%	162.4	162.4	0.00%
64831 GENTLMN3	64984 SWEET W3	273.7	273.7	0.00%	273.7	273.8	0.00%	273.7	268.4	-1.90%	273.7	273.7	0.00%	273.7	273.8	0.00%	273.7	274.1	0.20%	273.7	273.7	0.00%
64831 GENTLMN3	64984 SWEET W3	327.9	328	0.00%	327.9	328.1	0.00%	327.9	321.6	-1.90%	327.9	328	0.00%	327.9	328.1	0.00%	327.9	328.5	0.20%	327.9	328	0.00%
64831 GENTLMN3	64943 REDWILO3	276.9	277.8	0.30%	276.9	277.6	0.30%	276.9	274	-1.10%	276.9	277	0.00%	276.9	277.8	0.30%	276.9	277.9	0.40%	276.9	276.4	-0.20%
SUBTOTALS FOR: GGS		1356	1357	0.10%	1356	1357	0.10%	1356	1337.2	-1.40%	1356	1356.3	0.00%	1356	1357.2	0.10%	1356	1358.1	0.20%	1356	1355.7	0.00%
		Difference =	1	**1.30%**	Difference =	1	**1.00%**	Difference =	-18.8	**-25.10%**	Difference =	0.3	**0.60%**	Difference =	1.1	**1.10%**	Difference =	2.1	**2.10%**	Difference =	-0.3	**-0.30%**
64933 PAULINE3	64902 MOORE 3	55.1	56.2	1.90%	55.1	56.2	1.90%	55.1	53.5	-3.00%	55.1	55.4	0.60%	55.1	56.3	2.20%	55.1	57.5	4.30%	55.1	55.1	-0.10%
64839 GR ISLD4	64780 COLMB W4	99.6	99.4	-0.30%	99.6	99.5	-0.10%	99.6	95.7	-3.90%	99.6	99.7	0.00%	99.6	99.5	-0.20%	99.6	99.4	-0.20%	99.6	99.7	0.00%
66571 GR ISLD3	64896 MCCOOL 3	144.2	146.7	1.70%	144.2	146.7	1.70%	144.2	145.7	1.00%	144.2	144.9	0.50%	144.2	147	1.90%	144.2	149.5	3.60%	144.2	144.1	-0.10%
SUBTOTALS FOR: GRIS_LNC		299	302.2	1.10%	299	302.4	1.10%	299	294.9	-1.40%	299	300	0.40%	299	302.8	1.30%	299	306.4	2.50%	299	298.8	-0.10%
		Difference =	3.2	**4.20%**	Difference =	3.4	**3.40%**	Difference =	-4.1	**-5.50%**	Difference =	1	**2.10%**	Difference =	3.8	**3.80%**	Difference =	7.5		Difference =	-0.2	**-0.20%**
57981 LACYGNE7	57965 W.GRDNR7	577.6	577.4	0.00%	577.6	577.6	0.00%	577.6	578.5	0.20%	577.6	577.7	0.00%	577.6	577.4	0.00%	577.6	578.7	0.20%	577.6	578.1	0.10%
57981 LACYGNE7	57968 STILWEL7	720.3	720.3	0.00%	720.3	720.5	0.00%	720.3	720.7	0.10%	720.3	720.5	0.00%	720.3	720.3	0.00%	720.3	721.1	0.10%	720.3	720.8	0.10%
SUBTOTALS FOR: LACYGNE_N		1297.9	1297.7	0.00%	1297.9	1298	0.00%	1297.9	1299.3	0.10%	1297.9	1298.2	0.00%	1297.9	1297.7	0.00%	1297.9	1299.8	0.10%	1297.9	1298.8	0.10%
		Difference =	-0.1	**-0.20%**	Difference =	0.1	**0.10%**	Difference =	1.4	**1.90%**	Difference =	0.3	**0.60%**	Difference =	-0.1	**-0.10%**	Difference =	1.9	**1.90%**	Difference =	1	**1.00%**
62234 LKMARN 7	60276 AIRLAKE7	54.4	54.2	-0.50%	54.4	55.3	1.60%	54.4	54.2	-0.30%	54.4	54.5	0.10%	54.4	39.9	-26.60%	54.4	54.2	-0.50%	54.4	54.6	0.30%
SUBTOTALS FOR: LKM-WFB		54.4	54.2	-0.50%	54.4	55.3	1.60%	54.4	54.2	-0.30%	54.4	54.5	0.10%	54.4	39.9	-26.60%	54.4	54.2	-0.50%	54.4	54.6	0.30%
		Difference =	-0.3	**-0.30%**	Difference =	0.9	**0.90%**	Difference =	-0.2	**-0.20%**	Difference =	0.1	**0.20%**	Difference =	-14.5	**-14.50%**	Difference =	-0.2	**-0.20%**	Difference =	0.2	**0.20%**
60175 ROSEAU 4	67576 RICHER 4	-143.7	-144.1	0.30%	-143.7	-144.3	0.40%	-143.7	-143.8	0.10%	-143.7	-143.9	0.20%	-143.7	-144.2	0.40%	-143.7	-143.9	0.20%	-143.7	-143.8	0.10%
60173 ROSEAUN2	67564 DORSEY 2	-1132.7	-1138.8	0.50%	1132.7	-1141.5	0.80%	-1132.7	-1135.2	0.20%	-1132.7	-1135.7	0.30%	1132.7	-1140.5	0.70%	-1132.7	-1136	0.30%	-1132.7	-1130.8	-0.20%
66752 DRAYTON4	67557 LETELER4	-238.4	-234.8	-1.50%	-238.4	-233.3	-2.10%	-238.4	-236.5	-0.80%	-238.4	-236.7	-0.70%	-238.4	-233.8	-1.90%	-238.4	-236	-1.00%	-238.4	-240.6	0.90%
63379 RUGBY 4	67523 GLENBOR4	40	42.8	7.00%	40	44.1	10.20%	40	40.7	1.70%	40	41.4	3.50%	40	43.6	8.90%	40	41	2.50%	40	40.6	1.50%
SUBTOTALS FOR: MHEX_N		-1474.8	-1474.9	0.00%	1474.8	-1475	0.00%	-1474.8	-1474.9	0.00%	-1474.8	-1474.8	0.00%	1474.8	-1474.9	0.00%	-1474.8	-1474.9	0.00%	-1474.8	-1474.6	0.00%
		Difference =	-0.2	**-0.20%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.20%**	Difference =	0	**-0.10%**	Difference =	-0.2	**-0.20%**	Difference =	-0.1	**-0.10%**	Difference =	0.2	**0.20%**
67576 RICHER 4	60175 ROSEAU 4	146.1	146.6	0.30%	146.1	146.7	0.40%	146.1	146.3	0.10%	146.1	146.3	0.20%	146.1	146.7	0.40%	146.1	146.3	0.20%	146.1	146.3	0.10%
67564 DORSEY 2	60173 ROSEAUN2	1149.3	1155.6	0.50%	1149.3	1158.4	0.80%	1149.3	1151.9	0.20%	1149.3	1152.3	0.30%	1149.3	1157.3	0.70%	1149.3	1152.7	0.30%	1149.3	1147.3	-0.20%
67557 LETELER4	66752 DRAYTON4	242.9	239.1	-1.50%	242.9	237.6	-2.20%	242.9	241	-0.80%	242.9	241.1	-0.70%	242.9	238.1	-1.90%	242.9	240.4	-1.00%	242.9	245.2	1.00%
67523 GLENBOR4	63379 RUGBY 4	-39.7	-42.4	6.90%	-39.7	-43.7	10.10%	-39.7	-40.3	1.70%	-39.7	-41.1	3.50%	-39.7	-43.2	8.80%	-39.7	-40.6	2.50%	-39.7	-40.2	1.50%
SUBTOTALS FOR: MHEX_S		1498.6	1498.9	0.00%	1498.6	1499	0.00%	1498.6	1498.8	0.00%	1498.6	1498.7	0.00%	1498.6	1499	0.00%	1498.6	1498.6	0.00%	1498.6	1498.5	0.00%
		Difference =	0.3	**0.30%**	Difference =	0.4	**0.40%**	Difference =	0.1	**0.20%**	Difference =	0.1	**0.20%**	Difference =	0.3	**0.30%**	Difference =	0.2	**0.20%**	Difference =	-0.1	**-0.10%**
68613 AUBURNT4	67525 RESTON 4	42.3	42.2	-0.30%	42.3	42.2	-0.40%	42.3	42.3	-0.10%	42.3	42.3	-0.10%	42.3	42.2	-0.40%	42.3	42.3	-0.10%	42.3	42.4	0.00%
68615 YORKTON4	67514 ROBLIN 4	-90.6	-90.5	-0.10%	-90.6	-90.5	-0.10%	-90.6	-90.6	0.00%	-90.6	-90.5	-0.10%	-90.6	-90.5	-0.10%	-90.6	-90.5	0.00%	-90.6	-90.6	0.00%
68630 EBCAMPB4	67515 RALL 4	-6.4	-6.3	-1.00%	-6.4	-6.3	-1.50%	-6.4	-6.3	-0.30%	-6.4	-6.3	-0.50%	-6.4	-6.3	-1.30%	-6.4	-6.3	-0.50%	-6.4	-6.4	0.10%
SUBTOTALS FOR: MH_SPC_E		-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%	-54.6	-54.6	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67525 RESTON 4	68613 AUBURNT4	-42.2	-42.1	-0.30%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.1	-0.10%	-42.2	-42	-0.40%	-42.2	-42.1	-0.10%	-42.2	-42.2	0.00%
67514 ROBLIN 4	68615 YORKTON4	91.4	91.3	-0.10%	91.4	91.3	-0.10%	91.4	91.4	0.00%	91.4	91.3	0.00%	91.4	91.3	-0.10%	91.4	91.3	0.00%	91.4	91.4	0.00%
67515 RALL 4	68630 EBCAMPB4	6.6	6.5	-1.00%	6.6	6.5	-1.50%	6.6	6.5	-0.30%	6.6	6.5	-0.50%	6.6	6.5	-1.30%	6.6	6.5	-0.50%	6.6	6.6	0.10%
SUBTOTALS FOR: MH_SPC_W		55.8	55.7	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%	55.8	55.8	0.00%	55.8	55.7	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**

Distribution Factor Analysis
Transmission Alternative 9b
2009 Summer Peak Case
Generation to Generation Dispatch

			CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
64095 MNTZUMA3	64064 BONDRNT3	10.1	5.9	-41.10%	10.1	6.2	-38.20%	10.1	14.3	42.10%	10.1	9.3	-7.50%	10.1	6.3	-37.60%	10.1	17.7	76.20%	10.1	9.6	-4.30%
SUBTOTALS FOR: MNTZUMA_W		10.1	5.9	-41.10%	10.1	6.2	-38.20%	10.1	14.3	42.10%	10.1	9.3	-7.50%	10.1	6.3	-37.60%	10.1	17.7	76.20%	10.1	9.6	-4.30%
		Difference =	-4.1	**-5.40%**	Difference =	-3.8	**-3.80%**	Difference =	4.2	[redacted]	Difference =	-0.8	**-1.50%**	Difference =	-3.8	**-3.80%**	Difference =	7.7	[redacted]	Difference =	-0.4	**-0.40%**
61702 LASKIN 7	61705 BABBITT7	63.5	63.4	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.4	0.00%	63.5	63.4	0.00%	63.5	63.4	-0.10%	63.5	63.5	0.10%
61702 LASKIN 7	61722 FORBES 7	43.9	43.9	0.00%	43.9	43.9	0.10%	43.9	43.9	-0.10%	43.9	43.9	0.00%	43.9	43.9	0.00%	43.9	43.9	-0.10%	43.9	43.9	-0.10%
61702 LASKIN 7	62451 LAKELND7	64.6	64.5	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.00%	64.6	64.5	0.00%	64.6	64.5	-0.10%	64.6	64.6	0.10%
61702 LASKIN 7	61574 LASKNJCT	-74.8	-74.8	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.7	-0.10%	-74.8	-74.8	0.00%	-74.8	-74.8	-0.10%	-74.8	-74.7	-0.10%	-74.8	-74.9	0.10%
61626 BOSWELL4	61625 BLCKBRY4	139.7	139.4	-0.20%	139.7	139.3	-0.30%	139.7	139.5	-0.10%	139.7	139.6	-0.10%	139.7	139.3	-0.20%	139.7	139.4	-0.20%	139.7	140.4	0.50%
61626 BOSWELL4	61625 BLCKBRY4	135.9	135.7	-0.20%	135.9	135.6	-0.30%	135.9	135.8	-0.10%	135.9	135.8	-0.10%	135.9	135.6	-0.20%	135.9	135.7	-0.10%	135.9	136.6	0.50%
61626 BOSWELL4	61627 SHANNON4	87.3	87.9	0.60%	87.3	88.1	0.80%	87.3	87.7	0.40%	87.3	87.5	0.20%	87.3	88	0.70%	87.3	87.8	0.50%	87.3	85.9	-1.70%
61615 ARROWHD4	61614 98L TAP4	57.1	56	-2.00%	57.1	55.8	-2.20%	57.1	55.7	-2.50%	57.1	56.8	-0.50%	57.1	55.8	-2.40%	57.1	55.4	-2.90%	57.1	59.8	4.80%
61615 ARROWHD4	61554 AWHD1JCT	155.1	155	-0.10%	155.1	154.9	-0.10%	155.1	154.8	-0.20%	155.1	155.1	0.00%	155.1	155	-0.10%	155.1	154.8	-0.20%	155.1	155.9	0.50%
61615 ARROWHD4	61556 AWHD2JCT	160.6	160.4	-0.10%	160.6	160.3	-0.10%	160.6	160.2	-0.20%	160.6	160.5	0.00%	160.6	160.4	-0.10%	160.6	160.2	-0.20%	160.6	161.3	0.50%
61615 ARROWHD4	61624 FORBES 4	-110.1	-110.4	0.30%	-110.1	-109.9	-0.20%	-110.1	-111.2	1.00%	-110.1	-109.9	-0.10%	-110.1	-110.2	0.10%	-110.1	-111.3	1.10%	-110.1	-109.7	-0.30%
61615 ARROWHD4	63055 BEARCK 4	55	56	1.90%	55	57.4	4.40%	55	54.7	-0.50%	55	55.9	1.70%	55	56.6	3.10%	55	54.8	-0.20%	55	53.8	-2.10%
SUBTOTALS FOR: MP_EXPORT		777.7	777	-0.10%	777.7	778.6	0.10%	777.7	774.3	-0.40%	777.7	778.4	0.10%	777.7	777.5	0.00%	777.7	774	-0.50%	777.7	781.1	0.40%
		Difference =	-0.7	**-0.90%**	Difference =	0.9	**0.90%**	Difference =	-3.4	**-4.60%**	Difference =	0.7	**1.40%**	Difference =	-0.2	**-0.20%**	Difference =	-3.7	**-3.70%**	Difference =	3.3	**3.30%**
60105 PR ISLD3	61950 BYRON 3	-199	-182.8	-8.10%	-199	-212.5	6.80%	-199	-189.9	-4.60%	-199	-203	2.00%	-199	-192.9	-3.00%	-199	-187.5	-5.80%	-199	-203.5	2.20%
60304 EAU CL 3	92494 ARP 345	94.7	91.9	-3.00%	94.7	88.6	-6.40%	94.7	100.1	5.70%	94.7	92.4	-2.50%	94.7	90.7	-4.20%	94.7	100	5.60%	94.7	92.2	-2.70%
SUBTOTALS FOR: MWSI		-104.3	-90.9	-12.80%	-104.3	-123.9	18.80%	-104.3	-89.8	-13.80%	-104.3	-110.6	6.10%	-104.3	-102.2	-2.00%	-104.3	-87.5	-16.10%	-104.3	-111.3	6.70%
		Difference =	13.4	[redacted]	Difference =	-19.6	**-19.60%**	Difference =	14.4	[redacted]	Difference =	-6.3	**-12.70%**	Difference =	2.1	**2.10%**	Difference =	16.8	[redacted]	Difference =	-7	**-7.00%**
66756 SQBUTTE4	63049 STANTON4	-38.7	-37	-4.30%	-38.7	-36.4	-5.80%	-38.7	-37.4	-3.30%	-38.7	-37.8	-2.10%	-38.7	-36.5	-5.50%	-38.7	-36.9	-4.60%	-38.7	-39.3	1.80%
66756 SQBUTTE4	66751 CENTER 4	-41.6	-42.4	1.70%	-41.6	-42.8	2.80%	-41.6	-41.3	-0.80%	-41.6	-42.1	1.00%	-41.6	-42.6	2.20%	-41.6	-41.4	-0.60%	-41.6	-43.1	3.50%
66756 SQBUTTE4	66791 CENTER 3	92.5	91.6	-1.00%	92.5	91.5	-1.20%	92.5	90.9	-1.80%	92.5	92.2	-0.40%	92.5	91.3	-1.30%	92.5	90.5	-2.20%	92.5	94.7	2.30%
63041 COAL CR4	63042 COAL TP4	-23.2	-23.3	0.50%	-23.2	-23.4	0.80%	-23.2	-23.2	-0.10%	-23.2	-23.2	0.30%	-23.2	-23.3	0.60%	-23.2	-23.2	-0.10%	-23.2	-23.3	0.60%
63041 COAL CR4	63049 STANTON4	-124.8	-125.6	0.70%	-124.8	-126	1.00%	-124.8	-124.8	0.00%	-124.8	-125.2	0.40%	-124.8	-125.8	0.90%	-124.8	-124.9	0.10%	-124.8	-125.5	0.60%
63041 COAL CR4	63381 UNDERWD4	144	145	0.70%	144	145.5	1.00%	144	144	0.00%	144	144.6	0.40%	144	145.3	0.90%	144	144.1	0.10%	144	144.9	0.60%
SUBTOTALS FOR: NDDC		8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%	8.3	8.3	0.00%
		Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
67105 LELANDO3	66506 FTTHOMP3	130.1	131.6	1.20%	130.1	131.5	1.10%	130.1	134.2	3.20%	130.1	130.5	0.40%	130.1	132	1.50%	130.1	134.4	3.40%	130.1	128.1	-1.50%
67105 LELANDO3	67160 GROTON 3	254	252.8	-0.50%	254	252.4	-0.60%	254	252.5	-0.60%	254	253.5	-0.20%	254	252.6	-0.60%	254	253.5	-0.20%	254	251.3	-1.10%
67101 ANTELOP3	67120 BRDLAND3	192.2	192	-0.10%	192.2	191.7	-0.30%	192.2	192.7	0.30%	192.2	192.1	-0.10%	192.2	192	-0.10%	192.2	193.4	0.60%	192.2	189.8	-1.20%
63314 BIGSTON4	66503 BLAIR 4	-26.2	-1.5	-94.30%	-26.2	5.7	-121.80%	-26.2	0.2	-100.90%	-26.2	-10.5	-59.90%	-26.2	6.3	-123.90%	-26.2	10.2	-139.10%	-26.2	-3.1	-88.30%
63320 6MI GRV4	**66550 GRANITF4**	-20.1	-13.3	-33.60%	-20.1	-11.3	-44.00%	-20.1	-13.3	-34.00%	-20.1	-14.7	-26.80%	-20.1	-11	-45.40%	-20.1	-10.6	-47.40%	-20.1	-21	4.50%
63336 AUDUBON4	63053 HUBBARD4	111	114.4	3.00%	111	115.7	4.20%	111	112.9	1.70%	111	112.7	1.50%	111	115.3	3.90%	111	113.5	2.20%	111	107.1	-3.60%
66521 SULLYBT4	66519 OAHE 4	-72.4	-71.4	-1.30%	-72.4	-71.5	-1.20%	-72.4	-69.4	-4.00%	-72.4	-72	-0.40%	-72.4	-71.2	-1.60%	-72.4	-69.4	-4.10%	-72.4	-74.1	2.50%
63052 INMAN 4	61611 WINGRIV4	95.3	101	6.00%	95.3	103.1	8.20%	95.3	99.3	4.20%	95.3	98.3	3.10%	95.3	102.6	7.70%	95.3	100.4	5.30%	95.3	75.7	-20.50%
66470 BISON 4	66497 MAURINE4	-2	-1.4	-29.60%	-2	-1.4	-27.80%	-2	0.7	-134.00%	-2	-1.8	-8.90%	-2	-1.3	-36.20%	-2	-0.4	-81.60%	-2	-2.7	36.30%
66716 LAPORTE7	61640 BADOURA7	-0.8	0	-98.50%	-0.8	0.3	-140.00%	-0.8	-0.4	-46.90%	-0.8	-0.4	-54.30%	-0.8	0.2	-127.70%	-0.8	-0.3	-61.80%	-0.8	-0.8	1.50%
63222 ALEXAND7	60144 DGLASCO7	30.7	32.1	4.40%	30.7	32.6	6.10%	30.7	31.7	3.20%	30.7	31.7	3.00%	30.7	32.5	5.80%	30.7	32	4.00%	30.7	23.7	-22.80%
67327 ELLENDL7	67401 ABDNJCT7	-7.4	-6.7	-9.10%	-7.4	-6.6	-10.10%	-7.4	-6.2	-15.50%	-7.4	-7	-4.80%	-7.4	-6.5	-12.00%	-7.4	-5.7	-22.70%	-7.4	-8.8	19.90%
66432 EDGELEY7	66534 ORDWAY 7	-20.4	-20.5	0.50%	-20.4	-20.7	1.30%	-20.4	-20.1	-1.40%	-20.4	-20.5	0.40%	-20.4	-20.5	0.60%	-20.4	-19.8	-3.20%	-20.4	-22.2	8.90%
66438 FORMAN 7	66522 SUMMIT-7	-23.6	-23.1	-2.00%	-23.6	-23.1	-2.10%	-23.6	-22.7	-3.50%	-23.6	-23.3	-1.20%	-23.6	-22.9	-2.70%	-23.6	-21.9	-7.20%	-23.6	-25.2	7.00%
63311 CANBY 4	66550 GRANITF4	73.6	86.7	17.80%	73.6	91	23.70%	73.6	86	16.80%	73.6	83.5	13.40%	73.6	91	23.60%	73.6	90.1	22.30%	73.6	86.2	17.10%
62006 KERKHO 7	62005 KERKHOT7	16.3	17.8	9.00%	16.3	18.3	11.90%	16.3	17.7	8.20%	16.3	18.2	11.30%	16.3	18.3	12.20%	16.3	18.2	11.10%	16.3	16.2	-0.70%
66752 DRAYTON4	67557 LETELER4	-242.9	-239.1	-1.50%	-242.9	-237.6	-2.20%	-242.9	-241	-0.80%	-242.9	-241.1	-0.70%	-242.9	-238.1	-1.90%	-242.9	-240.4	-1.00%	-242.9	-245.2	1.00%
63379 RUGBY 4	67523 GLENBOR4	40	42.8	7.00%	40	44.1	10.20%	40	40.7	1.70%	40	41.4	3.50%	40	43.6	8.90%	40	41	2.50%	40	40.6	1.50%
63320 6MI GRV4	**63050 WILLMAR4**	96.5	103.5	7.30%	96.5	106.1	10.00%	96.5	102.2	5.90%	96.5	102.8	6.60%	96.5	105.8	9.70%	96.5	103.9	7.70%	96.5	99.3	2.90%
SUBTOTALS FOR: NDEX		624.3	697.6	11.80%	624.3	720.4	15.40%	624.3	697.7	11.80%	624.3	673.5	7.90%	624.3	720.7	15.50%	624.3	722.2	15.70%	624.3	615	-1.50%
		Difference =	73.4	[redacted]	Difference =	96.1	[redacted]	Difference =	73.5	[redacted]	Difference =	49.3	[redacted]	Difference =	96.5	[redacted]	Difference =	97.9	[redacted]	Difference =	-9.3	**-9.30%**
36406 WEMPL; B	39058 PAD 345	635.3	636.5	0.20%	635.3	637.8	0.40%	635.3	632.4	-0.50%	635.3	636.3	0.20%	635.3	636.9	0.20%	635.3	632.1	-0.50%	635.3	637	0.30%
SUBTOTALS FOR: NI_WUMS		635.3	636.5	0.20%	635.3	637.8	0.40%	635.3	632.4	-0.50%	635.3	636.3	0.20%	635.3	636.9	0.20%	635.3	632.1	-0.50%	635.3	637	0.30%
		Difference =	1.2	**1.50%**	Difference =	2.4	**2.40%**	Difference =	-2.9	**-3.90%**	Difference =	1	**2.00%**	Difference =	1.6	**1.60%**	Difference =	-3.3	**-3.30%**	Difference =	1.7	**1.70%**
60105 PR ISLD3	61950 BYRON 3	-199	-182.8	-8.10%	-199	-212.5	6.80%	-199	-189.9	-4.60%	-199	-203	2.00%	-199	-192.9	-3.00%	-199	-187.5	-5.80%	-199	-203.5	2.20%
SUBTOTALS FOR: PRI-BYN		-199	-182.8	-8.10%	-199	-212.5	6.80%	-199	-189.9	-4.60%	-199	-203	2.00%	-199	-192.9	-3.00%	-199	-187.5	-5.80%	-199	-203.5	2.20%
		Difference =	16.2	[redacted]	Difference =	-13.5	**-13.50%**	Difference =	9.1	[redacted]	Difference =	-4	**-7.90%**	Difference =	6.1	[redacted]	Difference =	11.5	[redacted]	Difference =	-4.5	**-4.50%**
36382 QUAD ;	34036 ROCK CK3	509.2	510.6	0.30%	509.2	510.5	0.30%	509.2	507.8	-0.30%	509.2	509.6	0.10%	509.2	510.3	0.20%	509.2	508.2	-0.20%	509.2	510.1	0.20%
SUBTOTALS FOR: QUAD-ROCKC		509.2	510.6	0.30%	509.2	510.5	0.30%	509.2	507.8	-0.30%	509.2	509.6	0.10%	509.2	510.3	0.20%	509.2	508.2	-0.20%	509.2	510.1	0.20%
		Difference =	1.5	**1.90%**	Difference =	1.3	**1.30%**	Difference =	-1.4	**-1.80%**	Difference =	0.4	**0.80%**	Difference =	1.1	**1.10%**	Difference =	-1	**-1.00%**	Difference =	1	**1.00%**
36382 QUAD ;	64405 SUB 91 3	553.9	554.3	0.10%	553.9	553.8	0.00%	553.9	554.3	0.10%	553.9	554.1	0.00%	553.9	554.1	0.00%	553.9	556.4	0.50%	553.9	554.2	0.10%
64400 MECCORD3	64403 E MOLIN3	274.7	274.8	0.10%	274.7	274.5	-0.10%	274.7	275.2	0.20%	274.7	274.8	0.00%	274.7	274.7	0.00%	274.7	276.7	0.70%	274.7	274.8	0.00%

