



1 Fact Finding #1 Introduction

As detailed in the Work Plan Narrative for Capacity Deliverability, PJM and MISO initiated the “Fact-Finding” effort through the JCM stakeholder process as requested by OPSI and PJM. This report specifically documents the results of the technical analysis for “Fact-Finding #1”. This analysis was carried out on a combined PJM/MISO Summer Peak 2018 model.

2 Model Development

2.1 Model Development

This Section documents the model development for the Cross Border Deliverability Fact-Finding #1. The MISO MTEP13 five-year out model (2018 model) was merged with the PJM RTEP13 five-year out 2018 model.

2.2 MISO Midwest Area Representation

The representation for the MISO East, Central and West Areas is based on the MTEP13 – 2018 Summer Peak Model. Only the transmission projects that were approved as MTEP Appendix A as of MTEP 2013 were included in the model.

MISO Region	Transmission Areas/ Zones
MISO East	ITC Michigan, METC, NIPSCO, BREC
MISO Central	AMIL, SIPC,SIGE,DEI,HE, IPL,CWLD, CWLP, AMMO
MISO West	DPC, MPW, MEC, ITCMW,ALTE,MGE, WEC, WPSC, UPPC,MP,XEL, GRE, MDU,OTP,SMMPA, Zone MRES

Table 2-1 MISO Areas

2.3 MISO South Representation

The MISO South representation was derived from the ERAG MMWG 2012 series models.

MISO Region	Transmission Areas/ Zones
MISO South	EMI,EAI ,PLUM ,OMLP,BCA ,LAGN ,WMU CWAY,BUBA,PUPP,DERS ,NLR ,SMEPA,EES CLEC,LAFA,LEPA and Zone ETEC

Table 2-2 MISO South Areas

2.4 PJM Area Representation

PJM provided an insert for the PJM areas. This representation was inserted and the resulting case was solved by enabling Area Interchange. It was also ensured



that the PJM net interchange and the MISO Net Interchange were not changed from the base data that was used.

2.5 MISO Area Generation Interconnection Projects topology updates

The following MISO GIPs that had signed GIAs and their associated Network Upgrades added to the base MTEP model.

MISO GI Project	MISO Control Area
R39	MEC
J238	IPL
J202	METC
J235	METC
J075	METC
J200	MDU
PID 224	EES

Table 2-3 MISO and Entergy GI Projects added to the case

As J238 is a refuel of the existing IPL Pritchard plant, the existing Pritchard generation was dispatched offline.

During the review of the input files it was found that the following generators were missing from the Network Resource list and they were subsequently added to the Network Resource List

MISO Generator	MW Amount	MISO Control Area
Sugar Creek Generation	578	NIPSCO
Edwardsport Generation	802	Duke Indiana
Mackinac Wind	20	WEC

Table 2-4 MISO Generators added to the NR List

The Titus generation in area 227 was turned off as it was retired; the PJM generation was scaled to maintain the area interchange. The TMI generation at bus 204659 was assigned as the area swing us for area 227.

2.6 Qualifying Facilities

Several Qualifying Facilities in the MISO South region were added to the power flow case. The listing is provided in the Table 2-5



Bus#	MW Size	Bus Name	Area#	Area Name	Comments
303035	39	1KCOCH U5 13.800	332	LAGN	Sterlington Power
334313	50	1WOODVILLE 13.800	351	EES	
334345	83	1CYPR U3! 13.800	351	EES	Cypress Peaking Power Facility
334346	83	1CYPR U4! 13.800	351	EES	Cypress Peaking Power Facility
334439	83.3	6VFWPK% 230.00	351	EES	BASF Corporation - VFW Park
334445	309.5	6SOSIDE! 230.00	351	EES	Motiva QF
334446	146.3	6SLTGRAS! 230.00	351	EES	Premcor
334447	42	1TOTAL 13.800	351	EES	
334503	35.1	2GOODYER! 69.000	351	EES	Goodyear Tire
334629	70	2SK HUNT% 69.000	351	EES	Huntsman P.N
334630	38.4	2MAGNOLIA! 69.000	351	EES	Air Liquide Magnolia
334708	10.6	2PHBLACK 69.000	351	EES	Eng. Carbons Inc
335016	36.4	1CII_LONESTR13.800	351	EES	Lone Star Steel
335056	31	1BASELL	351	EES	
335072	53.7	6ROSE_BLUFF%230.00	351	EES	Praxair
335592	75.8	4SOUTHWD 138.00	351	EES	Air Liquide America
335806	127	4REPAPCO! 138.00	351	EES	Repapco - PID 205
336002	240	1GA GULF 34.500	351	EES	Georgia Gulf
336072	159	1NUCORG1 18.000	351	EES	
336073	159	1NUCORG2 18.000	351	EES	
336090	20.4	1ALLI-T1! 34.500	351	EES	BP Alliance
336265	19	6KAISER! 230.00	351	EES	CII Carbon Calciner
336417	115	1SUNERGY 13.800	351	EES	
337336	60	PID268GEN	351	EES	
337458	40	PID266GEN	351	EES	
500110	61	BOISE 4 138.00	502	CLEC	Boise
500430	129.2	IPAPER 4 138.00	502	CLEC	International Paper
500710	32	PVKRFT 4 138.00	502	CLEC	PV Kraft