Distribution Factor Analysis

Transmission Alternative 9b

2009 Summer Peak Case

Generation to Generation Dispatch

		CMMPA			GRE			HCPD			HUC			MMPA			MRES			OTP	
SUBTOTALS FOR: QUADCITY_W	828.6	829.1	0.10%	828.6	828.3	0.00%	828.6	829.6	0.10%	828.6	828.9	0.00%	828.6	828.8	0.00%	828.6	833.2	0.60%	828.6	829	0.00%
Difference =		0.5	**0.70%**	Difference =	-0.3	**-0.30%**	Difference =	1	**1.30%**	Difference =	0.4	**0.70%**	Difference =	0.2	**0.20%**	Difference =	4.6	**4.80%**	Difference =	0.4	**0.40%**
64831 GENTLMN3 64943 REDWILO3	276.9	277.8	0.30%	276.9	277.6	0.30%	276.9	274	-1.10%	276.9	277	0.00%	276.9	277.8	0.30%	276.9	277.9	0.40%	276.9	276.4	-0.20%
SUBTOTALS FOR: WNE_WKS	276.9	277.8	0.30%	276.9	277.6	0.30%	276.9	274	-1.10%	276.9	277	0.00%	276.9	277.8	0.30%	276.9	277.9	0.40%	276.9	276.4	-0.20%
Difference =		0.8	**1.10%**	Difference =	0.7	**0.70%**	Difference =	-2.9	**-3.90%**	Difference =	0.1	**0.20%**	Difference =	0.9	**0.90%**	Difference =	1	**1.00%**	Difference =	-0.5	**-0.50%**
66756 SQBUTTE4 63049 STANTON4	-38.7	-37	-4.30%	-38.7	-36.4	-5.80%	-38.7	-37.4	-3.30%	-38.7	-37.8	-2.10%	-38.7	-36.5	-5.50%	-38.7	-36.9	-4.60%	-38.7	-39.3	1.80%
66756 SQBUTTE4 66751 CENTER 4	-41.6	-42.4	1.70%	-41.6	-42.8	2.80%	-41.6	-41.3	-0.80%	-41.6	-42.1	1.00%	-41.6	-42.6	2.20%	-41.6	-41.4	-0.60%	-41.6	-43.1	3.50%
66756 SQBUTTE4 66791 CENTER 3	92.5	91.6	-1.00%	92.5	91.5	-1.20%	92.5	90.9	-1.80%	92.5	92.2	-0.40%	92.5	91.3	-1.30%	92.5	90.5	-2.20%	92.5	94.7	2.30%
SUBTOTALS FOR: Y20C	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%	12.2	12.2	0.00%
Difference =		0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**	Difference =	0	**0.00%**
60186 AS KING3 60304 EAU CL 3	319.3	319.8	0.20%	319.3	313.3	-1.90%	319.3	324.8	1.70%	319.3	316.9	-0.80%	319.3	317.3	-0.60%	319.3	325	1.80%	319.3	316.8	-0.80%
60105 PR ISLD3 61950 BYRON 3	-199	-182.8	-8.10%	-199	-212.5	6.80%	-199	-189.9	-4.60%	-199	-203	2.00%	-199	-192.9	-3.00%	-199	-187.5	-5.80%	-199	-203.5	2.20%
60192 BLUE LK3 60050 WLMRTHTP	-489.6	-495.6	1.20%	-489.6	-506	3.40%	-489.6	-485	-0.90%	-489.6	-493.7	0.80%	-489.6	-487.6	-0.40%	-489.6	-482.1	-1.50%	-489.6	-495.2	1.10%
60187 AS KING7 60325 WILOWRV7	128.7	129.1	0.30%	128.7	127.9	-0.60%	128.7	129.4	0.50%	128.7	128.4	-0.30%	128.7	128.6	-0.10%	128.7	129.4	0.50%	128.7	128.5	-0.20%
60238 REDROCK7 68966 GLENMONT	50.5	51	0.90%	50.5	49.1	-2.80%	50.5	51.2	1.30%	50.5	50.1	-0.70%	50.5	50.2	-0.70%	50.5	51.2	1.40%	50.5	50.3	-0.30%
62234 LKMARN 7 60276 AIRLAKE7	54.4	54.2	-0.50%	54.4	55.3	1.60%	54.4	54.2	-0.30%	54.4	54.5	0.10%	54.4	39.9	-26.60%	54.4	54.2	-0.50%	54.4	54.6	0.30%
SUBTOTALS FOR: MNEX (INFO)	-135.6	-124.4	-8.20%	-135.6	-173	27.60%	-135.6	-115.4	-14.90%	-135.6	-146.7	8.20%	-135.6	-144.5	6.50%	-135.6	-109.8	-19.00%	-135.6	-148.4	9.40%
Difference =		11.2	**14.70%**	Difference =	-37.4	**-37.40%**	Difference =	20.2	**27.00%**	Difference =	-11.1	**-22.10%**	Difference =	-8.9	**-8.90%**	Difference =	25.8	**25.80%**	Difference =	-12.8	**-12.80%**

APPENDIX G

Delivery Service Requests Submitted to MISO
As Part of the Big Stone II Project

EXHIBIT B

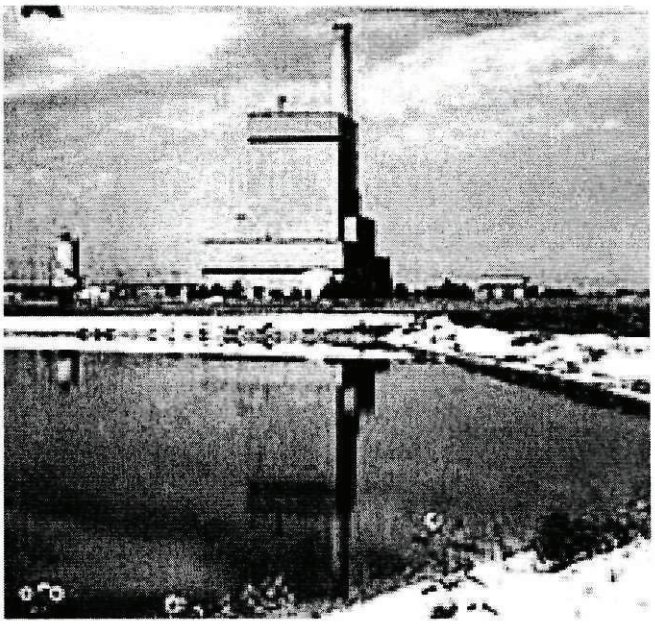
to System Impact Study Agreement

Transmission Service Requests Comprising the Study

TSR AREF Number	Customer	Increment	Service Type	Capacity	POR	Source	POD	Sink	Comment
75772450	UPLS	Yearly	Network	1 MW	OTP	Bigstone	ALTW	ALTW.CMPA	
75772451	UPLS	Yearly	Network	2 MW	OTP	Bigstone	ALTW	ALTW.CMPA	
75772452	UPLS	Yearly	Network	1 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772454	UPLS	Yearly	Network	2 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772456	UPLS	Yearly	Network	3 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772460	UPLS	Yearly	Network	4 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772461	UPLS	Yearly	Network	5 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772462	UPLS	Yearly	Network	10 MW	OTP	Bigstone	NSP	NSP.CMPA	Verify Service Type
75772463	UPLS	Yearly	Network	2 MW	OTP	Bigstone	NSP	OTP.NSP	POD should be OTP
75772465	UPLS	Yearly	Network	4 MW	OTP	Bigstone	NSP	OTP.NSP	POD should be OTP
75772468	UPLS	Yearly	Network	6 MW	OTP	Bigstone	NSP	OTP.NSP	POD should be OTP
75772470	UPLS	Yearly	Network	1 MW	OTP	Bigstone	GRE	GRE	Verify Service Type
75772474	UPLS	Yearly	Network	2 MW	OTP	Bigstone	GRE	GRE	Verify Service Type
75772478	UPLS	Yearly	Network	3 MW	OTP	Bigstone	GRE	GRE	Verify Service Type
75772483	UPLS	Yearly	Network	4 MW	OTP	Bigstone	GRE	GRE	Verify Service Type
75772487	UPLS	Yearly	Network	25 MW	OTP	Bigstone	SMP	SMP	Verify Service Type
75772490	UPLS	Yearly	Network	50 MW	OTP	Bigstone	SMP	SMP	Verify Service Type
75772455	GRE	Yearly	P-t-P	80 MW	OTP	Bigstone	GRE	GREC	
75772469	GRE	Yearly	P-t-P	50 MW	OTP	Bigstone	GRE	GREC	
75772477	GRE	Yearly	P-t-P	40 MW	OTP	Bigstone	GRE	GREC	
75772486	GRE	Yearly	P-t-P	20 MW	OTP	Bigstone	GRE	GREC	
75772492	GRE	Yearly	P-t-P	10 MW	OTP	Bigstone	GRE	GREC	
75772457	MRES	Yearly	P-t-P	35 MW	OTP	Bigstone	WAUE	WAUE	
75772466	MRES	Yearly	P-t-P	25 MW	OTP	Bigstone	WAUE	WAUE	
75772475	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	WAUE	WAUE	
75772481	MRES	Yearly	P-t-P	5 MW	OTP	Bigstone	WAUE	WAUE	
75772484	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	WAUE	WAUE	
75772493	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	WAUE	WAUE	
75772583	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	WAUE	WAUE	
75772459	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772464	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772472	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772476	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772479	MRES	Yearly	P-t-P	5 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772482	MRES	Yearly	P-t-P	15 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772485	MRES	Yearly	P-t-P	25 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772491	MRES	Yearly	P-t-P	50 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772495	MRES	Yearly	P-t-P	100 MW	OTP	Bigstone	WAUE	WAUE.MRES	
75772522	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	OTP	OTP.MRES	
75772525	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	OTP	OTP.MRES	
75772595	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	OTP	OTP.MRES	
75772467	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	OTP	OTP.MRES	
75772473	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	OTP	OTP.MRES	
75772480	MRES	Yearly	P-t-P	20 MW	OTP	Bigstone	OTP	OTP.MRES	
75772488	MRES	Yearly	P-t-P	40 MW	OTP	Bigstone	OTP	OTP.MRES	
75772494	MRES	Yearly	P-t-P	70 MW	OTP	Bigstone	OTP	OTP.MRES	
75772496	MRES	Yearly	Network	82 MW	OTP	Bigstone	ALTW	ALTW.MRES	
75772498	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	NSP	NSP.MELR	
75772501	MRES	Yearly	P-t-P	5 MW	OTP	Bigstone	NSP	NSP.MELR	
75772504	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	NSP	NSP.MELR	
75772508	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	NSP	NSP.MELR	
75772512	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	NSP	NSP.MELR	
75772514	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	NSP	NSP.MELR	
75772499	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	MP	MP.STPL	
75772502	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	MP	MP.STPL	
75772505	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	MP	MP.STPL	
75772500	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	NSP	NSP.HILL	
75772506	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	NSP	NSP.HILL	
75772510	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	NSP	NSP.HILL	
75772515	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	NSP	NSP.HILL	
75772507	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	MP	MP.WDNA	
75772511	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	MP	MP.WDNA	
75772513	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	MP	MP.WDNA	
75772517	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	MP	MP.WDNA	
75772519	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	MP	MP.WDNA	
75772518	MRES	Yearly	P-t-P	30 MW	OTP	Bigstone	NSP	NSP	
75772521	MRES	Yearly	P-t-P	30 MW	OTP	Bigstone	NSP	NSP	
75772524	MRES	Yearly	P-t-P	20 MW	OTP	Bigstone	NSP	NSP	
75772597	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	NSP	NSP	
75772527	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	NSP	NSP	
75772529	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	NSP	NSP	
75772530	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	NSP	NSP	
75772531	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	NSP	NSP	
75772520	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	NSP	NSP.SAUK	
75772526	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	NSP	NSP.SAUK	
75772532	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	MPW	NSP.SAUK	POD should be NSP
75772533	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	NSP	NSP.SAUK	
75772534	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	NSP	NSP.SAUK	
75772535	MRES	Yearly	P-t-P	10 MW	OTP	Bigstone	NSP	NSP.STJM	
75772538	MRES	Yearly	P-t-P	5 MW	OTP	Bigstone	NSP	NSP.STJM	
75772539	MRES	Yearly	P-t-P	4 MW	OTP	Bigstone	NSP	NSP.STJM	
75772540	MRES	Yearly	P-t-P	2 MW	OTP	Bigstone	NSP	NSP.STJM	
75772541	MRES	Yearly	P-t-P	3 MW	OTP	Bigstone	NSP	NSP.STJM	
75772542	MRES	Yearly	P-t-P	1 MW	OTP	Bigstone	NSP	NSP.STJM	
75772471	MMPA	Yearly	P-t-P	25 MW	OTP	Bigstone	NSP	NSP.MMPA	
75772503	MMPA	Yearly	P-t-P	25 MW	OTP	Bigstone	NSP	NSP.MMPA	
75772523	MMPA	Yearly	P-t-P	50 MW	OTP	Bigstone	NSP	NSP.MMPA	
75772544	MMPA	Yearly	P-t-P	25 MW	OTP	Bigstone	NSP	NSP.MMPA	
75772546	MMPA	Yearly	P-t-P	25 MW	OTP	Bigstone	NSP	NSP.MMPA	
75772560	OTPW	Yearly	Network	50 MW	OTP	Bigstone	OTP	OTP	
75772562	OTPW	Yearly	Network	50 MW	OTP	Bigstone	OTP	OTP	
75772564	OTPW	Yearly	Network	25 MW	OTP	Bigstone	OTP	OTP	
75772565	OTPW	Yearly	Network	5 MW	OTP	Bigstone	OTP	OTP	
75772566	OTPW	Yearly	Network	5 MW	OTP	Bigstone	OTP	OTP	
75772567	OTPW	Yearly	Network	5 MW	OTP	Bigstone	OTP	OTP	
75772568	OTPW	Yearly	Network	5 MW	OTP	Bigstone	OTP	OTP	
75772569	OTPW	Yearly	Network	5 MW	OTP	Bigstone	OTP	OTP	
75773986	HUC	Yearly	P-t-P	50 MW	OTP	Bigstone	GRE	GREC	

Exhibit No. _____ (TR-2)
79 pages

Big Stone II
Generator Interconnection Study



Performed by

OTTER TAIL
POWER COMPANY

Delivery Planning Department

For the

Midwest Independent System Operator

November 2004

Generation Interconnection Request #38020-01 – Project G392

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  - B.3.1 Loading Violations for Interconnection Alternatives 1 and 2
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Appendix C 2007 Summer Peak Contingency Analysis Results
- C.1 All Group 2 Projects from MISO/WAPA Coordinated Study
  - C.1.1 Loading Violations for Interconnection Alternatives 1 and 2
  - C.1.2 Voltage Violations for Interconnection Alternatives 1 and 2
- C.2 Half Group 2 Projects from MISO/WAPA Coordinated Study
  - C.2.1 Loading Violations for Interconnection Alternatives 1 and 2
  - C.2.2 Voltage Violations for Interconnection Alternatives 1 and 2
- C.3 No Group 2 Projects from MISO/WAPA Coordinated Study
  - C.3.1 Loading Violations for Interconnection Alternatives 1 and 2
  - C.3.2 Voltage Violations for Interconnection Alternatives 1 and 2

0.0 Executive Summary

Otter Tail Power Company's Delivery Planning Department has been retained by the Midwest Independent System Operator (hereas referred to as "MISO") to perform a Generator Interconnection Evaluation Study (hereas referred to as "Study" or "Big Stone II Study") for MISO project number G392. Project G392 refers to a potential 600 MW coal-fired base-load generating facility to be located at the existing Big Stone plant site in Grant County, South Dakota. The proposed in-service date for this project is early to mid 2011.

This Study has identified possible impacts that this proposed generator may have on the existing transmission system. The objectives of this Study were to:

- Identify thermal overloads and voltage violations resulting from the interconnection of G392
- Identify unstable conditions that may result from the interconnection of G392
- Identify potentially increased fault duties to existing equipment from the interconnection of G392

In order to meet the objectives of this Study, steady state power flow analysis, transient stability analysis, and short circuit analysis were considered. While performing these different types of analyses, two different transmission alternatives were evaluated independently to determine the impact of the proposed generator interconnection on the existing transmission system. Both of these alternatives have one common aspect, which is the addition of a new 230 kV line from Big Stone to Canby with an uprate of existing 115 kV line from Canby to Granite Falls.

The two alternatives studied for this interconnection request are shown below in Figure 0.

Figure 0 – Interconnection Alternatives for Big Stone II Study

1. New 230 kV line from Big Stone to Ortonville with uprate of Ortonville to Johnson Junction to Morris 115 kV line to 230 kV with new 230 kV line from Big Stone to Canby and an uprate of the Canby to Granite Falls 115 kV line to 230 kV.
2. New 230 kV line from Big Stone to Willmar with new 230 kV line from Big Stone to Canby with an uprate of the Canby to Granite Falls 115 kV line to 230 kV.

Steady state analysis for this Study focused on the 2007 timeframe with analysis focusing on summer peak and summer off-peak conditions. These steady state cases were derived from the 2002 series MAPP models and have been used in several previous studies, including the "Group 1" and "Group 2" MISO/WAPA coordinated interconnection studies for the numerous wind generation requests in the Buffalo Ridge area. The Group 1 and Group 2 interconnection requests are ahead of this project in the MISO interconnection queue. These Group studies analyzed the feasibility of connecting approximately 1750 MW's of wind generation within the Buffalo Ridge area of southwest Minnesota, northwestern Iowa, and southeastern South Dakota. The Group 1 projects totaled approximately 916 MW's while the Group 2 projects totaled about 825 MW's.

Since it is possible that this project and many of the Group 2 requests may use some of the same transmission, the project sponsor (hereas referred to as the "Customer") decided during the kick-

off scoping meeting that they would like this interconnection request studied at three different generation levels of "Group 2" projects, which fall in the interconnection queue just ahead of project G392. The reason for the three generation levels is to give a range of possible transmission upgrade costs from potentially the most expensive alternative (all Group 2 projects) to the least expensive (no Group 2 projects). Not knowing the possible markets that these Group 2 projects have targeted for their power, the Customer also requested that a "half-Group 2" case be analyzed to determine what would be the outcome of the Study if approximately half of the Group 2 projects went forward. For the "half Group 2" cases, those projects that were the closest to this project were included since they could potentially have an impact on the required transmission to connect this project.

Based on the analysis performed, it does not appear that the amount of Group 2 generation included within the Study models has a substantial impact on the loading of the interconnection facilities.

Loading violations encountered during steady state contingency analysis of the 2007 summer off-peak case are shown below in Figure 1. The quantities displayed within Figure 1 represent the percent loading on each facility based on its normal continuous rating. Quantities given in yellow represent facility loadings not exceeding emergency ratings while those in red represent those loadings that did exceed emergency ratings.

Figure 1- Overloaded Elements for Summer Off-peak Conditions

	Summer Off-peak Conditions					
	All Group 2		Half Group 2		No Group 2	
Overloaded Facility	**Alt #1**	**Alt #2**	**Alt #1**	**Alt #2**	**Alt #1**	**Alt #2**
Big Stone 230/115/13.8 kV Transformer	103.5%		101.9%			
Morris 230/115 kV Transformer	155.2%		150.4%		141.5%	
Ortonville - Johnson Jct. 115 kV Line		131.1%		127.1%		119.1%

Summer peak contingency analysis results are summarized below in Figure 2. Once again, the quantities shown represent the percent loading on each facility based on the facility's normal continuous rating. As was shown in Figure 1, quantities given in yellow represent facility loadings not exceeding emergency ratings while those in red represent those loadings that did exceed emergency ratings.

Figure 2- Overloaded Elements for Summer Peak Conditions

	Summer Peak Conditions					
	All Group 2		Half Group 2		No Group 2	
Overloaded Facility	**Alt #1**	**Alt #2**	**Alt #1**	**Alt #2**	**Alt #1**	**Alt #2**
Big Stone 230/115/13.8 kV Transformer	119.2%	111.8%	117.0%	109.2%	115.0%	108.4%
Morris 230/115 kV Transformer	177.0%		172.2%		166.4%	
Ortonville - Johnson Jct. 115 kV Line		141.7%		139.0%		133.8%
Big Stone - Browns Valley 230 kV Line	128.7%	114.1%	124.8%	112.8%	120.9%	112.6%
Big Stone - Highway 12 115 kV Line	112.6%		110.4%		108.3%	
Highway 12 - Ortonville 115 kV Line	106.9%		104.7%		102.6%	
Johnson Jct. - Morris 115 kV Line		118.2%		115.8%		111.2%

Voltage violations identified during contingency analysis of the 2007 summer off-peak case indicated that a decrease in voltage is caused by implementing interconnection alternative 2 with

the proposed interconnection. A summary of the post-contingent voltage levels is given below in Figure 3 in per unit voltage. Quantities shown in red indicate those post-contingent voltage levels that are below post-contingent voltage criteria set by transmission owners in this Region.

Figure 3 – Voltage Violations for Summer Off-peak Conditions

	Summer Off-peak Conditions					
	All Group 2		Half Group 2		No Group 2	
Voltage Violation	Alt #1	Alt #2	Alt #1	Alt #2	Alt #1	Alt #2
Willmar 115 kV Bus		0.88		0.90		0.90
Willmar 230 kV Bus		0.91				

Contingency analysis of the summer peak case has very similar voltage results as that shown for summer off-peak conditions. The Willmar bus voltage problems are evident for interconnection alternative 2 as shown below in Figure 4. Once again, quantities shown in red indicate those post-contingent voltage levels that are below post-contingent voltage criteria set by transmission owners in this Region.

Figure 4 – Voltage Violations for Summer Peak Conditions

	Summer Peak Conditions					
	All Group 2		Half Group 2		No Group 2	
Voltage Violation	Alt #1	Alt #2	Alt #1	Alt #2	Alt #1	Alt #2
Willmar 115 kV Bus		0.90		0.90		0.90
Willmar 230 kV Bus		0.90		0.91		0.91

Based on the overall system performance during steady state conditions, this Study has identified that the following upgrades will be necessary on the existing system for connecting the proposed project with interconnection alternative 1. These upgrades are in addition to the new facilities (described in Figure 0) that are included as part of interconnection alternative 1.

Table 1 – Required Upgrades for Interconnection Alternative 1

1. Increase capacity of Morris 230/115 kV Transformer
2. Increase capacity of Big Stone to Browns Valley 230 kV Line
3. Increase capacity of Big Stone to Highway 12 115 kV Line

Implementing interconnection alternative 2 to connect the proposed project to the system will require the following upgrades (shown in Table 2) to the existing system. These upgrades are in addition to the new facilities (described in Figure 0) that are included as part of interconnection alternative 2.

Table 2 – Required Upgrades for Interconnection Alternative 2

1. Increase capacity of Ortonville to Johnson Jct. 115 kV Line
2. Increase capacity of Johnson Jct. to Morris 115 kV Line
3. Increase capacity of Big Stone to Browns Valley 230 kV Line
4. Install capacitor bank in Willmar area to mitigate low voltages

While performing contingency analysis for interconnection alternatives 1 and 2, a few other facilities overloaded outside the area of immediate interconnection, but are very likely to appear during the delivery service study. The facilities that will likely need to be upgraded during the delivery service study may include the following:

Table 3 – Likely Upgrades Required for Delivery Service Study

1. Grant County to Morris 115 kV Line
2. Hoot Lake to Fergus Falls 115 kV Line
3. Hankinson to Wahpeton 230 kV Line

Other system constraints identified further from the area of interconnection were identified during contingency analysis of the summer peak and summer off-peak cases. These facilities are not as likely to be required for delivery, but may appear depending on the assumptions used in the delivery service study.

Table 4 – Upgrades that may be Required for Delivery Service Study

1. Wahpeton to Fergus Falls 230 kV Line
2. Fergus Falls 230/115/13.2 kV Transformer
3. Edgetown Tap to Pelican Rapids 115 kV Line
4. Sheyenne to Fargo 230 kV Line (Interconnection Alternative 1 only)
5. Grant County to Hoot Lake 115 kV Line (Interconnection Alternative 1 only)
6. Aberdeen Jct. to Aberdeen 115 kV Line (Interconnection Alternative 2 only)

Other studies on-going within this region have identified other numerous facility overloads. These overloads appeared again during this Study. Since the future of many of these line overloads is uncertain, the responsibility of these line upgrades may fall within the realm of this project depending on the assumptions used during the delivery service study and the status of any planned upgrades associated with any of these line sections.

Table 5 – Other Overloaded Facilities Under Suspicion for Delivery Service Study

1. Granite Falls to MN Valley Tap 230 kV Line
2. MN Valley Tap to Panther 230 kV Line
3. Panther to McLeod 230 kV Line
4. Willmar to Granite Falls 230 kV Line
5. MN Valley 230/115 kV Transformer
6. MN Valley to Maynard 115 kV Line
7. Maynard to Kerkhoven 115 kV Line

A brief loss analysis during this Study has indicated that alternative 1 is more effective in delivering the generation to the existing transmission system during summer off-peak conditions while alternative 2 is has more loss savings during summer peak conditions. Changes in losses due to project G392 are shown below in Figure 5 for the 2007 summer peak case for OTP and the adjacent control areas.

Figure 5 – Summary of Losses by Control Area

	Summer Peak Conditions						Summer Off-peak Conditions					
	All Group 2		Half Group 2		No Group 2		All Group 2		Half Group 2		No Group 2	
Control Area	% Chng Alt #1	% Chng Alt #2	% Chng Alt #1	% Chng Alt #2	% Chng Alt #1	% Chng Alt #2	% Chng Alt #1	% Chng Alt #2	% Chng Alt #1	% Chng Alt #2	% Chng Alt #1	% Chng Alt #2
ALTW	5.5	5.3	4.4	4.2	4.1	4.0	3.0	2.9	3.0	2.9	2.9	2.8
XEL	3.0	3.2	4.4	4.6	3.9	4.0	6.7	7.0	4.2	4.5	6.4	6.7
MP	4.7	2.7	4.3	2.4	3.4	1.7	8.2	5.6	7.9	5.4	7.5	5.1
SMMPA	0.0	0.0	-8.3	-8.3	0.0	0.0	6.7	6.7	6.7	6.7	3.4	6.7
GRE	4.9	13.8	4.8	14.0	4.4	13.3	13.5	30.7	13.4	21.8	12.4	29.9
OTP	19.6	18.7	19.5	18.6	19.6	18.7	16.8	12.8	16.7	12.8	16.8	12.7
MPW	7.1	7.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MEC	1.8	1.7	1.6	1.5	1.6	1.5	1.5	1.5	1.5	1.5	1.6	1.6
NPPD	-5.0	-5.2	-5.6	-5.7	-6.0	-6.1	-2.7	-2.9	-3.1	-3.3	-3.5	-3.6
OPPD	2.9	2.9	2.3	2.3	2.0	2.0	4.5	4.7	4.7	4.7	4.8	5.0
LES	0.0	0.0	0.0	0.0	-1.1	-1.1	0.0	0.0	0.0	0.0	0.0	0.0
WAPA	1.0	-2.2	0.8	-2.7	-0.2	-3.9	6.4	2.8	6.7	3.2	6.7	3.0
MH	-0.3	-0.2	-0.4	-0.2	-0.3	-0.2	-0.2	-0.1	-0.2	-0.2	-0.2	-0.2
DPC	-2.5	-2.3	-2.4	-2.2	-2.3	-2.1	-0.4	-0.1	0.0	0.1	0.0	0.3
TOTAL	**3.1**	**3.3**	**3.2**	**3.4**	**2.8**	**3.0**	**4.9**	**4.7**	**4.2**	**3.7**	**4.7**	**4.5**

Transient stability analysis is part of the interconnection Study, but has not yet been completed. This type of analysis will determine if the proposed project is able to maintain system stability after credible disturbances are applied to the system. An addendum to this report will be issued separately once this analysis is completed.

Short circuit analysis is also part of the interconnection Study. This analysis is also incomplete at this time. This type of analysis will determine if existing equipment on the system will be able to withstand increased fault duties associated with the proposed project. The results of this analysis will be included within the same addendum as the transient stability analysis once it is completed.

Interconnection alternatives 1 and 2 for this proposed project have been evaluated extensively from a steady state standpoint and the results of this analysis have been summarized above with more detailed information being contained within the body of this report to follow.

1.0 Introduction

1.1 Study Scope

The scope of this Generator Interconnection Evaluation Study (hereas referred to as the "Study" or the "Big Stone II Study") is to determine the most efficient method of integrating a second generating plant into the existing system at Big Stone, SD. Through the generation interconnection process at the Midwest ISO (MISO), a potential generation developer, hereas referred to as "the Customer", has submitted a request for a new 600 MW generator at the existing site of the Big Stone generator. The current transmission system is not adequate to support the requested generator. This report outlines the results of the Study that has been completed to determine the necessary transmission additions to accommodate this interconnection request.

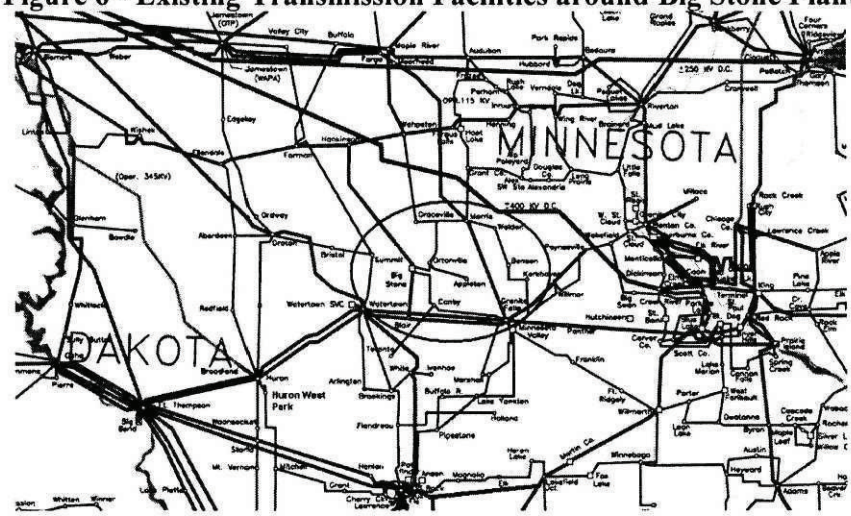
This Study has evaluated two different transmission alternatives to determine the impact of the proposed generator on the existing transmission system. These impacts have been identified by performing steady state power flow analysis for summer peak and summer off-peak conditions. It is anticipated that a subsequent report will be issued describing the results of the transient stability analysis and the short circuit analysis.

1.2 Existing Big Stone Transmission Facilities

The site of the generator interconnection request is at the same location as the existing Big Stone unit in extreme northeastern South Dakota. The existing unit at Big Stone is co-owned by Otter Tail Power Company, Northwestern Energy, and Montana-Dakota Utilities. The unit was initially installed during May of 1975. Over the years, generation equipment within the plant has been upgraded to get its accredited generation level within the MAPP Region to a net output of 470 MW.

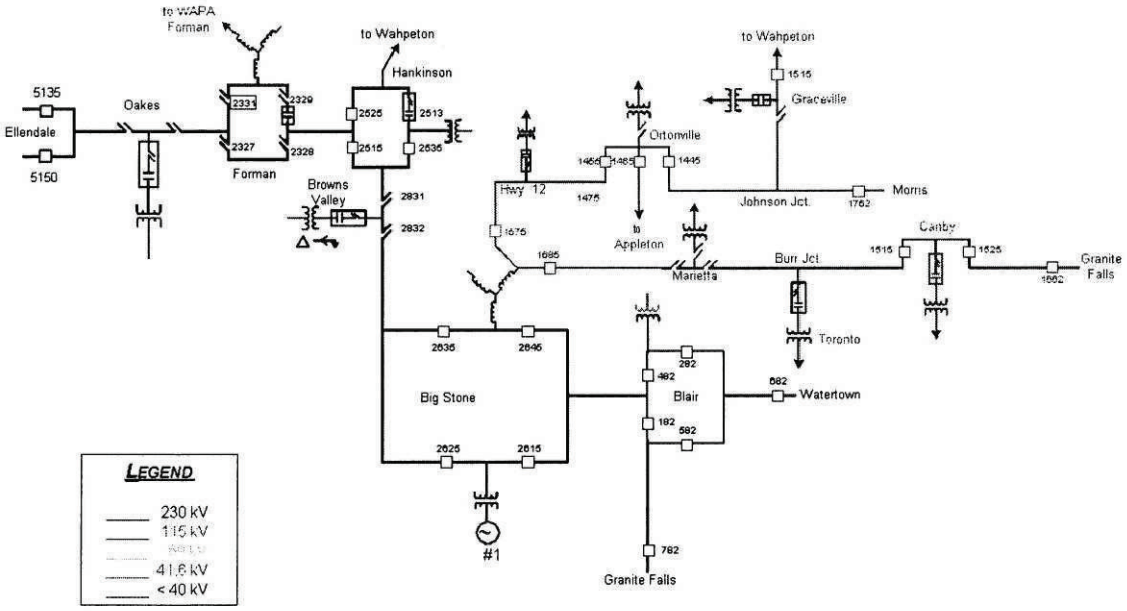
The current transmission system supporting this unit is two 230 kV lines and two 115 kV lines. The 230 kV lines go north and south of the Big Stone site. The north line is from Big Stone to Browns Valley and ultimately terminates at Hankinson, ND. The south line from Big Stone terminates at Blair, SD. The 115 kV lines from the plant also go north and south. The north 115 kV line terminates at the Graceville tap (or Johnson Junction) where it intersects the Graceville – Morris 115 kV line. This line serves loads around Ortonville and Appleton. The south 115 kV line terminates at Granite Falls. This line serves loads around Canby, Marietta, and Toronto. Figure 6 is shown below and illustrates the outlet lines from Big Stone and Big Stone's relative location within the MAPP region.

Figure 6 - Existing Transmission Facilities around Big Stone Plant



A one-line diagram illustrating the current breaker schemes on the existing transmission system is shown below in Figure 7. As shown below, 230 kV ring buses are present at Big Stone, Hankinson, and Blair while dedicated 115 kV line breakers are present at Big Stone, Ortonville, and Canby.

Figure 7 – One-Line Diagram of Existing Transmission System



2.0 Interconnection Alternatives

In order to interconnect the proposed generator without detrimental impacts to the existing transmission system, two separate interconnection alternatives have been analyzed. Both of these alternatives have one common aspect, which is the addition of a new 230 kV line from Big Stone to Canby with an uprate of existing 115 kV line from Canby to Granite Falls.

The two alternatives studied for this interconnection request are shown below in Figure 8. Further explanation of these alternatives can be found in subsequent sections of this report.

Figure 8 – Interconnection Alternatives for Big Stone II Study

3. New 230 kV line from Big Stone to Ortonville with uprate of Ortonville to Johnson Junction to Morris 115 kV line to 230 kV with new 230 kV line from Big Stone to Canby with uprate of the Canby to Granite Falls 115 kV line to 230 kV.
4. New 230 kV line from Big Stone to Willmar with new 230 kV line from Big Stone to Canby with uprate of the Canby to Granite Falls 115 kV line to 230 kV.

2.1 Interconnection Alternative 1

New 230 kV line from Big Stone – Ortonville and from Big Stone to Canby with a 115 kV to 230 kV uprate of Ortonville – Johnson Jct. – Morris line and Canby – Granite Falls line

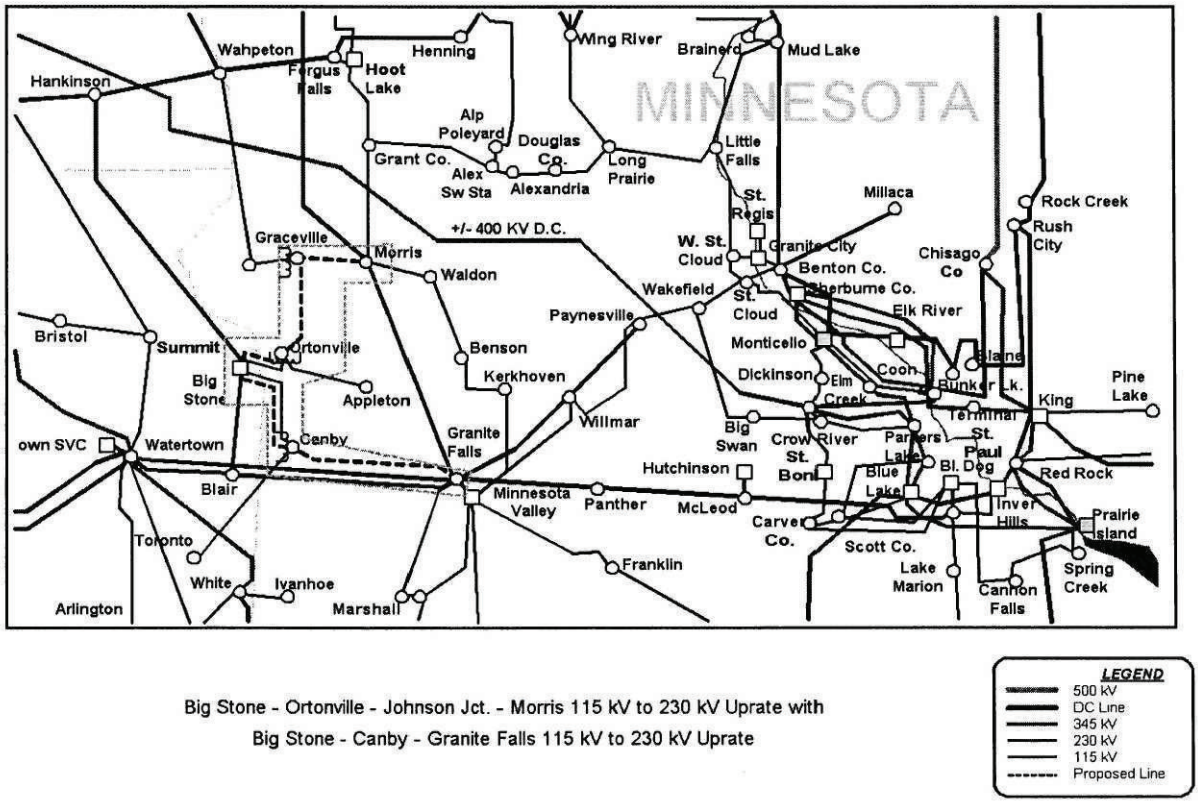
The first interconnection alternative considered for this Study involved utilizing existing 115 kV line routes from the Big Stone plant.

A new 6.5 mile, 230 kV line was considered from Big Stone to Ortonville. At Ortonville, a new 230/115/13.8 kV transformer was added to tie back into the existing 115 kV system feeding the radial line out to Appleton as well as looping back into the Highway 12 substation. From Ortonville, it was assumed that the existing 24.6 mile, 115 kV line was converted to 230 kV into the existing Johnson Junction substation. At Johnson Junction, another 230/115 kV transformer was installed to tie into the existing 115 kV line to Graceville (and eventually to Wahpeton). From Johnson Junction, interconnection alternative 1 included uprating the existing 15.5 mile, 115 kV line to Morris to 230 kV and connecting into the existing 230 kV bus at Morris.

In addition to the "northern" 230 kV line, interconnection alternative 1 also assumed a new 50.5 mile, 230 kV line from Big Stone to Canby with a new 230/115 kV transformer added at Canby to connect back to the existing 115 kV system feeding towards Toronto and Marietta. From Canby, it was assumed that the existing 39.2 mile, 115 kV line to Granite Falls was uprated to 230 kV and terminated into the existing 230 kV bus at Granite Falls.

The following figure illustrates a geographic representation of interconnection alternative 1 that was considered for this Study. Changes or additions to the existing transmission system are shown with dotted lines and circled in gray boxes.

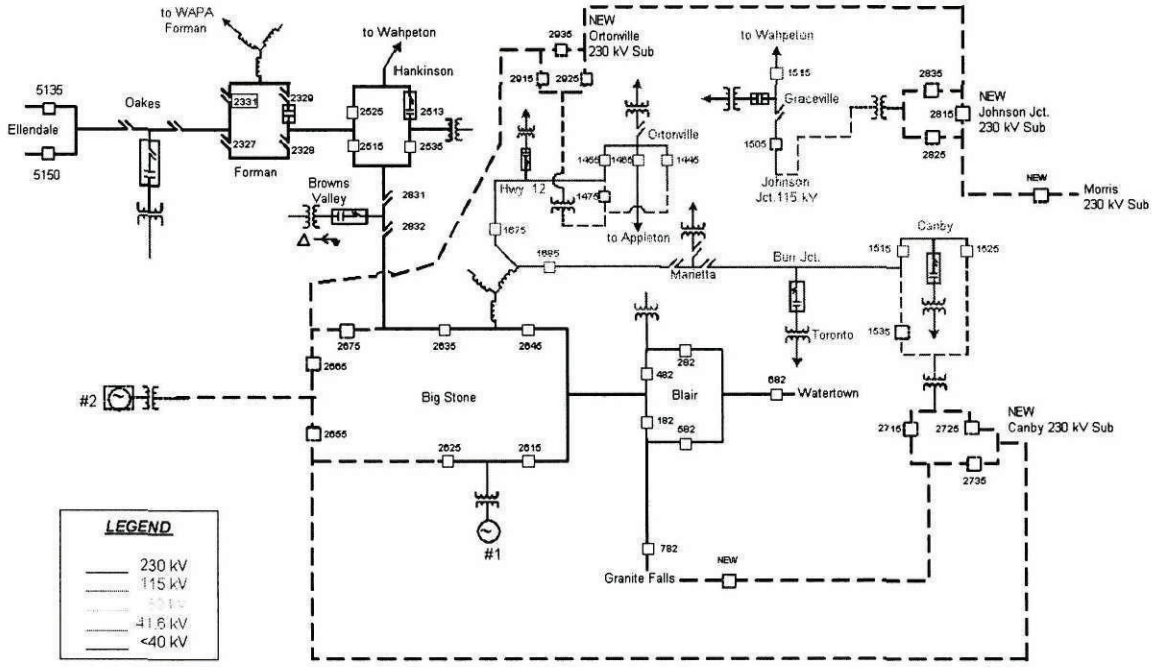
Figure 9 – Geographic Map of Interconnection Alternative 1



Big Stone - Ortonville - Johnson Jct. - Morris 115 kV to 230 kV Uprate with
Big Stone - Canby - Granite Falls 115 kV to 230 kV Uprate

To incorporate interconnection alternative 1 into the existing transmission system, assumptions had to be made as to expected breaker configurations and line arrangements within new or existing substations. Figure 10 is shown below and illustrates the assumptions used in adding the facilities associated with interconnection alternative 1 to the existing transmission system. The existing 230 kV ring bus at Big Stone was expanded to include four more 230 kV breakers to accommodate the new generator and two new 230 kV outlet lines. Along with changes at Big Stone, new 230 kV ring buses were also established at Ortonville, Johnson Junction, and Canby along with 115 kV breaker arrangements being made at Ortonville and Canby. The terminations at Morris and Granite Falls assumed adding new line breakers to match the existing configurations at these substations.

Figure 10 – One-Line Diagram of Interconnection Alternative 1



2.2 Interconnection Alternative 2

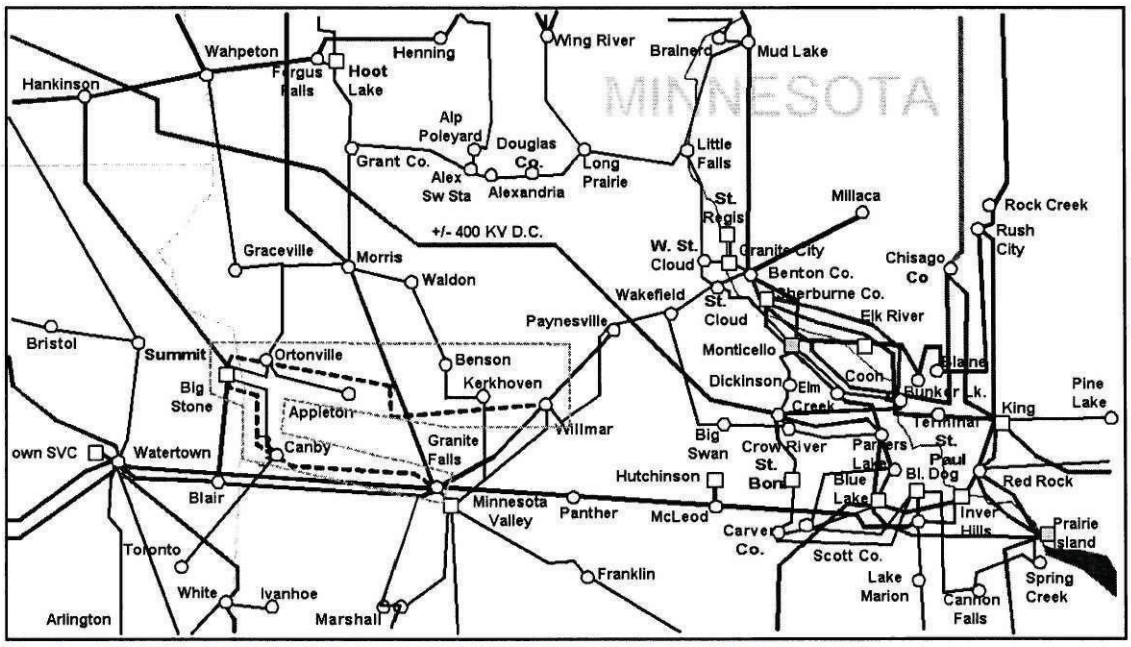
New 230 kV line from Big Stone to Willmar and from Big Stone to Canby with a 115 kV to 230 kV uprate of Canby – Granite Falls line

The second interconnection alternative considered for this Study still uses the "southern" 230 kV line introduced within alternative 1, but includes a new 102 mile, 230 kV line from Big Stone to Willmar instead of taking advantage of the existing 115 kV route from Big Stone to Morris. From Willmar, existing 230 kV lines head northeast towards Paynesville, and southwest towards Granite Falls. This new 230 kV line from Big Stone to Willmar did not require the need for any additional transformers.

As mentioned previously, besides the new line from Big Stone to Willmar, the same Big Stone to Granite Falls 230 kV line configuration, as discussed as part of interconnection alternative 1, was also included as part of alternative 2.

Figure 11 illustrates a geographic representation of interconnection alternative 2 that was studied for this interconnection request. Changes or additions to the existing transmission system are shown with dotted lines and circled in gray boxes.

Figure 11 – Geographic Map of Transmission Alternative 2



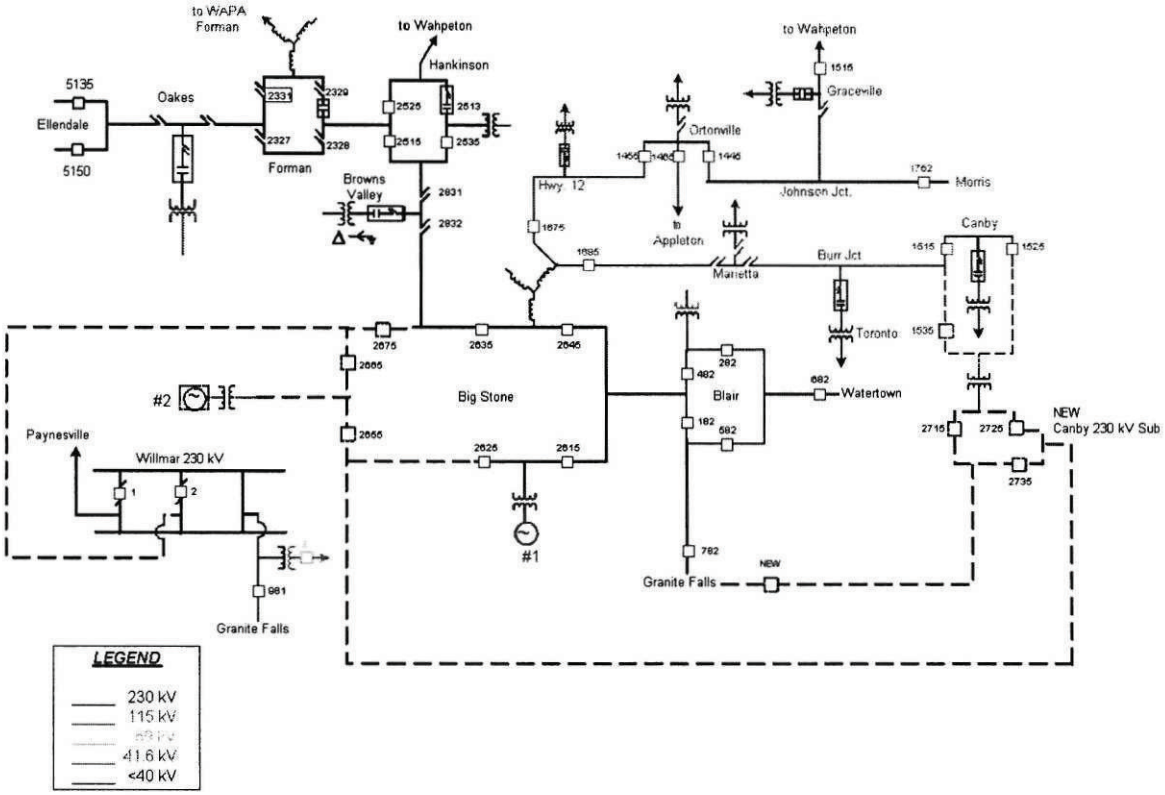
Big Stone - Canby - Granite Falls 115 to 230 kV Uprate with
Big Stone - Willmar 230 kV Line

To add interconnection alternative 2 into the existing transmission system, it was assumed that the same 230 kV ring bus expansion as discussed for interconnection alternative 1 was necessary. However, instead of the 230 kV line going from Big Stone to Ortonville, the "northern" 230 kV line for alternative 2 went from Big Stone to Willmar. To terminate into the existing 230 kV bus at Willmar, it was assumed that one new 230 kV line breaker would be necessary on the line to Big Stone. This configuration seemed to match the existing setup of the Willmar 230 kV bus.

Breaker configurations and line arrangements along the "southern" 230 kV line from Big Stone to Granite Falls were assumed to be the same as that mentioned above as part of interconnection alternative 1.

Figure 12 illustrates the assumptions used in adding interconnection alternative 2 into the Study models with dotted lines.

Figure 12 – One-Line Diagram of Interconnection Alternative 2



3.0 Model Development

Steady state analysis for this Study focused on summer peak and summer off-peak conditions for the 2007 timeframe. The Customer does not project an in-service date until 2011 for this generator, but the 2007 cases were most readily available for analysis. These steady state cases were taken from the Group 2 WAPA/MISO coordinated interconnection study. These cases were initially developed from the 2002 series MAPP models for 2007 and then modified by ABB to include the Group 1 interconnection projects from the MISO/WAPA interconnection queues. Upon completion of the Group 1 coordinated study, these models were modified once again to include all of the Group 2 projects. Through the coordinated study process, transmission owners in the northern MAPP region have reviewed the models and submitted numerous updates that ABB has included in the base case models. More documentation about the base case model development for the coordinated studies can be obtained from MISO.

Due to the proximity of the Big Stone site to southwest Minnesota and all the possible wind generation projects occurring in that part of the state, the Customer decided during the April 15, 2004 kick-off meeting that they would like this interconnection request studied at three different generation levels of Group 2 projects. These Group 2 projects refer to seven previously queued wind generation projects in southwestern Minnesota, northeastern South Dakota, and northern Iowa that have been studied together as one interconnection study. Many of these Group 2 projects were studied with the assumption of being delivered to Xcel Energy. A list of these projects that have been studied as part of Group 2 is listed below in Figure 13.

Figure 13 – Group 2 Projects

Project	MW Size	Location	Point of Interconnection	Sink Information
G272	9.9 MW	Murray, MN	Chandler Tap 69 kV	GRE Load
G278	8.0 MW	Pipestone, MN	Pipestone 115 kV	MAIN and ECAR generation
G287	200 MW	Nobles, MN	Nobles 345 kV	MAIN and ECAR generation
GI-0303	200 MW	Brookings, SD	White 115 kV	MAIN and ECAR generation
GI-0304	80 MW	O'Brien, IA	Sioux City - Spencer 115 kV line	MEC
GI-0305	126 MW	Sioux, IA	Eagle 230 kV	MEC
G349	200 MW	Brookings, SD	Yankee 115 kV	MAIN and ECAR generation
Total =	**823.9 MW**			

Due to the low generation level of many of the Xcel Energy peaking facilities in the base case models, the Group 2 generation was sunk further east to the MAIN and ECAR control areas so that Xcel Energy's baseload units would not be backed down.

Since it is possible that this request and many of the Group 2 requests may use some of the same transmission, the Customer prefers to have three generation levels studied in order to give a range of possible interconnection upgrade costs from potentially the most expensive alternative (all Group 2 projects) to the least expensive (no Group 2 projects). Not knowing the possible markets that these Group 2 projects have targeted for their power, the Customer also requested that a half Group 2 case be analyzed to determine what would be the outcome of the Study if approximately half of the Group 2 projects went forward. For the half Group 2 cases, projects G272, GI-0303, and G349 were included in the models since they seemed to be the closest generators that could potentially have an impact on the required transmission for Big Stone II.

In addition to these Group 2 projects, other previously queued generation projects were added to the base case models. These included projects G261, G267, G370, and G380. A description of these projects is listed below in Figure 14.

Figure 14 – Previously Queued Generation Projects Added to Models

Project	MW Size	Location	Point of Interconnection	Sink Information
G261	667.4 MW	Mankato, MN	Wilmarth 345 kV and 115 kV	Xcel Energy
G267	190.5 MW	McLeod, MN	McLeod 230 kV	Xcel Energy
G370	160 MW	Sioux Falls, SD	Anson 115 kV	Xcel Energy
G380	150 MW	Rugby, ND	Rugby 115 kV	Manitoba Hydro

In order to further stress the existing transmission system out of Big Stone and identify all of the potential system constraints during this Study, generation levels at Lake Preston (Toronto), Hoot Lake (Fergus Falls), and the existing Big Stone unit were modeled at their maximum accredited capacity. These generators have the potential for sharing some of the same transmission capacity as the proposed interconnection, therefore having this existing generation on-line further stresses the local transmission outlet out of Big Stone.

After all the previously mentioned base case model alterations were completed, the proposed interconnection of the new Big Stone unit with each associated interconnection alternative was added to the models.

During the kick-off meeting, the Customer stated that the final size and final allocations for this particular project were not definite between the potential partners of the project. However, the Customer brought forward some assumptions in studying this interconnection request of 600 MW. The Customer preferred the following dispatch for this Study.

Sink	***Amount***
Otter Tail Power Company (OTP)	100 MW
Missouri River Energy Services (MRES)	100 MW
Great River Energy (GRE)	100 MW
Minnesota Municipal Power Agency (MMPA)	100 MW
Central Minnesota Municipal Power Agency (CMMPA)	76 MW
Heartland Consumers Power District (HCPD)	74 MW
Hutchinson Utilities Commission (HUC)	50 MW

The final models that were developed for this Study are listed below in Figure 15 and illustrate the following export levels (in MW's) over the known interfaces in the northern MAPP region:

- NDEX: North Dakota Export Interface
- MHEX: Manitoba Hydro Export Interface (Manitoba to US)
- MWSI: Minnesota Wisconsin Stability Interface
- MHOH: Manitoba Hydro/Ontario Hydro Interface
- OHMP: Ontario Hydro/Minnesota Power Interface
- EWTW: Ontario East-West Transfer (East to West)
- BD: Boundary Dam/Tioga 230 kV Line

Figure 15 – 2007 Summer Peak Steady State Analysis Models

2007 Summer Peak Cases - All Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
bas-sp07aa-g392.sav	Base Case Model All prior queued interconnections	0	491.3	1494.9	235.2	0.1	0.4	107.7	0.6
alt1-sp07aa-allgr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	952.8	1505.5	289.7	0.1	0	107.3	0.2
alt2-sp07aa-allgr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	947.2	1502.1	290.9	0.1	0.2	107.5	0.6

2007 Summer Peak Cases - Half Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
bas-sp07aa-halfgr2.sav	Base Case Model All prior queued interconnections	0	502.4	1488.4	171.6	0.1	0.1	107.4	0.2
alt1-sp07aa-halfgr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	965.8	1498.3	229	0.1	0.1	107.4	0.3
alt2-sp07aa-halfgr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	960.2	1495.2	230.4	0.1	0.1	107.3	0.3

2007 Summer Peak Cases - No Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
bas-sp07aa-nogr2.sav	Base Case Model All prior queued interconnections	0	519	1477.8	101.9	0.1	0.1	107.4	0.2
alt1-sp07aa-nogr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	984.4	1487.5	162.6	0.1	0.1	107.4	0.3
alt2-sp07aa-nogr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	979.9	1484.1	164.4	0.1	0.1	107.4	0.3

The base case Group 2 summer off-peak models obtained from MISO included maximum simultaneous export levels over MHEX, NDEX, and MWSI. During development of the summer off-peak cases for this Study, the appropriate changes were made to the source and sinks to modify the level of the Group 2 projects as well as adding all the prior queued generation projects. In the process of making these changes to the base case models, these maximum simultaneous export levels were altered across these critical interfaces. Therefore, in order to obtain the maximum simultaneous transfer levels across NDEX, MHEX, and MWSI, the setexports iplan within the Northern MAPP Operating Review Working Group (NMORWG) stability package was utilized to restore these interfaces back to their base case levels. Once the interface flows were close to the base case level, the proposed interconnection was added to the model. This interconnection did increase the NDEX quantity since alternative #1 included an uprate of an existing 115 kV line to 230 kV (Canby – Granite Falls) and alternative #2 included a new 230 kV line across the existing NDEX interface (Big Stone – Willmar) . The Study models derived for the summer off-peak analysis are listed below and list the new export levels with the proposed interconnection added to the models.

Figure 16 - 2007 Summer Off-peak Steady State Analysis Models

2007 Summer Off-peak Cases - All Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
bas-so07aa.uyv0020.sav	Base Case Model All prior queued interconnections	0	1948.9	2174	1480.9	0.4	0	106.1	0.1
alt1-so07aa-allgr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	2420.4	2183.2	1503.8	0.4	0	106.1	0.1
alt2-so07aa-allgr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	2420.1	2179.9	1508.3	0.4	0	106.1	0

2007 Summer Off-peak Cases - Half Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
bs2-so07aa.uyv0020.sav	Base Case Model All prior queued interconnections	0	1949.3	2174.6	1480.7	0.4	0	106.1	0.1
alt1-so07aa-halfgr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	2421	2183.7	1506	0.3	0	106	-0.1
alt2-so07aa-halfgr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	2421.6	2180.4	1509.9	0.4	0	106.1	-0.1

2007 Summer Off-peak Cases - No Group 2

Case Name	Description	Big Stone II	NDEX	MHEX	MWSI	OHMH	OHMP	EWTW	BD
no2-so07aa.uyv0020.sav	Base Case Model All prior queued interconnections	0	1949.7	2174.4	1480.3	0.3	0	106.1	0
alt1-so07aa-nogr2.sav	Big Stone - Morris 230 kV Big Stone - Granite Falls 230 kV	600	2425.1	2182.2	1509.5	0.3	0	106	-0.1
alt2-so07aa-nogr2.sav	Big Stone - Willmar 230 kV Big Stone - Granite Falls 230 kV	600	2425.5	2179	1513.5	0.4	0	106.1	-0.1

Machine characteristics for modeling the proposed interconnection for steady state analysis were obtained from the Customer. These machine characteristics and the assumptions used for modeling this proposed generator are given in Appendix A in PSS/E format.

4.0 Study Procedure

All aspects of this Study utilized the Power System Simulator for Engineers (PSS/E) software program distributed by Power Technologies Incorporated (PTI). PSS/E version 29.4 on the PC platform has been used during this Study.

Steady state analysis utilized the PSS/E activity ACCC, which simulates branch outages in a user-defined area while monitoring voltage and loading within another user-defined area. For this Study, the following areas had all single contingencies simulated during ACCC analysis:

- Area 331 – Alliant West (ALTW)
- Area 600 – Xcel Energy (XEL)
- Area 608 – Minnesota Power (MP)
- Area 613 – Southern Minnesota Municipal Power Agency (SMMPA)
- Area 618 – Great River Energy (GRE)
- Area 626 – Otter Tail Power Company (OTP)
- Area 635 – Mid-American Energy Council (MEC)
- Area 652 – Western Area Power Administration (WAPA)
- Area 667 – Manitoba Hydro (MH)

In addition, valid multiple contingencies from the 2003 series MAPP contingency file were applied during ACCC analysis. The contingency file used for this Study was the same as that used during the Group 2 MISO/WAPA coordinated study.

In flagging violations during contingency analysis, the following areas were monitored during ACCC analysis:

- Area 331 – Alliant West (ALTW)
- Area 600 – Xcel Energy (XEL)
- Area 608 – Minnesota Power (MP)
- Area 613 – Southern Minnesota Municipal Power Agency (SMMPA)
- Area 618 – Great River Energy (GRE)
- Area 626 – Otter Tail Power Company (OTP)
- Area 635 – Mid-American Energy Council (MEC)
- Area 640 – Nebraska Public Power District (NPPD)
- Area 645 – Omaha Public Power District (OPPD)
- Area 650 – Lincoln Electric System (LES)
- Area 652 – Western Area Power Administration (WAPA)
- Area 667 – Manitoba Hydro (MH)

4.1 Study Criteria

During steady state contingency analysis, branch loadings and bus voltages were monitored. Study criteria for contingency analysis monitored normal branch ratings (Rate A) for system intact conditions and emergency ratings (Rate C) for contingency conditions. Voltage criteria

used during contingency analysis was taken from the latest version of the MAPP Members Reliability Criteria and Study Procedures Manual.

All impacts created or worsened by the addition of the proposed interconnection were flagged. Facility impacts within the following bounds were not considered a violation during contingency analysis:

- A change in voltage of less than +/- 1%
- Any bus voltage higher than 0.92 p.u. during "n-1" conditions
- Any bus voltage lower than 1.10 p.u. during "n-1" conditions
- An increase in loading of less than 2% of the proposed interconnection project size for non-MISO (MAPP member) facilities during "n-1" conditions
- An increase in loading of less than 3% of the proposed interconnection project size for MISO member facilities during "n-1" conditions
- An increase in loading of less than 5% of the proposed interconnection during system intact conditions
- Branch loadings not exceeding emergency ratings (Rate C) during a contingency condition
- Branch loadings not exceeding normal ratings (Rate A) during a system intact condition

Any impacted facilities that were identified during steady state ACCC contingency analysis for 2007 summer peak and 2007 summer off-peak conditions that do not fall within these criteria are discussed in the following sections. In discussing the ACCC analysis results, the primary focus was on those facilities immediately surrounding the point of interconnection.

5.0 Steady State Power Flow Analysis Results

5.1 2007 Summer Off-peak Conditions

5.1.1 All Group 2 Projects from MISO/WAPA Coordinated Study

5.1.1.1 Loading Violations

5.1.1.1.1 Interconnection Alternative 1

During ACCC contingency analysis of the 2007 summer off-peak case with all Group 2 projects modeled from the MISO/WAPA coordinated study, there were two facilities identified as being overloaded for interconnection alternative 1. These facilities included the existing Big Stone 230/115/13.8 kV transformer and the Morris 230/115 kV transformer. The magnitude of the post-contingent loading on these facilities along with the corresponding contingencies is shown below in Figure 17.

Figure 17 – Loading Violations for Alternative 1 During Summer Off-peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
FromBus		kV	ToBus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			239.6	102.8	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			241.2	103.5	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			105.2	105.2	BASE CASE
												NUMEROUS OTHER CONTINGENCIES
										136.8	136.8	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1

The existing Big Stone 230/115/13.8 kV transformer only loads up to 103.5% of the normal rating for loss of the new Big Stone to Ortonville 230 kV line, which is well below the 125% emergency rating of the Big Stone transformer. However, the Morris 230/115 kV transformer overloads for a multitude of system conditions. During summer off-peak, system intact conditions, the transformer exceeds its normal rating of 100 MVA and is only worsened by critical contingencies in the area of interconnection. The magnitude of the loading experienced by the Morris 230/115 kV transformer during summer off-peak conditions will require this interconnection project to upgrade the existing 230/115 kV transformer at Morris for interconnection alternative 1.

As mentioned in section 2.1, interconnection alternative #1 included 230 kV lines from Big Stone to Morris and from Big Stone to Granite Falls. These 230 kV lines were assumed to be composed of 954 ACSR conductor with a thermal rating of 390 MVA. During contingency analysis of interconnection alternative 1 for 2007 summer off-peak conditions will all of the Group 2 projects modeled, it appears that the 390 MVA rating of the new 230 kV lines between Big Stone and Morris will not be adequate in carrying the amount of post-contingent flow possible for loss of adjacent 230 kV outlet lines out of the Big Stone plant. Figure 18 indicates that up to 411 MVA of flow is possible on the Big Stone to Ortonville 230 kV line for loss of the Big Stone to Blair 230 kV line. Likewise, a 125 MVA, 230/115/13.8 kV transformer was added at Ortonville as part of interconnection alternative 1 for modeling purposes. It appears that 125 MVA will not be sufficient in handling the potential for up to 182 MVA during loss of the Big

Stone to Ortonville 230 kV line during summer off-peak conditions. The expected loading on the new interconnection facilities that exceed their assumed capacity can be found below in Figure 18.

Figure 18 – Potential Loading on Interconnection Facilities for 2007 Summer Off-peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
FromBus		kV	ToBus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			411.0	102.2	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			181.4	145.1	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63216	ORTONVL7	115	63321	ORTNVLEY	230	1	125			181.5	145.2	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			408.2	104.5	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1

Contingency analysis for interconnection alternative 1, also indicated that there were other facilities overloaded. Some of these facilities that are closer to the point of interconnection are shown below in Figure 19. Since these facilities are not in the direct area of interconnection, they are not required interconnection upgrades. However, upgrades to these facilities may be required at a later date if some of these same facilities appear in the delivery service study. A full listing of other facility overloads that appeared at locations more remote from the area of interconnection are shown in Appendix B.1.1. The more local facilities exceeding their emergency rating include the 230 kV line from Granite Falls to MN Valley Tap extending to Panther and continuing to McLeod. In addition, the Grant County to Morris 115 kV line, the MN Valley 230/115 kV transformer, and the Maynard to Kerkhoven Tap 115 kV line all exceed their emergency ratings as shown below in Figure 19. According to the following figure, an upgrade of the Fergus Falls to Hoot Lake 115 kV line may also be required during the delivery service study. Study results also indicate that the Wahpeton to Fergus Falls 230 kV also loads up beyond normal ratings, but not above emergency ratings.

Figure 19 - Loading Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
FromBus		kV	ToBus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			355.7	100.7	BASE CASE
										451.8	116.4	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
												NUMEROUS OTHER CONTINGENCIES
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			385.9	126.2	BASE CASE
								365.1	117.0	481.4	157.6	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187	204.5	109.4	250.2	133.8	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60357	MAYNARD7	115	62005	KERKHOT7	115	1	78			77.3	113.3	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			392.4	123	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
												NUMEROUS OTHER CONTINGENCIES
63050	WILLMAR4	230	66550	GRANITF4	230	1	383			354.6	100.0	60150 MNVLTAP4230.00 63054 PANTHER4230.00 C1
										360.3	101.6	63054 PANTHER4230.00 60742 PANTHER869.000 C1
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			118.5	123.4	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			343.7	109.6	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										338.6	105.8	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
										338.6	105.8	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
										338.6	105.8	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96			96.9	100.7	63219 GRANTCO7115.00 63220 ELBOWLK7115.00 C1
								110.5	113.4	123.4	130.2	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

As mentioned previously, the mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded to handle the post-contingent flow identified in Figure 19.

5.1.1.1.2 Interconnection Alternative 2

Contingency analysis for interconnection alternative 2 during summer off-peak conditions with all of the Group 2 projects within the model has only identified one overloaded facility. This is the Johnson Jct. to Ortonville 115 kV line that overloads for numerous contingencies. The highest post-contingent flow on the line was for loss of the Hankinson to Wahpeton 230 kV line. The following figure illustrates this overload.

Figure 20 - Loading Violations for Alternative 2 During Summer Off-peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6	112.9	109.1	106.7	110.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES

Since the post-contingent flow on this 115 kV line exceeds the emergency limit of 106 MVA, implementation of this interconnection alternative would trigger the need to upgrade this 115 kV line to handle this post-contingent flow.

Contingency analysis for interconnection alternative 2 also identified numerous other lines that were overloaded further away from the point of interconnection. These facility overloads could be a result of the assumed delivery of this generation, therefore these facilities are not required to be upgraded as part of the interconnection process, but may be required during a later stage of the delivery service study. The overloaded facilities that are a bit closer to the point of interconnection are identified below in Figure 21, with a full listing of the contingency results for interconnection alternative 2 being available in Appendix B.1.1 for 2007 summer off-peak conditions with all of the Group 2 projects.

Figure 21 - Loading Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
FromBus		kV	ToBus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			360.2	101.3	BASE CASE
										452.8	116.7	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
												NUMEROUS OTHER CONTINGENCIES
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			392.2	127.1	BASE CASE
								365.1	117.0	429.5	138.7	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187	204.5	109.4	253.7	135.7	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			395.4	123.9	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			107.9	112.4	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			333.8	105.9	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										330.5	103.3	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
										330.5	103.3	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
										330.3	103.2	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96	110.5	113.4	119.5	125.6	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.1.1.2 Voltage Violations

5.1.1.2.1 Interconnection Alternative 1

Contingency analysis of the 2007 summer off-peak case for all of the Group 2 projects within the model did not identify any voltage violations within the immediate area of interconnection for alternative 1. However, there were a multitude of voltage violations that did occur at locations far from the proposed interconnection. A full listing of these voltage violations can be found within Appendix B.1.2. Some of these voltage violations that occurred at locations a bit closer to the point of interconnection are listed below in Figure 22. These voltage violations are not required to be fixed during the interconnection Study, but may be required if later in the delivery service study these same voltage violations are shown to be further aggravated by the assumed delivery of the proposed interconnection.

Figure 22 – Voltage Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63054	PANTHER4	230			NEW	BASE CASE AND NUMEROUS OTHERS
60149	MINVALT4	230		0.9118	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230		0.9117	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60189	BLK DOG4	230		0.8856	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8859	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8865	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8917	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
60898	GLENCOE	115		0.8793	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8797	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8810	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8880	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115		0.9194	NEW	62001 BENSON 7115.00 62006 KERKHO 7115.00 C1
				0.9044	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62981	MCLEOD 7	115		0.8858	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8862	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8874	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8945	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62982	HUTCHMN7	115		0.8916	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8920	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8932	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8998	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62983	HUTCH3M7	115		0.8909	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8912	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8924	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8991	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
63219	GRANTCO7	115		0.9026	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9025	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9019	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES
			0.8897	0.8274	-0.0623	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
			0.8939		ELIMINATED	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
				0.8864	NEW	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
				0.9008	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
67452	ALEXSS	115		0.9005	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9004	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.8996	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
67453	ALEXSWM	115		0.9002	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9001	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.8993	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
67454	ALEXPLDM	115		0.8977	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.8976	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.8968	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63220	ELBOWLK7	115		0.898	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.898	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.8974	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1

Figure 22 (continued)

Voltage Violation			Existing System	Int. Alt #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63221	BRANDN 7	115			NEW	NUMEROUS CONTINGENCIES
63222	ALEXAND7	115		0.9046	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9046	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9037	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
60156	PYNSVIL7	115			NEW	NUMEROUS CONTINGENCIES
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62530	FRAZEE 7	115		0.9186	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9185	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9178	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62752	MLTN TP7	115			NEW	NUMEROUS CONTINGENCIES
62753	MILTONA7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230		0.8989	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.8988	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.898	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63052	INMAN 4	230		0.8983	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.8983	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.8974	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, mitigation of these voltage violations may be required if these same violations appear during the delivery service study.

5.1.1.2.2 Interconnection Alternative 2

Interconnection alternative 2 involved 230 kV lines from Big Stone to Willmar and from Big Stone to Granite Falls. Contingency analysis of the 2007 summer off-peak case with all of the Group 2 projects included in the model has identified some potential voltage violations at both the Willmar 115 kV and 230 kV buses. Since these voltage violations are directly at the point of interconnection, mitigation of the voltage violations at Willmar will be necessary if interconnection alternative 2 goes forward in connecting the proposed generator. Post-contingent voltage levels with the worst-case contingencies are shown below in Figure 23.

Figure 23 – Voltage Violations for Alternative 2 During Summer Off-peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES
			0.8939	0.8848	-0.0091	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
				0.9139	NEW	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
				0.9123	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1

Since the post-contingent voltage at these two buses dropped below GRE's criteria of 0.92 p.u., mitigation of these voltages must be completed if interconnection alternative 2 is implemented when connecting the proposed generator to the system.

Interconnection alternative 2 also had numerous other voltage violations identified during contingency analysis of the 2007 summer off-peak case with all of the Group 2 projects modeled. A complete listing of these voltage violations can be found in Appendix B.1.2. However, a list of those buses closer to the point of interconnection can be found below in Figure 24. Since these voltage violations occur at buses more remote from the point of interconnection, they do not have to be resolved during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 24 – Voltage Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63054	PANTHER4	230			NEW	BASE CASE AND NUMEROUS OTHERS
60149	MINVALT4	230		0.9169	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230		0.9167	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60189	BLK DOG4	230		0.8867	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60898	GLENCOE	115		0.8840	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.8904	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62982	HUTCHMN7	115		0.8953	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62983	HUTCH3M7	115		0.8947	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63219	GRANTCO7	115		0.9142	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9142	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9143	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
67452	ALEXSS	115		0.9154	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9153	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9154	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
67453	ALEXSWM	115		0.9151	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.915	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9151	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
67454	ALEXPLDM	115		0.9126	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9125	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9126	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63220	ELBOWLK7	115		0.9105	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9105	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9106	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63221	BRANDN 7	115			NEW	NUMEROUS CONTINGENCIES
63222	ALEXAND7	115		0.9194	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9193	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9194	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
60156	PYNSVIL7	115			NEW	NUMEROUS CONTINGENCIES
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62752	MLTN TP7	115			NEW	NUMEROUS CONTINGENCIES
62753	MILTONA7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230		0.9133	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9132	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9133	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63052	INMAN 4	230		0.9128	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9127	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9127	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, mitigation of these low voltages may be required if these same violations appear during the delivery service study.

5.1.2 Half Group 2 Projects from MISO/WAPA Coordinated Study

5.1.2.1 Loading Violations

5.1.2.1.1 Interconnection Alternative 1

The 2007 summer off-peak case with half of the Group 2 projects modeled from the MISO/WAPA coordinated study resulted in two facilities being overloaded for interconnection alternative 1. These two facilities are once again the Morris 230/115 kV transformer and the Big Stone 230/115/13.8 kV transformer, as was shown for interconnection alternative 1 for the scenario with all of the Group 2 projects modeled. These facilities with their corresponding post-contingent flows are shown below in Figure 25.

Figure 25 - Loading Violations for Alternative 1 During Summer Off-peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			130.0	130.0	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			236.2	101.4	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			237.5	101.9	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1

The Morris 230/115 kV transformer is overloaded for numerous different contingencies, of which the highest post-contingent flow was for loss of the Hankinson to Wahpeton 230 kV line. Since the post-contingent flow on this transformer exceeds the emergency rating, the Morris 230/115 kV transformer would have to be upgraded as part of interconnection alternative 1. The Big Stone 230/115/13.8 kV transformer only reaches about 102% of its normal rating, which is below the emergency rating of this transformer, therefore the need to upgrade this transformer is not required for this interconnection alternative.

Overloads on some of the new line sections also appeared during contingency analysis of the half Group 2 summer off-peak cases. These line sections included the Big Stone to Ortonville 230 kV line and the Ortonville to Johnson Jct. 230 kV line. In addition, the 125 MVA, 230/115/13.8 kV transformer placed at Ortonville did not have enough capacity to handle the amount of post-contingent flow experienced for loss of the Big Stone to Ortonville 230 kV line. Figure 26 illustrates the post-contingent flows possible on these line sections for the contingencies shown in the far right-hand column.

Figure 26 - Potential Loading on Interconnection Facilities for 2007 Summer Off-peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			409.8	101.9	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			406.8	103.9	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
63216	ORTONVL7	115	63321	ORTNVLEY	230	1	125			177.8	142.3	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			177.8	142.2	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1

Implementation of interconnection alternative 1 will have to be designed such that the conductor used on the 230 kV line from Big Stone to Johnson Jct. will be able to handle the amount of

post-contingent flow illustrated in Figure 26. Furthermore, the Ortonville 230/115/13.8 kV transformer will have to be able to handle at least 180 MVA of flow as shown in the previous figure.

In addition to these local facility overloads, there were also numerous other overloads shown for interconnection alternative 1 during the summer off-peak half Group 2 case. A full listing of these facility overloads can be found in Appendix B.2.1. Overloaded facilities within the vicinity of the proposed interconnection are shown below in Figure 27. These facilities as well as those shown in Appendix B.2.1 are not directly impacted by the interconnection itself, but could be more related to the delivery of the output from the proposed interconnection. Therefore, the upgrade of these facilities is not required during the interconnection stage of this Study, but may be required later if the delivery service study shows some of these same constraints.

Figure 27 - Loading Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			372.3	120.7	BASE CASE
										472	148.4	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
										395.8	124.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187	193.1	103.2	240.4	128.6	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			436.7	112.6	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96	102.6	106.3	111.5	116.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			355.1	111.3	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96	107.1	109.1	120.0	125.5	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			331.2	105.0	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										322.7	100.8	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
										322.7	100.8	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
										322.6	100.8	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
63194	FERGSFLY	230	63231	FERGSFL7	115	1	112			120.0	107.2	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.1.2.1.2 Interconnection Alternative 2

Similar to section 5.1.1.1.2, the only overloaded facility identified by contingency analysis of the 2007 summer off-peak case with half of the Group 2 projects for interconnection alternative 2 was on the Johnson Jct. to Ortonville 115 kV line. This line overload appeared for a large number of contingencies, but reaches the highest level for loss of the Wahpeton to Hankinson 230 kV line. The post-contingent flow on this line is shown below in Figure 28.

Figure 28 - Loading Violations for Alternative 2 During Summer Off-peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6	108.1	104.3	112.2	116.2	63311 CANBY 4230.00 66550 GRANITF4230.00 C1
												NUMEROUS OTHER CONTINGENCIES

Since the highest amount of flow on this line reaches 116% of its normal rating, it is over the emergency rating of 106 MVA. Therefore, implementation of interconnection alternative 2 would require the upgrade of the Johnson Jct. to Ortonville 115 kV line.

Numerous other overloads in areas remote from the point of interconnection were identified for interconnection alternative 2 during contingency analysis of the 2007 summer off-peak case with half of the Group 2 projects included. These overloads can be found in Appendix B.2.1 with more of the local overloads being shown below in Figure 29. Since these overloads are not in the direct area of interconnection, they are not required upgrades during the interconnection Study process. These overloads are provided for informational purposes and may appear in a delivery service study, which would then require upgrades due to the delivery of the output of the proposed interconnection.

Figure 29 - Loading Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			377.8	121.7	BASE CASE
										397.8	125.1	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187	193.1	103.2	242.4	129.6	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96	102.6	106.3	101.3	105.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96	107.1	109.1	116.2	121.0	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			322.8	101.8	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63194	FERGSFLY	230	63231	FERGSFL7	115	1	112			116.1	103.6	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.1.2.2 Voltage Violations

5.1.2.2.1 Interconnection Alternative 1

With only half of the Group 2 projects modeled from the MISO/WAPA coordinated study during 2007 summer off-peak conditions, the amount of voltage violations seemed to decrease for interconnection alternative 1. Once again, there were no voltage violations encountered in the immediate area of interconnection. However, there were others spread throughout the system. A complete list of voltage violations for interconnection alternative 1 that were evident during 2007 summer off-peak conditions can be found in Appendix B.2.2. Some of the voltage violations

adjacent to the area of interconnection are shown below in Figure 30. These voltage violations could be more related to the assumptions used during the interconnection Study as to where the power from the proposed interconnection is being delivered. Therefore, they are not required to be fixed during the interconnection Study, but may be required if later in the delivery service study these same voltage violations are shown to be further aggravated by the assumed delivery of the proposed interconnection.

Figure 30 - Voltage Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	ΔV	Contingency
60156	PYNSVIL7	115			NEW	NUMEROUS CONTINGENCIES
60189	BLK DOG4	230		0.8975	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8977	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8984	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9028	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
60898	GLENCOE	115		0.8917	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8921	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8934	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8993	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
60899	GLNCOMU8	69			NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.8981	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8985	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8998	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9057	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62982	HUTCHMN7	115		0.9004	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9008	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9019	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9074	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62983	HUTCH3M7	115		0.9001	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9004	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9016	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9071	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES
			0.9041	0.8719	-0.0322	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
				0.8719	NEW	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
62526	RUSH LK7	115		0.9184	NEW	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
				0.9152	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9152	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9132	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
62527	ELMO 7	115		0.9145	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9144	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9126	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1
62531	INMAN 7	115		0.9122	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9122	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
				0.9103	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, mitigation of these low voltages may be required if these same violations appear during the delivery service study.

5.1.2.2.2 Interconnection Alternative 2

Contingency analysis results for interconnection alternative 2 for 2007 summer off-peak conditions with half of the Group 2 projects modeled had one voltage violation in the immediate area of interconnection. This voltage violation was at the Willmar 115 kV bus and was evident for five different contingencies. Figure 31 is shown below and illustrates the post-contingent voltage levels evident at the 115 kV bus for the corresponding contingencies shown in the far right-hand column.

Figure 31 - Voltage Violations for Alternative 2 During Summer Off-peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62425	WILLMAR7	115	0.9186	0.8927	-0.0259	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1 63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
			0.9048	0.8850	-0.0198	62425 WILLMAR7115.00 62005 KERKHOT7115.00 CC1 60357 MAYNARD7115.00 62005 KERKHOT7115.00 C1 62005 KERKHOT7115.00 62006 KERKHO 7115.00 C1 62006 KERKHO 7115.00 62001 BENSON 7115.00 C1
			0.9041	0.8941	-0.0100	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
			0.9172	0.8909	-0.0263	62427 WILLMAR869.000 63050 WILLMAR4230.00 C1

Since the post-contingent voltage at this bus is below the criteria of 0.92 p.u., mitigation of this voltage violation must be completed if interconnection alternative 2 is implemented when connecting the proposed generator to the existing system.

Numerous other voltage violations were identified during contingency analysis of the 2007 summer off-peak case with half of the Group 2 projects modeled for interconnection alternative 2. A full listing of these voltage violations can be found in Appendix B.2.2. A list of those buses closer to the point of interconnection can be found below in Figure 32. Since these voltage violations occur at buses more remote from the point of interconnection, they do not have to be resolved during the interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 32 - Voltage Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60156	PYNSVIL7	115			NEW	NUMEROUS CONTINGENCIES
60189	BLK DOG4	230		0.8987	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
60898	GLENCOE	115		0.896	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60899	GLNCOMU8	69		0.9139	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.9024	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62982	HUTCHMN7	115		0.9036	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62983	HUTCH3M7	115		0.9034	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES
62531	INMAN 7	115		0.9185	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9195	NEW	60101 FORBES 2500.00 60174 ROSEAUS2500.00 C1

The mitigation of these voltage violations is not required as part of this interconnection Study. However, these voltage problems would need to be mitigated if these same violations appear during the delivery service study.

5.1.3 No Group 2 Projects in Southwest Minnesota

5.1.3.1 Loading Violations

5.1.3.1.1 Interconnection Alternative 1

When none of the Group 2 projects from the MISO/WAPA coordinated study were included in the models, only one overloaded facility was evident during contingency analysis of the 2007 summer off-peak case for interconnection alternative 1. This facility was the Morris 230/115 kV transformer. This transformer overload was evident for numerous contingencies, but seemed to have the highest loading for loss of the Hankinson to Wahpeton 230 kV line. The post-contingent flow is shown below in Figure 33.

Figure 33 - Loading Violations for Alternative 1 During Summer Off-peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			122.6	122.6	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES

The emergency rating of the Morris 230/115 kV transformer is 125 MVA. Since the post-contingent loading of this transformer does not exceed this level, it would not be necessary to upgrade this transformer if none of the Group 2 projects go forward.

As seen in previous summer off-peak results for interconnection alternative 1, the new 230 kV line from Big Stone to Ortonville to Johnson Jct. overloaded for loss of he Big Stone to Blair 230 kV line. The assumed line capacity of 390 MVA will not be sufficient if interconnection alternative 1 is selected. In addition, the new Ortonville 230/115/13.8 kV transformer that was

added to the models as part of alternative 1 also overloaded for loss of the Big Stone to Ortonville 230 kV line. Post-contingent flows on these new facilities are shown below in Figure 34.

Figure 34 - Potential Loading on Interconnection Facilities for 2007 Summer Off-peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			407.5	101.3	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			412.4	102.9	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			170.4	136.3	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1

Besides local facility overloads, there were also a lot of other loading violations noticed at areas further away from the point of interconnection. A full list of these overloads can be found in Appendix B.3.1. Some of these overloads that are a bit closer to the point of interconnection are listed below in Figure 35. These overloaded facilities are not required upgrades during this interconnection Study, but may be required at a later date if these same facilities appear during the delivery service study.

Figure 35 - Loading Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			343.4	110.1	BASE CASE
										430.1	138.2	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			217.4	116.3	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			390.7	100.7	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
										390.7	100.7	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
												NUMEROUS OTHER CONTINGENCIES
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			329.0	103.1	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
												NUMEROUS OTHER CONTINGENCIES
63054	PANTHER4	230	62980	MCLEOD 4	230	1	319					60108 WILMART3345.00 60192 BLUE LK3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			124.6	128.2	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
										98.5	102.6	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										97.7	101.7	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										104.3	108.6	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
										97.4	100.8	63219 GRANTCO7115.00 63223 HOOT LK7115.00 C1
63194	FERGSFLY	230	63231	FERGSFL7	115	1	112			114.5	102.2	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
63194	FERGSFLY	230	63331	FERGSFL4	230	1	112			114.4	102.1	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96	101.3	102.8	114.5	117.6	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.1.3.1.2 Interconnection Alternative 2

Interconnection alternative 2 identified the Johnson Jct. to Ortonville 115 kV line as being overloaded for five separate contingencies. This is the same line section that has been overloaded for the all Group 2 as well as the half Group 2 cases that have been discussed in previous sections. The critical contingencies as well as the resultant post-contingent loading on this 115 kV line can be found below in Figure 36.

Figure 36 - Loading Violations for Alternative 2 During Summer Off-peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6			109.2	105.7	63050 WILLMAR4230.00 63314 BIGSTON4230.00 C1
										116.9	113.3	63311 CANBY 4230.00 66550 GRANITF4230.00 C1
										121.7	117.7	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										120.5	116.6	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										97.8	101.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1

Since some of these contingencies load this line section up beyond the emergency limit, implementation of interconnection alternative 2 will require the upgrade of the existing 115 kV line from Johnson Jct. to Ortonville.

Contingency analysis of interconnection alternative 2 during 2007 summer off-peak conditions with none of the Group 2 projects modeled identified a large number of other facility overloads more remote from the Big Stone area. These overloads can be found in Appendix B.3.1. A listing of some of the closer facility overloads that could be associated with the assumptions for the delivery of the power from the proposed interconnection can be found below in Figure 37. Since these facility overloads are more related to the delivery from the proposed interconnection, they are not required to be upgraded unless they are identified in the delivery service study.

Figure 37 - Loading Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			348.6	110.9	BASE CASE
										379.2	120.4	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			220.2	117.8	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			392.7	101.2	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
										392.7	101.2	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
												NUMEROUS OTHER CONTINGENCIES
63054	PANTHER4	230	62980	MCLEOD 4	230	1	319			296.7	103.9	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			115.4	119.6	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1
63231	FERGSFL7	115	63223	HOOT LK7	115	1	96	101.3	102.8	110.8	113.2	63329 WAHPETN4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.1.3.2 Voltage Violations

5.1.3.2.1 Interconnection Alternative 1

Adding interconnection alternative 1 to the 2007 summer off-peak case with no Group 2 projects modeled from the MISO/WAPA coordinated study did not have any voltage impacts in the immediate area of interconnection. However, there was a multitude of voltage violations noted at other locations more remote from the proposed project. A complete listing of these violations can be found in Appendix B.3.2. Some of these violations that are adjacent to the area of interconnection are shown below in Figure 38. These voltage violations are more remote from the point of interconnection and may be more influenced by the assumptions used in the delivery of the power from the proposed interconnection. Therefore, they are not required to be fixed during the interconnection Study. However, if some of these same voltage violations occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 38 - Voltage Violations on Remote Facilities for Alternative 1 During Summer Off-peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60189	BLK DOG4	230		0.9117	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9119	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9125	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9163	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
60898	GLENCOE	115		0.9124	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9127	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9139	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9186	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62005	KERKHOT7	115		0.9110	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62981	MCLEOD 7	115		0.9187	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9190	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
62982	HUTCHMN7	115		0.9191	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9193	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
62983	HUTCH3M7	115		0.9190	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9193	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES
62425	WILLMAR7	115	0.9198	0.8918	-0.0280	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1 63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
			0.9081	0.8898	-0.0183	62425 WILLMAR7115.00 62005 KERKHOT7115.00 CC1 60357 MAYNARD7115.00 62005 KERKHOT7115.00 C1 62005 KERKHOT7115.00 62006 KERKHO 7115.00 C1 62006 KERKHO 7115.00 62001 BENSON 7115.00 C1
			0.9082	0.8887	-0.0195	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
				0.9006	NEW	62427 WILLMAR869.000 63050 WILLMAR4230.00 C1
			0.9146	0.8697	-0.0449	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
			0.9081	0.8898	-0.0183	62425 WILLMAR7115.00 62005 KERKHOT7115.00 CKT C1 60357 MAYNARD7115.00 62005 KERKHOT7115.00 CKT 1 62005 KERKHOT7115.00 62006 KERKHO 7115.00 CKT 1 62006 KERKHO 7115.00 62001 BENSON 7115.00 CKT 1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, these low voltages would require mitigation if these same violations appear during the delivery service study.

5.1.3.2.2 Interconnection Alternative 2

Contingency analysis results for the 2007 summer off-peak case with none of the Group 2 projects modeled had one voltage violation within the immediate area of interconnection for alternative 2. This voltage violation occurred at the Willmar 115 kV bus and was evident during five separate contingencies. The post-contingent voltage level at this bus for these five contingencies is shown below in Figure 39.

Figure 39 - Voltage Violations for Alternative 2 During Summer Off-peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt #2		
Bus		kV	V-CONT	V-CONT	ΔV	Contingency
62425	WILLMAR7	115	0.9198	0.9046	-0.0152	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1 63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
			0.9081	0.9001	-0.0080	62425 WILLMAR7115.00 62005 KERKHOT7115.00 CC1 60357 MAYNARD7115.00 62005 KERKHOT7115.00 C1 62005 KERKHOT7115.00 62006 KERKHO 7115.00 C1 62006 KERKHO 7115.00 62001 BENSON 7115.00 C1
			0.9082	0.8997	-0.0085	62005 KERKHOT7115.00 62425 WILLMAR7115.00 CC1
				0.9041	NEW	62427 WILLMAR869.000 63050 WILLMAR4230.00 C1

In the event that interconnection alternative 2 goes forward when connecting the proposed generator to the system, it will be necessary to install system enhancements in order to eliminate this voltage violation that has appeared to be aggravated by the proposed project.

In addition to this voltage violation at Willmar, there was several other voltage violations noted at various other locations outside the area of immediate interconnection. A complete list of these voltage violations can be found in Appendix B.3.2. Some of these violations that are just adjacent to the area of interconnection are noted below in Figure 40. Since these voltage violations may be more related to the delivery of the power from the proposed interconnection, they are not required upgrades during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 40 - Voltage Violations on Remote Facilities for Alternative 2 During Summer Off-peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60189	BLK DOG4	230		0.9126	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
					NEW	NUMEROUS CONTINGENCIES
60898	GLENCOE	115		0.9157	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
					NEW	NUMEROUS CONTINGENCIES
62981	MCLEOD 7	115			NEW	NUMEROUS CONTINGENCIES
62982	HUTCHMN7	115			NEW	NUMEROUS CONTINGENCIES
62983	HUTCH3M7	115			NEW	NUMEROUS CONTINGENCIES
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES

The mitigation of these voltage violations is not required as part of this interconnection Study. However, if these same violations appear during the delivery service study, they would need to be mitigated through the addition of system enhancements.

5.2 2007 Summer Peak Conditions

5.2.1 All Group 2 Projects from the MISO/WAPA Coordinated Study

5.2.1.1 Loading Violations

5.2.1.1.1 Interconnection Alternative 1

Contingency analysis of the 2007 summer peak case with all Group 2 wind projects modeled from the MISO/WAPA coordinated study has indicated that there are five potential overloads for interconnection alternative 1. These overloads appear on the Big Stone 230/115/13.8 kV transformer, the Big Stone to Browns Valley 230 kV line, the Morris 230/115 kV transformer, the Big Stone to Highway 12 115 kV line and the Highway 12 to Ortonville 115 kV line. The post-contingent loadings on these overloaded facilities are shown below in Figure 41.

Figure 41 – Loading Violations for Alternative 1 During Summer Peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			298	102.4	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
										374.6	128.7	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			132.7	132.7	BASE CASE
										177	177	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			277.7	119.2	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			277.7	119.2	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63214	BIGSTON7	115	63215	HIWY12 7	115	1	216			243.3	112.6	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63215	HIWY12 7	115	63216	ORTONVL7	115	1	216			230.8	106.9	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1

According to the figure above, post-contingent flow on the Big Stone to Browns Valley 230 kV line exceeds its emergency limit for outage of the Johnson Jct. to Morris 230 kV line. The

Morris 230/115 kV transformer is overloaded for numerous contingencies with the highest amount of post-contingent loading occurring for outage of the Hankinson to Wahpeton 230 kV line. The corresponding post-contingent flow on this transformer was 177 MVA, which is well above the 125 MVA emergency transformer limit. Flows on the Big Stone 230/115/13.8 kV transformer were over the normal rating of the transformer, but did not exceed the emergency limit. The highest loading experienced on this transformer was 277.7 MVA when the Big Stone to Ortonville 230 kV line was out of service. In addition, the Big Stone to Highway 12 115 kV and the Highway 12 to Ortonville 115 kV line were overloaded for loss of the Big Stone to Ortonville 230 kV line. Facilities with post-contingent loadings above their respective emergency limits would need to be upgraded if interconnection alternative 1 is chosen to connect the proposed generator. These facilities include the Big Stone to Browns Valley 230 kV line, the Morris 230/115 kV transformer, and the Big Stone to Highway 12 115 kV line.

Contingency analysis results from the 2007 summer peak case also indicated that the assumptions used in adding the interconnection facilities to the model were not adequate in handling the amount of post-contingent flow possible on these facilities. Figure 42 is shown below and illustrates the amount of post-contingent flow possible on the new interconnection facilities. If interconnection alternative 1 is implemented to connect the generator, the facilities associated with this interconnection alternative would have to be able to handle the following amount of post-contingent flow.

Figure 42 - Potential Loading on Interconnection Facilities for 2007 Summer Peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			412.2	105.6	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
										431.2	110.4	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										426.5	109.2	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
63216	ORTNVLE4	115	63321	ORTNVLEY	230	1	125			202.8	162.3	63314 BIGSTON4230.00 63320 ORTNVLE4 230.00 C1
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			201.8	161.5	63314 BIGSTON4230.00 63320 ORTNVLE4 230.00 C1
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			418.6	107.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
										438.6	112.3	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										433.5	111	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
63337	JHNSNJT4	230	66554	MORRIS 4	230	1	390.4			427.2	109.4	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										422.1	108.1	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										407.3	104.3	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1

Numerous other overloads were identified for interconnection alternative 1 while performing contingency analysis on the 2007 summer peak case with all of the Group 2 projects. A full listing of these overloads can be found in Appendix C.1.1. A list of those overloads that are near the vicinity of the interconnection are shown below in Figure 43. Since these overloads are a bit more remote from the point of interconnection, they are not required fixes during the interconnection phase of this Study. However, if these facility overloads occur during the delivery service study, they would then be required upgrades.

Figure 43 - Loading Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			345.3	113.9	BASE CASE
								344.4	108.3	450.6	141.7	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			112.8	120.2	BASE CASE & NUMEROUS OTHERS
										161.6	168.4	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			389.4	121.7	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60357	MAYNARD7	115	1	78			93.7	132.4	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			436.8	112.6	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
60357	MAYNARD7	115	62005	KERKHOT7	115	1	78			89.7	137.4	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			360	112.9	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
60133	SHEYNNE4	230	66435*	FARGO 4	230	1	391			395.2	101.1	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63233	EDGETAP7	115	63223	HOOT LK7	115	1	96			113	120.7	63051 HENNING4230.00 63052 INMAN 4230.00 C1
										114.8	122.2	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
										94	101.4	*63219 GRANTCO7115.00 63220 ELBOWLK7115.00 C1*
63233	EDGETAP7	115	63234	PEL RPD7	115	1	96			95.1	101.9	63051 HENNING4230.00 63052 INMAN 4230.00 C1
										96.9	103.5	63051 HENNING4230.00 63331 FERGSFL4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.1.1.2 Interconnection Alternative 2

Analysis results from studying interconnection alternative 2 during summer peak conditions with all of the Group 2 projects has identified four facilities that are overloaded. These facilities include the Big Stone 230/115/13.8 kV transformer, the Big Stone to Browns Valley 230 kV line, the Ortonville to Johnson Jct. 115 kV line and the Johnson Jct. to Morris 115 kV line. Post-contingent flows on these overloaded facilities are shown below in Figure 44.

Figure 44 - Loading Violations for Alternative 2 During Summer Peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			259.1	111.2	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										255.7	109.8	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										250.6	107.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			260.5	111.8	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										255.7	109.8	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										250.6	107.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6			126.4	124.3	BASE CASE
										136.8	141.7	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			289.8	100.6	BASE CASE
										326.1	112.1	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
62003*	JOHNJCT7	115	66555	MORRIS 7	115	1	106			125.3	118.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1

The post-contingent flow on the Big Stone 230/115/13.8 kV transformer never exceeds its emergency rating. However, the Ortonville to Johnson Jct. 115 kV line, the Johnson Jct. to Morris 115 kV line and the Big Stone to Browns Valley 230 kV line all exceed their emergency ratings, therefore an upgrade of these lines would be necessary if interconnection alternative 2 is implemented to connect this generator to the system.

There were also numerous other overloads that occurred during contingency analysis of interconnection alternative 2 during summer peak conditions. These overloads were not as close to the point of interconnection as the overloads shown above in Figure 44. A few of these overloads that did occur a bit closer to the point of interconnection are shown below in Figure 45. These overloads are most likely caused by the assumed delivery of the interconnection and are therefore not required upgrades as part of this interconnection Study. The overloads shown below may require system upgrades if these same facilities occur during the delivery service study. A full listing of the overloads encountered during contingency analysis of interconnection alternative 2 for summer peak conditions with all of the Group 2 projects modeled can be found in Appendix C.1.1.

Figure 45 - Loading Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with All Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			349.6	114.7	BASE CASE
								344.4	108.3	450.9	141.8	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			99.1	107.2	BASE CASE
										148.4	154.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			332.7	107.2	BASE CASE
										421.4	131.7	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			225.5	120.6	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			436.9	112.6	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			364	114.1	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
												60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
63233	EDGETAP7	115	63223	HOOT LK7	115	1	96			98	108.3	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										110.9	118.4	63051 HENNING4230.00 63052 INMAN 4230.00 C1
										112.7	119.9	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
63233	EDGETAP7	115	63234	PEL RPD7	115	1	96			94.8	101.2	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			306.1	101.3	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
67401	ABDNJCT7	115	67402	ABDNSBT7	115	1	80			78.5	100.3	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										81.4	101.8	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.1.2 Voltage Violations

5.2.1.2.1 Interconnection Alternative 1

Summer peak conditions seemed to cause more voltage violations than summer off-peak conditions. These voltage violations were widespread throughout the system. Analyzing the impacts that interconnection alternative 1 had on the summer peak case with all of the Group 2 projects modeled from the MISO/WAPA coordinated study, has identified that voltages within the area of immediate interconnection were improved by new 230 kV terminations at Morris and Granite Falls. Within the immediate area, voltages below 0.92 p.u. were improved in all contingencies that were studied. The magnitude of this improvement along with the troublesome contingencies that caused these voltage violations is shown below in Figure 46.

Figure 46 - Voltage Violations for Alternative 1 During Summer Peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
66550	GRANITF4	230	0.919	0.9194	0.0004	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
			0.9108	0.9162	0.0054	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
			0.9118	0.9168	0.005	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
			0.9119	0.9175	0.0056	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
			0.8744	0.9156	0.0412	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.8166	0.896	0.0794	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
66554	MORRIS 4	230	0.9057		ELIMINATED	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.8094		ELIMINATED	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
66555	MORRIS 7	115	0.8971		ELIMINATED	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.7689	0.9023	0.1334	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1

Low voltage criteria at these WAPA buses is 0.90 p.u. As can be seen above, interconnection alternative 1 improves voltages to above 0.90 p.u. in nearly all cases.

Besides these voltage violations within the immediate area of interconnection, there was a multitude of other bus voltage violations spread throughout the system. A full list of these voltage violations can be found in Appendix C.1.2. Those voltage violations that were just adjacent to the area of interconnection can be found below in Figure 47. These voltage violations are more remote from the area of interconnection and will not be required fixes during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 47 - Voltage Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230		0.9088	NEW	BASE CASE AND NUMEROUS OTHERS
60162	WAKEFLD7	115		0.9157	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9165	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9183	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60189	BLK DOG4	230		0.9095	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9101	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9112	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9168	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
60357	MAYNARD7	115		0.9068	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
60898	GLENCOE	115		0.8682	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8693	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8716	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8784	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62001	BENSON 7	115		0.9198	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115			NEW	NUMEROUS CONTINGENCIES
62616	BIGSWAN7	115		0.9041	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9049	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9065	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9113	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62981	MCLEOD 7	115		0.8747	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8759	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8781	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8848	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62982	HUTCHMN7	115		0.8733	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8744	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8764	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8828	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62983	HUTCH3M7	115		0.8733	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8744	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8765	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8829	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
63054	PANTHER4	230		0.9132	NEW	BASE CASE AND NUMEROUS OTHERS
63219	GRANTCO7	115		0.9073	NEW	BASE CASE AND NUMEROUS OTHERS
63329	WAHPETN4	230			NEW	NUMEROUS CONTINGENCIES
63260	ENDERLN7	115		0.9179	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9175	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
62527	ELMO 7	115		0.9158	NEW	BASE CASE AND NUMEROUS OTHERS
62531	INMAN 7	115		0.9189	NEW	BASE CASE AND NUMEROUS OTHERS
62752	MLTN TP7	115		0.9073	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9073	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115		0.9173	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9018	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9047	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.9021	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.902	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.903	NEW	BASE CASE AND NUMEROUS OTHERS

Figure 47 (continued)

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115			NEW	NUMEROUS CONTINGENCIES
62529	CMRTJCT7	115			NEW	NUMEROUS CONTINGENCIES
62530	FRAZEE 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115		0.9174	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9178	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9184	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
62533	CORMRNT7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230			NEW	NUMEROUS CONTINGENCIES
63052	INMAN 4	230			NEW	NUMEROUS CONTINGENCIES
63231	FERGSFL7	115		0.9178	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9182	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9188	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63232	EDGETWN7	115		0.9174	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9178	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9184	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63233	EDGETAP7	115		0.9192	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9197	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
63234	PEL RPD7	115			NEW	NUMEROUS CONTINGENCIES
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.9198	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9194	NEW	60173 ROSEAUN2500.00 67564 DORSEY 2500.00 C1
63247	CASS LK7	115		0.9198	NEW	63246 BEMIDJI7115.00 66710 NARY 7115.00 C1
63248	CASS N 7	115		0.9195	NEW	63246 BEMIDJI7115.00 66710 NARY 7115.00 C1
63331	FERGSFL4	230			NEW	NUMEROUS CONTINGENCIES
63336	AUDUBON4	230	0.8053	0.9135	0.1082	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
66792	MAPLE R3	345		0.9167	NEW	60133 SHEYNNE4230.00 66435 FARGO 4230.00 C1
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
62425	WILLMAR7	115		0.9115	NEW	BASE CASE AND NUMEROUS OTHERS

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. Mitigation of these may be required if these same violations appear during the delivery service study.

5.2.1.2.2 Interconnection Alternative 2

The implementation of interconnection alternative 2 indicated that two voltage violations are evident within the direct area of this project. These voltage violations are at the Willmar 115 kV and 230 kV buses. The number of contingencies that caused these voltage violations were numerous and are not all going to be shown here within the report, but if further information is desired about the contingencies that caused these voltage violations and the corresponding post-contingent voltage levels, refer to Appendix C.1.2.

Figure 48 – Voltage Violations for Alternative 2 During Summer Peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES

Since the two voltage violations at Willmar are at the point of interconnection for alternative 2, the mitigation of these voltage violations will be required as part of this interconnection Study if alternative 2 is implemented to connect the proposed generator to the system.

Besides these voltage violations at Willmar, numerous other violations were found throughout the system for interconnection alternative 2. Some of these violations that are a bit closer to the area of interconnection are shown below in Figure 49, while a complete listing can be found in Appendix C.1.2. Since these voltage violations are not directly within the area of interconnection, they are not required to be fixed during the interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 49 - Voltage Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with All Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230		0.8819	NEW	BASE CASE AND NUMEROUS OTHERS
60149	MINVALT4	230		0.9111	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230		0.911	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60162	WAKEFLD7	115		0.9162	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60189	BLK DOG4	230		0.9109	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60374	FIBROMN7	115		0.916	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
60898	GLENCOE	115		0.8726	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62002	WALDEN 7	115		0.9122	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115			NEW	NUMEROUS CONTINGENCIES
62616	BIGSWAN7	115		0.906	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.8791	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62982	HUTCHMN7	115		0.877	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62983	HUTCH3M7	115		0.8771	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63054	PANTHER4	230		0.9163	NEW	BASE CASE AND NUMEROUS OTHERS
63219	GRANTCO7	115		0.9071	NEW	BASE CASE AND NUMEROUS OTHERS
63218	MOROTP 7	115		0.9108	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9048	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9097	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63329	WAHPETN4	230			NEW	NUMEROUS CONTINGENCIES
63260	ENDERLN7	115		0.9178	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9149	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9194	NEW	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
62527	ELMO 7	115		0.9175	NEW	BASE CASE AND NUMEROUS OTHERS
62531	INMAN 7	115			NEW	BASE CASE AND NUMEROUS OTHERS
62752	MLTN TP7	115		0.9089	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9089	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115		0.9174	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9022	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.906	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.9035	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.9035	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.9045	NEW	BASE CASE AND NUMEROUS OTHERS
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115			NEW	NUMEROUS CONTINGENCIES
62529	CMRTJCT7	115			NEW	NUMEROUS CONTINGENCIES
62530	FRAZEE 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115		0.9099	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9032	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9084	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
62533	CORMRNT7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230			NEW	NUMEROUS CONTINGENCIES

Figure 49 (continued)

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63052	INMAN 4	230			NEW	NUMEROUS CONTINGENCIES
63053	HUBBARD4	230		0.9189	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
63231	FERGSFL7	115		0.9105	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9039	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9091	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63232	EDGETWN7	115		0.9099	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9032	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9084	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63233	EDGETAP7	115		0.9118	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9051	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9104	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63234	PEL RPD7	115			NEW	NUMEROUS CONTINGENCIES
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.9056	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9129	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9066	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9115	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
63331	FERGSFL4	230			NEW	NUMEROUS CONTINGENCIES
63336	AUDUBON4	230	0.8053		ELIMINATED	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
66717	ULRICH 7	115		0.9136	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.914	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9189	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
66792	MAPLE R3	345		0.9192	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9145	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9182	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
				0.9072	NEW	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
66550	GRANITF4	230	0.919		ELIMINATED	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
			0.9108	0.9183	0.0075	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
			0.9118	0.9138	0.002	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1

Figure 49 (continued)

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
66550	GRANITF4	230	0.9119	0.9178	0.0059	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
			0.8744		ELIMINATED	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.8166		ELIMINATED	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
66554	MORRIS 4	230	0.9057		ELIMINATED	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.8094		ELIMINATED	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
				0.9198	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
66555	MORRIS 7	115	0.8971		ELIMINATED	60108 WILMART 3345.00 60331 LKFLDXL3345.00 C1
			0.7689		ELIMINATED	60143 BENTON 7115.00 60146 GRANTCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
				0.912	NEW	60192 BLUE LK3345.00 60108 WILMART 3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9059	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9109	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, these voltage violations will need to be mitigated if these same ones appear during the delivery service study.

5.2.2 Half Group 2 Projects from the MISO/WAPA Coordinated Study

5.2.2.1 Loading Violations

5.2.2.1.1 Interconnection Alternative 1

Only including half of the Group 2 projects from the MISO/WAPA coordinated study didn't seem to alleviate any of the loading constraints identified for 2007 summer peak conditions for interconnection alternative 1. Overloads were still noted on the Big Stone 230/115/13.8 kV transformer, the Big Stone to Highway 12 115 kV line, the Highway 12 to Ortonville 115 kV line, the Big Stone to Browns Valley 230 kV line, and the Morris 230/115 kV transformer. Each of these overloads is listed below with their corresponding post-contingent load levels for the critical contingency that overloaded the facility.

Figure 50 – Loading Violations for Alternative 1 During Summer Peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			272.7	117.0	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			272.7	117.0	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63214	BIGSTON7	115	63215	HIWY12 7	115	1	216			238.5	110.4	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63215	HIWY12 7	115	63216	ORTONVL7	115	1	216			226.1	104.7	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			130.6	130.6	BASE CASE
										172.2	172.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			360.0	126.7	63320 ORTNVLE4230.00 63337 JHNSNJT4230.00 C1
												NUMEROUS OTHER CONTINGENCIES

As shown above in Figure 50, the Big Stone to Ortonville 230 kV line is a critical contingency that will require the upgrade of the Big Stone to Highway 12 115 kV line. Other contingencies simulated have shown that the Morris 230/115 kV transformer as well as the Big Stone to Browns Valley 230 kV line will need to be upgraded in order to handle post-contingent flows higher than they are currently capable of. The Big Stone 230/115/13.8 kV transformer and the Highway 12 to Ortonville 115 kV line is overloaded for outage of the Big Stone to Ortonville 230 kV line, but loading does not exceed emergency ratings on these facilities.

As shown previously in section 5.2.1.1.1, many of the interconnection facilities associated with alternative 1 are not adequate in handling the amount of post-contingent flow possible on them with the proposed project connected at Big Stone. This Study assumed 954 ACSR conductor along the new 230 kV lines out of the site, however it appears that this conductor will not be capable of handling the amount of flow expected on these lines. The following figure illustrates the interconnection facilities that exceeded their assumed 390 MVA capacity for this ACSR conductor.

Figure 51 - Potential Loading on Interconnection Facilities for 2007 Summer Peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63216	ORTONVL7	115	63321	ORTNVLEY	230	1	125			210.7	168.6	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			210.6	168.5	63314 BIGSTON4230.00 63320 ORTNVLE4230.00 C1
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			428.5	107.3	63195 BIGSTONY230.00 63214 BIGSTON7115.00 C1
										428.5	107.3	63195 BIGSTONY230.00 63314 BIGSTON4230.00 C1
										404.4	101.3	63214 BIGSTON7115.00 63215 HIWY12 7115.00 C1
										421.5	105.5	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
										418.9	104.9	63311 CANBY 4230.00 66550 GRANITF4230.00 C1
										421.9	108.1	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										417	106.8	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										403.2	103.3	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
										425.3	106.5	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
										408.5	102.3	66503 BLAIR 4230.00 66550 GRANITF4230.00 C1
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			401.0	103.4	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
										422.4	109.3	63311 CANBY 4230.00 66550 GRANITF4230.00 C1
										427.2	109.4	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										422.3	108.2	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										408.2	104.6	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
										414.7	107.0	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
										396.9	102.5	66503 BLAIR 4230.00 66550 GRANITF4230.00 C1
63337	JHNSNJT4	230	66554*	MORRIS 4	230	1	390.4			415.8	106.5	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										410.9	105.3	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										396.9	101.7	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1

The contingency analysis results from the 2007 summer peak case with half of the Group 2 projects modeled also identified numerous other overloads that were not as close to the point of interconnection as those shown in previous sections. A list of these overloads can be found in Appendix C.2.1. However, some of these facilities that are a bit closer to the point of interconnection are shown below in Figure 52. Since these overloads could be more related to the delivery of the power from this project, they are not required upgrades at this time. However, if the delivery service study for this interconnection identifies some of these same facility overloads, it would be during that study that these facilities would need to be upgraded.

Figure 52 – Loading Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			336.3	110.2	BASE CASE
								319.2	100.4	446.1	140.3	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			110.5	117.1	BASE CASE
								124.2	133.2	155.8	162.3	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			395.5	123.6	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			216.3	115.7	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60148	MINVALY7	115	60357	MAYNARD7	115	1	78			74.7	102.6	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
										74.8	101.1	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			431.0	111.1	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
60357	MAYNARD7	115	62005	KERKHOT7	115	1	78			70.2	102.2	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
												63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
										74.4	100.5	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			337.8	105.9	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
63219	GRANTCO7	115	63223	HOOT LK7	115	1	96			87	100.7	63219 GRANTCO7115.00 66555 MORRIS 7115.00 C1
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			307.4	101.1	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										337.1	105.3	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.2.1.2 Interconnection Alternative #2

Interconnection alternative 2 had slightly more favorable results over interconnection alternative 1 during contingency analysis of the 2007 summer peak case with half of the Group 2 projects modeled. Alternative 2 indicated that the Big Stone 230/115/13.8 kV transformer, the Ortonville to Johnson Jct. to Morris 115 kV line as well as the Big Stone to Browns Valley 230 kV line were overloaded. The magnitude of these overloads along with their corresponding contingencies is shown below in Figure 53.

Figure 53 - Loading Violations for Alternative 2 During Summer Peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			254.0	109.0	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
										245.2	105.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			254.3	109.2	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
										245.2	105.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6			124.2	121.9	BASE CASE & NUMEROUS OTHERS
										134.2	139	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62003*	JOHNJCT7	115	66555	MORRIS 7	115	1	106			122.8	115.8	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			327.1	112.8	63195 BIGSTONY 230.00 63214 BIGSTON7 115 C1

According to the quantities in Figure 53, the Big Stone 230/115/13.8 kV transformer does not exceed its emergency rating. However, the existing 115 kV line from Ortonville to Johnson Jct. and around to Morris as well as the Big Stone to Browns Valley 230 kV line exceed emergency limits therefore mandating the need for an upgrade of these lines if interconnection alternative 2 is implemented in connecting the proposed generator to the system.

A multitude of other facilities were identified as being overloaded for interconnection alternative 2 during contingency analysis of the 2007 summer peak case. This list of overloads can be found in Appendix C.2.1. Some of the overloads that appear closer to the point of interconnection are shown below in Figure 54. These overloads are not in the direct area of interconnection and could be more related to the assumptions used in delivering this power from the proposed generator. Therefore, it is not necessary to upgrade these facilities during the interconnection phase of this Study. However, if these same facilities appear in the delivery service study, they will then need to be upgraded.

Figure 54 - Loading Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with Half Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			340.5	111	BASE CASE
								319.2	100.4	445.7	140.2	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			97	104.1	BASE CASE & NUMEROUS OTHERS
								124.2	133.2	144.4	150.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			325.9	104.4	BASE CASE
								332.3	105.8	360.1	116.2	63195 BIGSTONY230.00 63214 BIGSTON7115.00 C1
								332.3	105.8	360.1	116.2	63195 BIGSTONY230.00 63314 BIGSTON4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			218.1	116.7	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			431.1	111.1	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
62980	MCLEOD 4	230	63054	PANTHER4	230	1	319			339.3	106.4	60192 BLUE LK3345.00 60108 WILMART3345.00 C1
63329	WAHPETN4	230	63331	FERGSFL4	230	1	320			327.2	102.2	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.2.2 Voltage Violations

5.2.2.2.1 Interconnection Alternative 1

As mentioned previously, the amount of voltage violations identified during summer peak conditions were far more abundant than those identified during summer off-peak conditions. Analysis of interconnection alternative 1 during summer peak conditions with half of the Group 2 projects modeled only revealed one bus voltage that fell below this Study's voltage criteria. This voltage appeared at the Morris 115 kV bus for loss of the Morris 230/115 kV transformer. The post-contingent voltage is noted below in Figure 55.

Figure 55 - Voltage Violations for Alternative 1 During Summer Peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
66555	MORRIS 7	115		0.9046	NEW	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1

This particular bus is owned by WAPA and their low voltage criteria is 0.90 p.u. As can be seen from the previous figure, the bus voltage at the Morris 115 kV bus does not drop below 0.90 p.u. for this contingency.

There were no other bus voltage violations found within the immediate area of interconnection for alternative 1. However, there were numerous other bus voltage violations at locations more remote from the immediate Study area. A complete listing of these voltage violations can be found in Appendix C.2.2. Some of these voltage violations that appeared at locations closer to the immediate area of interconnection are shown below in Figure 56. Since these voltage violations are not directly contained within the immediate Study area, mitigation of them is not required during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 56 – Voltage Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230		0.9193	NEW	BASE CASE AND NUMEROUS OTHERS
63219	GRANTCO7	115		0.9167	NEW	BASE CASE AND NUMEROUS OTHERS
60189	BLK DOG4	230		0.9193	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9194	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
60149	MINVALT4	230		0.9183	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230		0.9182	NEW	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60357	MAYNARD7	115		0.915	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
60898	GLENCOE	115		0.8854	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8852	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8864	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.894	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62002	WALDEN 7	115		0.9086	NEW	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115		0.9095	NEW	62001 BENSON 7115.00 62006 KERKHO 7115.00 C1
				0.9166	NEW	62427 WILLMAR869.000 63050 WILLMAR4230.00 C1
			0.9108	0.8728	-0.038	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
				0.9008	NEW	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1 63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
				0.9133	NEW	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
62616	BIGSWAN7	115		0.9164	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.916	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9166	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63218	MOROTP 7	115		0.9049	NEW	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
62981	MCLEOD 7	115		0.8918	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8916	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8928	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9003	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62982	HUTCHMN7	115		0.8892	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8889	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8899	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8972	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62983	HUTCH3M7	115		0.8893	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.8891	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.8901	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.8975	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
63054	PANTHER4	230		0.904	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9039	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9053	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9102	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
66555	MORRIS 7	115		0.9046	NEW	66554 MORRIS 4230.00 66555 MORRIS 7115.00 C1
62425	WILLMAR7	115		0.92	NEW	BASE CASE AND NUMEROUS OTHERS
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
62752	MLTN TP7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9114	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9148	NEW	BASE CASE AND NUMEROUS OTHERS

Figure 56 (continued)

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	ΔV	Contingency
67452	ALEXSS	115		0.9122	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.9121	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.913	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62752	MLTN TP7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9114	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9148	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.9122	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.9121	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.913	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115		0.9072	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9193	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62529	CMRTJCT7	115		0.9058	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
62530	FRAZEE 7	115		0.9004	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9173	NEW	62530 FRAZEE 7115.00 63236 AUDUBON7115.00 C1
				0.9128	NEW	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9073	0.8933	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62533	CORMRNT7	115		0.906	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63051	HENNING4	230		0.9191	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63052	INMAN 4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63232	EDGETWN7	115	0.9073	0.8933	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63233	EDGETAP7	115	0.9093	0.8953	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63234	PEL RPD7	115		0.9113	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9097	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.91	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63247	CASS LK7	115		0.909	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
63248	CASS N 7	115		0.9087	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
62752	MLTN TP7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9168	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9114	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9148	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.9122	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.9121	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.913	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115		0.9072	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9193	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1

Figure 56 (continued)

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62529	CMRTJCT7	115		0.9058	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
62530	FRAZEE 7	115		0.9004	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9173	NEW	62530 FRAZEE 7115.00 63236 AUDUBON7115.00 C1
				0.9128	NEW	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9073	0.8933	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62533	CORMRNT7	115		0.906	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63051	HENNING4	230		0.9191	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63052	INMAN 4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63232	EDGETWN7	115	0.9073	0.8933	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63233	EDGETAP7	115	0.9093	0.8953	-0.014	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63234	PEL RPD7	115		0.9113	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9097	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.91	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63247	CASS LK7	115		0.909	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
63248	CASS N 7	115		0.9087	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
66710	NARY 7	115		0.9162	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
66715	LEECHLK7	115		0.9161	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
66716	LAPORTE7	115		0.9163	NEW	63245 WILTON 7115.00 63246 BEMIDJI7115.00 C1
66717	ULRICH 7	115		0.9181	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, if these same violations appear during the delivery service study, they would then need to be mitigated by system additions.

5.2.2.2.2 Interconnection Alternative 2

Voltage performance for interconnection alternative 2 during summer peak conditions with half of the Group 2 projects modeled from the MISO/WAPA coordinated study resulted in a slight voltage decrease at the Willmar 230 kV bus and the Willmar 115 kV bus. This voltage decrease at the 230 kV bus occurred for loss of the Willmar to Granite Falls 230 kV line. The post-contingent voltage at the Willmar 230 kV bus is noted below in Figure 57. The voltage decrease at the 115 kV bus was larger than that noticed on the 230 kV bus and occurred for numerous different contingencies.

Figure 57 - Voltage Violations for Alternative 2 During Summer Peak Conditions with Half Group 2 Projects

Voltage Violations			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63050	WILLMAR4	230	0.9098	0.9074	-0.0024	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62425	WILLMAR7	115				NUMEROUS CONTINGENCIES

Voltage criteria at these buses is 0.92 p.u. As can be seen in the previous figure, the bus voltage within the existing system was below this criteria and interconnection alternative 2 further depressed it. Since the change in bus voltage on the 230 kV bus is less than 0.01 p.u., this

voltage violation is dismissed for this interconnection Study. However, the voltage violations witnessed at the 115 kV bus will need to be mitigated as part of this interconnection Study if alternative 2 is implemented in connecting the proposed generator to the system. Other than these two voltage violations at Willmar, there were no other voltage violations evident within the immediate area of interconnection.

Even though this was the only voltage violation within the immediate area of interconnection, there were several other voltage violations evident for interconnection alternative 2 during summer peak conditions with half of the Group 2 projects modeled. A complete listing of these voltage violations can be found in Appendix C.2.2. Since these voltage violations are not within the area of interconnection, they are not required to be fixed during the interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project. Some of these more remote voltage violations that are adjacent to the Study area are shown below in Figure 58.

Figure 58 - Voltage Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with Half Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230			NEW	BASE CASE AND NUMEROUS OTHERS
63219	GRANTCO7	115		0.9171	NEW	BASE CASE AND NUMEROUS OTHERS
60189	BLK DOG4	230		0.9175	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60898	GLENCOE	115		0.8832	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115	0.9108		ELIMINATED	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
62616	BIGSWAN7	115		0.9137	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.8896	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62982	HUTCHMN7	115		0.8868	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62983	HUTCH3M7	115		0.887	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62752	MLTN TP7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9124	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9165	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.9149	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62752	MLTN TP7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS
62753	MILTONA7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9124	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9165	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.9149	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115		0.9056	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9199	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62529	CMRTJCT7	115		0.9037	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
62530	FRAZEE 7	115		0.8983	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9194	NEW	62530 FRAZEE 7115.00 63236 AUDUBON7115.00 C1
				0.9163	NEW	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9073	0.894	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62533	CORMRNT7	115		0.9039	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63051	HENNING4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63052	INMAN 4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63232	EDGETWN7	115	0.9073	0.894	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63233	EDGETAP7	115	0.9093	0.896	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63234	PEL RPD7	115		0.9102	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9104	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.9071	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
62752	MLTN TP7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS

Figure 58 (continued)

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62753	MILTONA7	115		0.9188	NEW	BASE CASE AND NUMEROUS OTHERS
63220	ELBOWLK7	115		0.9124	NEW	BASE CASE AND NUMEROUS OTHERS
63222	ALEXAND7	115		0.9165	NEW	BASE CASE AND NUMEROUS OTHERS
67452	ALEXSS	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67453	ALEXSWM	115		0.914	NEW	BASE CASE AND NUMEROUS OTHERS
67454	ALEXPLDM	115		0.9149	NEW	BASE CASE AND NUMEROUS OTHERS
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115		0.9056	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9199	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62529	CMRTJCT7	115		0.9037	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
62530	FRAZEE 7	115		0.8983	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9194	NEW	62530 FRAZEE 7115.00 63236 AUDUBON7115.00 C1
				0.9163	NEW	63051 HENNING4230.00 63331 FERGSFL4230.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9073	0.894	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62533	CORMRNT7	115		0.9039	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63051	HENNING4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63052	INMAN 4	230		0.9192	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
63232	EDGETWN7	115	0.9073	0.894	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63233	EDGETAP7	115	0.9093	0.896	-0.0133	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63234	PEL RPD7	115		0.9102	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.9104	NEW	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.9071	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
66553	MOORHED4	230		0.9184	NEW	66435 FARGO 4230.00 66553 MOORHED4230.00 C1
66717	ULRICH 7	115		0.9145	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. If these same violations appear during the delivery service study, they would then need to be mitigated.

5.2.3 No Group 2 Projects from MISO/WAPA Coordinated Study

5.2.3.1 Loading Violations

5.2.3.1.1 Interconnection Alternative 1

Eliminating all of the Group 2 projects from MISO/WAPA coordinated study during 2007 summer peak conditions did not seem to have a large impact on the overloaded facilities that have been shown in previous sections for interconnection alternative 1. The Big Stone 230/115/13.8 kV transformer, the Big Stone to Browns Valley 230 kV line, the Big Stone to Highway 12 115 kV line, the Highway 12 to Ortonville 115 kV line, as well as the Morris 230/115 kV transformer all appeared as being overloaded. Figure 59 illustrates the amount of post-contingent flow possible on these facilities for the critical contingencies shown in the far right-hand column.

Figure 59 - Loading Violations for Alternative 1 During Summer Peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
FromBus		kV	ToBus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			347.9	121.5	63320 ORTNVLE4230.00 63337 JHNSNJT4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			267.9	115	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			267.9	115	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63214	BIGSTON7	115	63215	HIWY12 7	115	1	216			233.9	108.3	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63215	HIWY12 7	115	63216	ORTONVL7	115	1	216			221.6	102.6	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
66554	MORRIS 4	230	66555	MORRIS 7	115	1	100			126.7	126.7	BASE CASE
										166.4	166.4	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES

The Big Stone 230/115/13.8 kV transformer, The Big Stone to Highway 12 115 kV line and the Highway 12 to Ortonville 115 kV line do not exceed emergency limits and therefore are not a required upgrades for this scenario. However, the overloads present on the Big Stone to Browns Valley 230 kV line and the Morris 230/115 kV transformer are beyond their emergency limits and will be required upgrades if interconnection alternative 1 is chosen to connect the proposed generator.

As seen in previous sections, a few of the lines associated with the interconnection alternative itself were not assumed to have adequate capacity during this Study. The new 230 kV lines out of Big Stone were assumed to be composed of 954 ACSR with a summer capacity of 390 MVA. This rating is not sufficient in meeting the amount of post-contingent flow possible on these facilities. In addition, the new Ortonville 230/115/13.8 kV transformer added to the models as part of interconnection alternative 1 will need to have a capacity much greater than 125 MVA in order to handle the amount of post-contingent flow possible on this transformer. Figure 60 is shown below and illustrates the amount of flow possible on some of the interconnection facilities associated with alternative 1.

Figure 60 – Potential Loading on Interconnection Facilities for 2007 Summer Peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63320	ORTNVLE4	230	63321	ORTNVLEY	230	1	125			202.2	159	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63216	ORTONVL7	115	63321	ORTNVLEY	230	1	125			202.2	159	63314 BIGSTON4 230.00 63320 ORTNVLE4 230.00 C1
63314	BIGSTON4	230	63320	ORTNVLE4	230	1	390.4			413	105.8	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										408.4	104.6	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										394.6	101.1	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
63320	ORTNVLE4	230	63337	JHNSNJT4	230	1	390.4			392.1	100.6	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
										416.5	106.7	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										412.8	106.1	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1
										411.4	105.4	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
										397.2	101.7	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63337	JHNSNJT4	230	66554	MORRIS 4	230	1	390.4			405.1	103.8	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
										400.1	102.5	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1

Numerous other overloaded facilities were present during contingency analysis of the 2007 summer peak case for interconnection alternative 1 with none of the Group 2 projects modeled. A full listing of these overloaded elements can be found in Appendix C.3.1. Some of these overloads that were somewhat closer to the point of interconnection are shown below in Figure 61. These overloads may not be directly associated with the interconnection of this proposed generator, but could be more related to the assumed delivery of its power. Since the constraints are further from the immediate point of interconnection, the upgrade of these facilities is not required during this Study, but may be required later if these same facilities appear during the delivery service study.

Figure 61 – Loading Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #1		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			316.3	102.4	BASE CASE
										419.5	131.9	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96			105.6	111.1	BASE CASE
								117.7	124.9	149.3	155.5	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
60148	MINVALY7	115	60357	MAYNARD7	115	1	78			89.7	123.1	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			403.6	104.0	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
										392.8	101.2	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
60357	MAYNARD7	115	62005	KERKHOT7	115	1	78			85.8	126.5	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			380.2	118.8	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
										362.9	113.4	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63233	EDGETAP7	115	63223	HOOT LK7	115	1	96			97.6	105.9	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
										108.8	113.6	63051 HENNING4230.00 63052 INMAN 4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.3.1.2 Interconnection Alternative 2

Interconnection alternative 2 identified many of the same constraints during 2007 summer peak conditions as were shown previously with all and half of the Group 2 projects modeled. Once again, the Big Stone 230/115/13.2 kV transformer, the Ortonville to Johnson Jct. 115 kV line and the Johnson Jct. to Morris 115 kV line were all identified as being overloaded. The post-contingent loading levels with their corresponding contingencies can be found below in Figure 62.

Figure 62 – Loading Violations for Alternative 2 During Summer Peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
63195	BIGSTONY	230	63214	BIGSTON7	115	1	233			249.6	107.1	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
								236.2	101.4	249.3	107.0	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
63195	BIGSTONY	230	63314	BIGSTON4	230	1	233			249.6	107.1	63311 CANBY 4230.00 63314 BIGSTON4230.00 C1
								240.4	103.2	252.6	108.4	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
								236.2	101.4	249.8	107.2	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
62003	JOHNJCT7	115	63216	ORTONVL7	115	1	96.6			119.8	117.3	BASE CASE
								138.5	135.5	129.2	133.8	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
												NUMEROUS OTHER CONTINGENCIES
62003*	JOHNJCT7	115	66555	MORRIS 7	115	1	106			117.9	111.2	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
63314	BIGSTON4	230	63325	BROWNSV4	230	1	291			326.5	112.6	63314 BIGSTON4230.00 66503 BLAIR 4230.00 C1

Since the two 115 kV line sections between Ortonville and Morris exceed the short-term emergency rating of the conductor, it will be necessary to upgrade these two line sections. In addition, the loading on the Big Stone to Browns Valley 230 kV line is above its emergency limit. However, the loading on the Big Stone 230/115/13.8 kV transformer is below 125% of the normal rating, therefore it does not exceed its emergency limit and will not be a required upgrade if alternative 2 is implemented in connecting the proposed generator to the system for this scenario.

In addition to these overloaded facilities in the immediate vicinity of the interconnection, there were also a multitude of overloads shown for a variety of other contingencies. These overloads can be found in Appendix C.3.1. A few of these overloads that are more immediately located near the proposed interconnection are shown below in Figure 63. These facilities are shown for informational purposes since they could be more related to the delivery of the power from the proposed generator than the actual interconnection. These facilities are not required upgrades during the interconnection Study, but may be required later if these same facilities appear during the delivery service study.

Figure 63 – Loading Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with No Group 2 Projects

Overloaded Branch							Normal	Existing System		Int. Alt. #2		
From Bus		kV	To Bus		kV	ckt	Rating	MVA	% Rate A	MVA	% Rate A	Contingency
60150	MNVLTAP4	230	66550	GRANITF4	230	1	318			319.9	103.1	BASE CASE
										421.1	132.4	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63219	GRANTCO7	115	66555	MORRIS 7	115	1	96	117.7	124.9	137.1	142.8	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
60148	MINVALY7	115	60149	MINVALT4	230	C1	187			201.8	107.9	60150 MNVLTAP4230.00 66550 GRANITF4230.00 C1
60150	MNVLTAP4	230	63054	PANTHER4	230	1	388			404.9	104.4	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
63327	HANKSON4	230	63329	WAHPETN4	230	1	320			391.7	122.4	63369 JAMESTN3345.00 66791 CENTER 3345.00 C1
												NUMEROUS OTHER CONTINGENCIES
63233	EDGETAP7	115	63223	HOOT LK7	115	1	96			106.8	111.1	63051 HENNING4230.00 63052 INMAN 4230.00 C1

The mitigation of these overloaded facilities is not required for this interconnection Study. However, if these facilities appear during the delivery service study, they would need to be upgraded.

5.2.3.2 Voltage Violations

5.2.3.2.1 Interconnection Alternative 1

Contingency analysis of the 2007 summer peak case with none of the Group 2 projects included from the MISO/WAPA coordinated study did not reveal any voltage violations in the immediate area of interconnection for alternative 1. There were however, numerous voltage violations in areas throughout the northern MAPP region. A complete listing of these violations can be found in Appendix C.3.2. A few of the voltage violations that were just adjacent to the area of interconnection are shown below in Figure 64. Since these voltage violations are not in the immediate Study area, mitigation of them is not required during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 64 – Voltage Violations on Remote Facilities for Alternative 1 During Summer Peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
62006	KERKHO 7	115		0.8942	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
				0.9182	NEW	66550 GRANITF4230.00 63050 WILLMAR4230.00 C1
						63050 WILLMAR4230.00 62427 WILLMAR869.000 C1
				0.9171	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1
						60143 BENTON 7115.00 60348 BENCTP7 115.00 C1
						60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES
63331	FERGSFL4	230		0.8976	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9057	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1
						60143 BENTON 7115.00 60348 BENCTP7 115.00 C1
						60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
60898	GLENCOE	115		0.8992	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9001	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9016	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9066	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62981	MCLEOD 7	115		0.9055	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9064	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9079	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9128	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62982	HUTCHMN7	115		0.902	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9028	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9041	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.9086	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62983	HUTCH3M7	115		0.9023	NEW	63314 BIGSTON4230.00 63325 BROWNSV4230.00 C1
				0.9031	NEW	63325 BROWNSV4230.00 63327 HANKSON4230.00 C1
				0.9044	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
				0.909	NEW	63337 JHNSNJT4230.00 66554 MORRIS 4230.00 C1
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES
63050	WILLMAR4	230			NEW	NUMEROUS CONTINGENCIES
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62528	TAMARAC7	115		0.9173	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.8878	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9006	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1
						60143 BENTON 7115.00 60348 BENCTP7 115.00 C1
						60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
62529	CMRTJCT7	115		0.9150	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.8872	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9041	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1
						60143 BENTON 7115.00 60348 BENCTP7 115.00 C1
						60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
62530	FRAZEE 7	115		0.9098	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
			0.9128	0.8768	-0.0360	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1

Figure 64 (continued)

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
62530	FRAZEE 7	115		0.8921	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9151	0.9041	-0.0110	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
				0.9117	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9129	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
62533	CORMRNT7	115		0.9153	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.8873	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9035	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
62752	MLTN TP7	115			NEW	NUMEROUS CONTINGENCIES
62753	MILTONA7	115			NEW	NUMEROUS CONTINGENCIES
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230	0.9198	0.8797	-0.0401	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.8821	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63052	INMAN 4	230	0.9195	0.8794	-0.0401	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.8804	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63053	HUBBARD4	230		0.9002	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
63219	GRANTCO7	115			NEW	NUMEROUS CONTINGENCIES
63220	ELBOWLK7	115			NEW	NUMEROUS CONTINGENCIES
63222	ALEXAND7	115			NEW	NUMEROUS CONTINGENCIES
63231	FERGSFL7	115		0.9124	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9146	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63232	EDGETWN7	115	0.9151	0.9041	-0.0110	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
				0.9117	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9129	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63233	EDGETAP7	115	0.9170	0.9061	-0.0109	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
				0.9136	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9148	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1

Figure 64 (continued)

Voltage Violation			Existing System	Int. Alt. #1		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63234	PEL RPD7	115		0.8904	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9000	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
63236	AUDUBON7	115		0.9180	NEW	60133 SHEYNNE4230.00 63336 AUDUBON4230.00 C1
				0.8943	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
				0.9167	NEW	60143 BENTON 7115.00 60146 GRANCTY7115.00 C1 60143 BENTON 7115.00 60348 BENCTP7 115.00 C1 60348 BENCTP7 115.00 60157 STCLOUD7115.00 C1
63336	AUDUBON4	230		0.9127	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
66717	ULRICH 7	115		0.9000	NEW	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
67452	ALEXSS	115			NEW	NUMEROUS CONTINGENCIES
67453	ALEXSWM	115			NEW	NUMEROUS CONTINGENCIES
67454	ALEXPLDM	115			NEW	NUMEROUS CONTINGENCIES

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study. However, if some of these same violations appear during the delivery service study, they would then need to be mitigated by the addition of system enhancements.

5.2.3.2.2 Interconnection Alternative 2

Analysis of interconnection alternative 2 during summer peak conditions with no Group 2 projects modeled indicated very similar results to previous sections of this report. The same two voltage violations at Willmar were evident for alternative 2. The Willmar 230 kV voltage violation was only evident for about a handful of contingencies; however, the 115 kV voltage violation appeared for numerous contingencies. A summary of the post-contingent voltage levels for these two buses is shown below in Figure 65.

Figure 65 - Voltage Violations for Alternative 2 During Summer Peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
63050	WILLMAR4	230		0.9194	NEW	63050 WILLMAR4230.00 66550 GRANITF4230.00 C1
				0.9184	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60215 HYLNDLK7115.00 60261 DEANLAK7115.00 C1
				0.9190	NEW	60192 BLUE LK3345.00 60108 WILMART3345.00 C1 60261 DEANLAK7115.00 60244 SCOTTCO7115.00 C1
				0.9195	NEW	60108 WILMART3345.00 60192 BLUE LK3345.00 C1
				0.9145	NEW	60108 WILMART3345.00 60331 LKFLDXL3345.00 C1
62425	WILLMAR7	115			NEW	NUMEROUS CONTINGENCIES

Since the voltages at these two buses are below the criteria of 0.92 p.u. and are slightly aggravated by the proposed interconnection, mitigation of these two voltage violations will be required during this interconnection Study if alternative 2 is implemented when connecting the

proposed generator to the system. Besides these two voltage violations at Willmar, there were no other voltage problems identified within the immediate area of interconnection.

As shown with other sections of this report, interconnection alternative 2 caused a whole bunch of other voltage violations at locations further from the immediate area of interconnection. A list of these voltage violations with their corresponding post-contingent voltage levels can be found in Appendix C.3.2. Some of these voltage violations that were just adjacent to the area of interconnection are shown below in Figure 66. Since these violations are not in the immediate Study area, they are not required to be mitigated during this interconnection Study. However, if some of these same voltage violations would happen to occur during the delivery service study, system upgrades would need to be added to mitigate the voltage violations that are aggravated by this proposed project.

Figure 66 – Voltage Violations on Remote Facilities for Alternative 2 During Summer Peak Conditions with No Group 2 Projects

Voltage Violation			Existing System	Int. Alt. #2		
Bus		kV	V-CONT	V-CONT	Δ V	Contingency
60356	PAYNES 4	230			NEW	NUMEROUS CONTINGENCIES
62005	KERKHOT7	115			NEW	NUMEROUS CONTINGENCIES
63054	PANTHER4	230			NEW	NUMEROUS CONTINGENCIES
60898	GLENCOE	115		0.8998	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62981	MCLEOD 7	115		0.9061	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62982	HUTCHMN7	115		0.9019	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62983	HUTCH3M7	115		0.9023	NEW	63327 HANKSON4230.00 63329 WAHPETN4230.00 C1
62526	RUSH LK7	115			NEW	NUMEROUS CONTINGENCIES
62527	ELMO 7	115			NEW	NUMEROUS CONTINGENCIES
62530	FRAZEE 7	115	0.9128		ELIMINATED	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
62531	INMAN 7	115			NEW	NUMEROUS CONTINGENCIES
62532	FERGUS 7	115	0.9151	0.9061	-0.0090	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
62752	MLTN TP7	115			NEW	NUMEROUS CONTINGENCIES
62753	MILTONA7	115			NEW	NUMEROUS CONTINGENCIES
60144	DGLASCO7	115			NEW	NUMEROUS CONTINGENCIES
63051	HENNING4	230	0.9198		ELIMINATED	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
63052	INMAN 4	230	0.9195		ELIMINATED	60173 ROSEAUN2500.00 60174 ROSEAUS2500.00 C1
63219	GRANTCO7	115			NEW	NUMEROUS CONTINGENCIES
63220	ELBOWLK7	115			NEW	NUMEROUS CONTINGENCIES
63222	ALEXAND7	115			NEW	NUMEROUS CONTINGENCIES
63232	EDGETWN7	115	0.9151	0.9061	-0.0090	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63233	EDGETAP7	115	0.9170	0.9081	-0.0089	63233 EDGETAP7115.00 63223 HOOT LK7115.00 C1
63235	PERHAM 7	115			NEW	NUMEROUS CONTINGENCIES
66792	MAPLE R3	345		0.9149	NEW	63358 BUFFALO3345.00 66792 MAPLE R3345.00 C1
67452	ALEXSS	115			NEW	NUMEROUS CONTINGENCIES
67453	ALEXSWM	115			NEW	NUMEROUS CONTINGENCIES
67454	ALEXPLDM	115			NEW	NUMEROUS CONTINGENCIES

As mentioned previously, the mitigation of these voltage violations is not required as part of this interconnection Study, but if these same violations appear during the delivery service study, mitigation of them may be required.

6.0 Loss Analysis

6.1 Introduction

A brief loss analysis was conducted for this interconnection Study using the steady state power flow models developed for contingency analysis. Areas monitored for the loss analysis focused on those control areas within the immediate Study area and those just adjacent of it.

6.2 Summer Off-peak Conditions

Figure 67 is shown below and illustrates the loss characteristics of each interconnection alternative for the three different summer off-peak scenarios studied for this proposed interconnection.

Figure 67 – Loss Analysis Results by Control Area for Summer Off-peak Conditions

	Summer Off-peak Conditions														
Control	All Group 2					Half Group 2					No Group 2				
Area	Base	Alt #1	Δ MW	Alt #2	Δ MW	Base	Alt #1	Δ MW	Alt #2	Δ MW	Base	Alt #1	Δ MW	Alt #2	Δ MW
ALTW	181.0	186.6	5.6	186.4	5.4	162.0	167.0	5.0	166.9	4.9	149.3	153.7	4.4	153.6	4.3
XEL	592.3	634.9	42.6	637.0	44.7	565.4	590.0	24.6	592.1	26.7	525.6	561.6	36.0	563.2	37.6
MP	91.5	99.7	8.2	96.9	5.4	88.7	96.3	7.6	93.8	5.1	84.4	91.2	6.8	88.9	4.5
SMMPA	2.8	3.0	0.2	3.0	0.2	2.8	3.0	0.2	3.0	0.2	2.8	2.9	0.1	3.0	0.2
GRE	48.7	56.3	7.6	70.3	21.6	46.6	53.8	7.2	59.6	13.0	43.1	49.2	6.1	61.5	18.4
OTP	93.8	112.7	18.9	107.6	13.8	90.0	108.1	18.1	103.2	13.2	84.3	101.3	17.0	96.6	12.3
MPW	1.6	1.6	0.0	1.6	0.0	1.4	1.4	0.0	1.4	0.0	1.3	1.3	0.0	1.3	0.0
MEC	328.6	333.6	5.0	333.5	4.9	297.3	301.8	4.5	301.8	4.5	279.4	283.9	4.5	283.9	4.5
NPPD	88.4	86.1	-2.3	85.9	-2.5	84.2	81.7	-2.5	81.5	-2.7	80.5	77.8	-2.7	77.7	-2.8
OPPD	48.7	51.0	2.3	51.1	2.4	44.2	46.4	2.2	46.4	2.2	41.6	43.7	2.1	43.8	2.2
LES	4.6	4.6	0.0	4.6	0.0	4.6	4.6	0.0	4.6	0.0	4.6	4.6	0.0	4.6	0.0
WAPA	298.0	318.4	20.4	306.7	8.7	288.9	309.6	20.7	298.5	9.6	253.3	271.6	18.3	261.2	7.9
MH	241.4	240.9	-0.5	241.1	-0.3	242.6	242.1	-0.5	242.2	-0.4	246.1	245.5	-0.6	245.7	-0.4
DPC	79.2	78.9	-0.3	79.1	-0.1	75.8	75.8	0.0	75.9	0.1	75.4	75.4	0.0	75.6	0.2
Total =	**2100.6**	**2208.3**	**107.7**	**2204.8**	**104.2**	**1994.5**	**2081.6**	**87.1**	**2070.9**	**76.4**	**1871.7**	**1963.7**	**92.0**	**1960.6**	**88.9**

As can be seen from the previous figure, interconnection alternative 2 was most effective in reducing system losses when the proposed generator was added to the summer off-peak models.

6.3 Summer Peak Conditions

This same type of analysis was performed for summer peak conditions. The following figure illustrates the loss characteristics of each interconnection alternative for the three different summer peak scenarios.

Figure 68 – Loss Analysis Results by Control Area for Summer Peak Conditions

	Summer Peak Conditions														
Control	All Group 2					Half Group 2					No Group 2				
Area	Base	Alt #1	Δ MW	Alt #2	Δ MW	Base	Alt #1	Δ MW	Alt #2	Δ MW	Base	Alt #1	Δ MW	Alt #2	Δ MW
ALTW	120.6	127.6	7.0	127.4	6.8	85.3	89.2	3.9	89.0	3.7	77.7	81.0	3.3	80.9	3.2
XEL	489.9	504.9	15.0	506.1	16.2	406.4	425.1	18.7	425.9	19.5	380.3	395.9	15.6	396.3	16.0
MP	69.7	73.1	3.4	71.6	1.9	66.4	69.4	3.0	68.0	1.6	65.0	67.3	2.3	66.1	1.1
SMMPA	1.3	1.3	0.0	1.3	0.0	1.3	1.2	-0.1	1.2	-0.1	1.2	1.2	0.0	1.2	0.0
GRE	118.7	124.8	6.1	137.7	19.0	110.9	116.5	5.6	128.9	18.0	108.1	113.1	5.0	124.7	16.6
OTP	104.8	130.3	25.5	128.9	24.1	101.5	126.1	24.6	124.7	23.2	95.8	119.2	23.4	117.8	22.0
MPW	1.3	1.4	0.1	1.4	0.1	1.2	1.2	0.0	1.2	0.0	1.2	1.2	0.0	1.2	0.0
MEC	198.8	202.5	3.7	202.2	3.4	158.9	161.5	2.6	161.3	2.4	146.7	149.1	2.4	148.9	2.2
NPPD	95.8	91.2	-4.6	91.1	-4.7	94.6	89.6	-5.0	89.5	-5.1	94.1	88.8	-5.3	88.7	-5.4
OPPD	36.5	37.6	1.1	37.6	1.1	34.7	35.5	0.8	35.5	0.8	33.8	34.5	0.7	34.5	0.7
LES	9.5	9.5	0.0	9.5	0.0	9.5	9.5	0.0	9.5	0.0	9.6	9.5	-0.1	9.5	-0.1
WAPA	233.2	235.5	2.3	228.1	-5.1	211.4	213.1	1.7	205.9	-5.5	187.4	187.0	-0.4	180.3	-7.1
MH	258.6	257.8	-0.8	258.1	-0.5	252.3	251.4	-0.9	251.8	-0.5	258.9	258.0	-0.9	258.4	-0.5
DPC	65.9	64.3	-1.6	64.4	-1.5	64.1	62.6	-1.5	62.7	-1.4	63.0	61.6	-1.4	61.7	-1.3
Total =	**1804.6**	**1861.8**	**57.2**	**1865.4**	**60.8**	**1598.5**	**1651.9**	**53.4**	**1655.1**	**56.6**	**1522.8**	**1567.4**	**44.6**	**1570.2**	**47.4**

As can be seen from the previous figure, interconnection alternative 1 was most effective in reducing system losses when the proposed generator was added to the summer peak models.

6.4 Conclusion

Loss performance is very similar between the two interconnection alternatives, however interconnection alternative 1 reduces losses more during summer peak conditions when power pool prices are typically higher than those in the off-peak times.

7.0 Constrained Interface Analysis

Favorable results from a generator interconnection study do not guarantee delivery of the power to a specific market. Interconnection studies performed within MISO typically include a high level constrained interface analysis section to indicate to the Customer any potential constrained interfaces that may be encountered during a subsequent delivery service study.

This particular interconnection Study did not include constrained interface analysis. This is in part due to the changing nature of this interconnection request. During the April 15, 2004 interconnection Study kick-off meeting, assumptions were brought forward to model the delivery of this proposed interconnection. However, since this kick-off meeting, the same parties are not all involved in this project any more. In fact, additional parties that did not originally attend the kick-off meeting are now potentially involved in this project.

Due to the sole dependency of delivery on constrained interface analysis results and the changing nature of this interconnection project, there is not going to be constrained interface analysis performed as part of this interconnection Study unless the Customer comes forward with new assumptions for the delivery of this project. Constrained interface analysis performed during the delivery service study will ultimately determine the liabilities that this project will have for fixing any constrained interfaces in the MAPP and MISO footprints.

8.0 Transient Stability Analysis

As part of this interconnection Study, transient stability analysis is required to evaluate the stability constraints that may be introduced by this new generator. This analysis has not yet been completed. It is expected that work on stability analysis will commence immediately following the publication of this Study report. An addendum to this report will be issued with the transient stability analysis results included within it.

The current Northern MAPP Operating Review Working Group (NMORWG) stability package published on March 11, 2004 is planning to be utilized to perform this analysis. This analysis will build off the models that have been utilized by the Group 2 MISO/WAPA coordinated study. Analysis results from steady state contingency analysis or input from the Customer after review of this report may influence the transient stability analysis process and the amount of cases that will be studied.

If transient stability analysis results indicate any system violations either local to the generator or regional on the MAPP or MISO system, they will be required to be fixed as part of the interconnection process.

9.0 Short Circuit Analysis

Short circuit analysis evaluates the capability of existing equipment on the system to determine if fault duties and system protection schemes are adequate for new interconnection requests. This type of analysis is also part of the interconnection Study and is not yet complete at this time. It is anticipated that transient stability analysis and short circuit analysis will be performed together and included within the same addendum to this report.

Any short circuit associated constraints identified during evaluation of this project will also require system upgrades during the interconnection Study.

10.0 Conclusion

This report has documented the steady state contingency analysis results and the loss characteristics of two interconnection alternatives when connecting a new 600 MW coal-fired generator in northeastern South Dakota at the existing Big Stone site in Grant County.

These two transmission alternatives included two different 230 kV outlet lines out of the existing Big Stone site. These were:

Alternative #1: Uprate existing 115 kV lines to 230 kV along following routes:

a. Big Stone to Ortonville
b. Ortonville to Johnson Jct.
c. Johnson Jct. to Morris
d. Big Stone to Canby
e. Canby to Granite Falls

Alternative #2: New 230 kV line from

a. Big Stone to Willmar

With an up-rate of existing 115 kV lines to 230 kV along following routes:

a. Big Stone to Canby
b. Canby to Granite Falls

Contingency analysis results have indicated that the amount of Group 2 generation included from the latest MISO/WAPA coordinated study does not have a huge impact on the overloaded facilities associated with the interconnection of project G392.

Based on the overall system performance during steady state conditions, this Study has identified that the following upgrades will be necessary for connecting the proposed project with interconnection alternative 1.

Table 6 – Required Upgrades for Interconnection Alternative 1

1. Increase capacity of Morris 230/115 kV Transformer
2. Increase capacity of Big Stone to Browns Valley 230 kV Line
3. Increase capacity of Big Stone to Highway 12 115 kV Line
4. Increase capacity of Highway 12 to Ortonville 230 kV Line

Implementing interconnection alternative 2 to connect the proposed project to the existing system will require the following upgrades:

Table 7 – Required Upgrades for Interconnection Alternative 2

1. Increase capacity of Ortonville to Johnson Jct. 115 kV Line
2. Increase capacity of Johnson Jct. to Morris 115 kV Line
3. Increase capacity of Big Stone to Browns Valley 230 kV Line
4. Install capacitor bank in Willmar area to mitigate low voltages

While performing contingency analysis for interconnection alternatives 1 and 2, a few other facilities were overloaded outside the area of immediate interconnection, but are very likely to

appear during the delivery service study. The facilities that will likely need to be upgraded during the delivery service study may include the following:

Table 8 – Likely Upgrades Required for Delivery Service Study

1. Grant County to Morris 115 kV Line
2. Hoot Lake to Fergus Falls 115 kV Line
3. Hankinson to Wahpeton 230 kV Line

Other system constraints identified further from the area of interconnection were identified during contingency analysis of the summer peak and summer off-peak cases. These facilities are not as likely to be required for delivery, but may appear depending on the assumptions used in the delivery service study.

Table 9 – Upgrades that may be Required for Delivery Service Study

1. Wahpeton to Fergus Falls 230 kV Line
2. Fergus Falls 230/115/13.2 kV Transformer
3. Edgetown Tap to Pelican Rapids 115 kV Line
4. Sheyenne to Fargo 230 kV Line (Interconnection Alternative 1 only)
5. Grant County to Hoot Lake 115 kV Line (Interconnection Alternative 1 only)
6. Aberdeen Jct. to Aberdeen 115 kV Line (Interconnection Alternative 2 only)

Other studies on-going within this region have identified other numerous facility overloads. These overloads appeared again during this Study. Since the future of many of these line overloads is uncertain, the responsibility of these line upgrades may fall within the realm of this project depending on the assumptions used during the delivery service study and the status of any planned upgrades associated with any of these line sections.

Table 10 – Other Overloaded Facilities Under Suspicion for Delivery Service Study

1. Granite Falls to MN Valley Tap 230 kV Line
2. MN Valley Tap to Panther 230 kV Line
3. Panther to McLeod 230 kV Line
4. Willmar to Granite Falls 230 kV Line
5. MN Valley 230/115 kV Transformer
6. MN Valley to Maynard 115 kV Line
7. Maynard to Kerkhoven 115 kV Line

A brief loss analysis during this Study has indicated that alternative 1 is more effective in delivering the generation to the existing transmission system during summer off-peak conditions while alternative 2 is has more loss savings during summer peak conditions with the proposed interconnection added to the models.

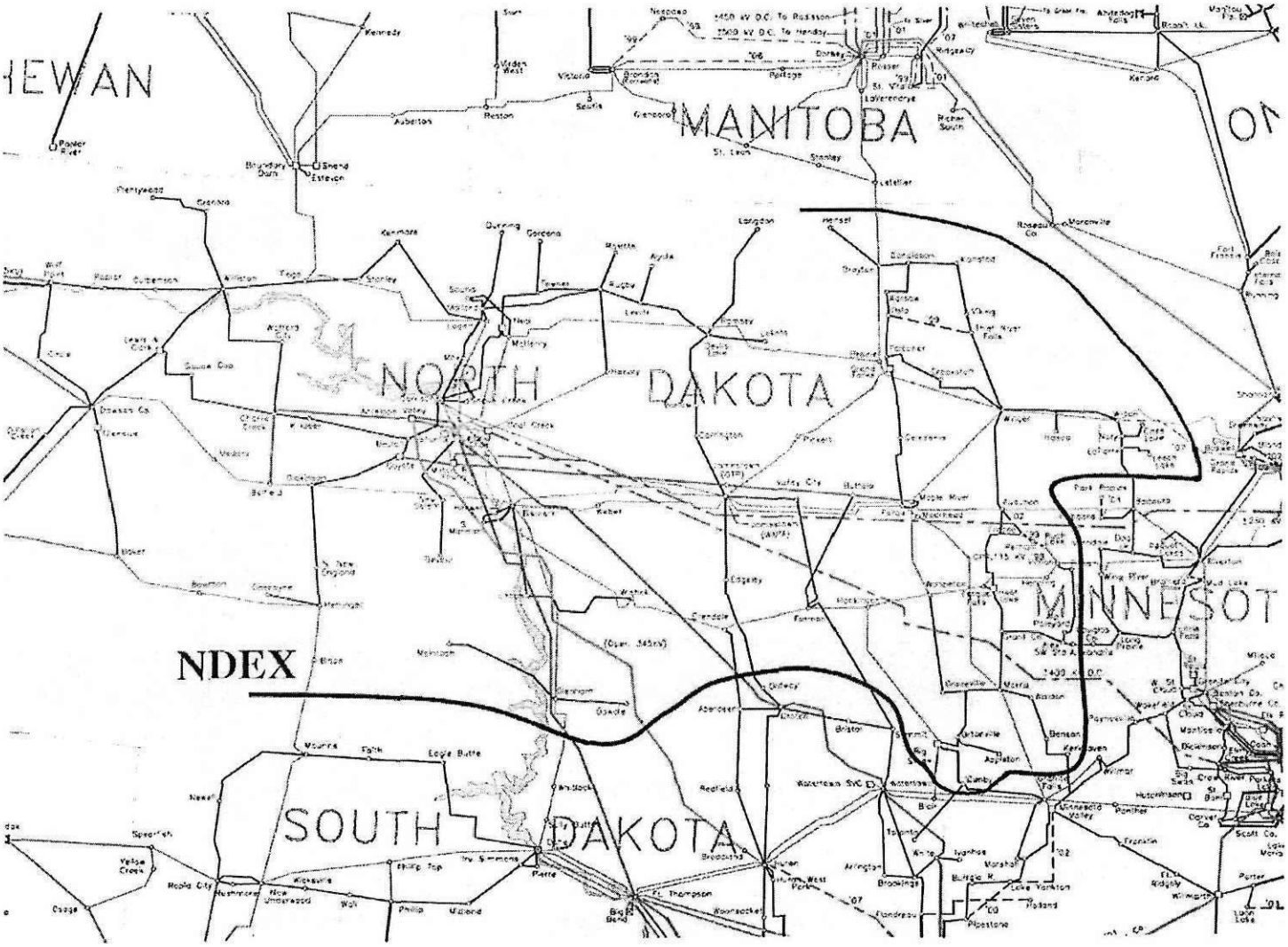
Transient stability analysis is part of the interconnection Study, but has not yet been completed. This type of analysis will determine if the proposed project is able to maintain system stability both locally and regionally after credible disturbances are applied to the system. An addendum to this report will be issued separately once this analysis is completed.

Short circuit analysis is also part of the interconnection Study. This analysis is also incomplete at this time. This type of analysis will determine if existing equipment and protection schemes

on the system will be able to withstand increased fault duties and power flows associated with the proposed project. The results of this analysis will be included within the same addendum as the transient stability analysis once it is completed.

Based on the results of this interconnection Study, it appears that either alternative used to connect this generator to the system will work from a steady state contingency analysis standpoint given that the proper system enhancements are made within the direct area of interconnection.

Exhibit No. _____ (TR-3)
1 page


MANITOBA
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MINNESOT
NDEX

Case No. PU-06-482
Exhibit No.___(TR-4)

TRADE SECRET - PRIVATE

Case No. PU-06-482
Exhibit No.___(TR-5)

TRADE SECRET - PRIVATE