Table 2-5 MISO South Qualifying Facilities

2.7 Transmission Topology Changes

The Transmission Topology changes that were made to the models are classified as

2.7.1 Transmission Additions

- i. MISO Topology Additions



1. The Network upgrades for the MISO GI Project J238 were added to the cases. These are as listed below
 - a. The lines from the Pritchard substation were moved to the J238 substation
 - b. A new 138kV line from the J238 Substation to the Franklin 138kV substation.
 - c. Various switch upgrades at Centerton- Honeycreek Southport 138kV
 - d. Line clearance upgrade from J238 to Heartland Crossing Tap-Mooresville
 - e. Hanna to Southeast line 138kV line
- ii. The 500kV line from Holland Bottoms – Keo and Holland Bottoms – Independence 500 kV Lines was added to the cases.
- iii. The following CLECO Area Transmission Facilities were added to the cases
 1. Capacitor Banks at Caney, Cooper, Many and Plaisance
 2. Cooper and the West Fork auto transformers were switched
 3. Impedance Correction at Coughlin transformer
 4. Rodemacher to Cocodrie 230 kV line was tapped and added Hineston Substation
 5. Impedances were updated for several transmission facilities in CLECO
 6. Taps for several transformers were updated
 7. Added a 230/138 kV Auto transformer at Rork
 8. Topology was corrected from Westfork – Guidery 138kV
 9. Added LAGN load embedded in CLECO and moved DEMCO load
 10. Deleted Franklin, Abbeville and Slidell double loads
 11. Corrected Modeling of the CLECO valley load
- iv. The following Entergy Area Transmission Facilities were added to the case
 1. Cut Nelson to Carlyss 138 kV line 616 into Mossville 138 kV substation
 2. Stuttgart Ricuskey expansion of Cap bank
 3. Eastgate-Dayton 138kV upgrade



4. Melbourne to Calico Rock 138kV upgrade
5. Hickory-Eastgate 138 kV Rating Change
- v. TVA Updates
 1. Added second Shelby Cordova 500kV line
 2. Various TVA branch rating updates
 3. Various branch impedance changes
 4. Dispatch changes to undo the Johnsonville retirement
- vi. AECI Area update :

AECI had provided an updated representation for the AECI area and it was added to the model.
- vii. SMEPA
 1. SMEPA Improvements for 2017

2.7.2 Removals

- i. The duplicated zero impedance lines between the following buses were removed.
 1. Falcon 69kV – Falcon EK 69kV
 2. Lee 69kV – Helechaw 69kV
 3. Leon KY 69kV – Leon 69kV
 4. Morgan Co. 69kV – Morgan Co. 69kV

2.7.3 Modifications

- i. The Zion Pleasant Prairie 345kV Line rating was updated to 1202/1526 MVA SN/SE.
- ii. The invalid ties between Colee HV- Marshall 161kV and Colee HV- Livingstone 161 were removed and the topology in the area was corrected to account for the BREC Gilbertsville load addition.
- iii. The area interchange between PJM and NYISO was adjusted to match the PJM cases.



3 MISO Fact-Finding #1 Analysis Methodology

The MISO Generation Deliverability Method is outlined in the MISO Deliverability Whitepaper¹. This study analyzes the ability of groups of generation in small pockets to simultaneously operate at their maximum output serve the aggregate load without being bottled up.

3.1 MISO Fact-Finding #1 Step 1

The Step 1 of Fact-Finding #1 determined the unit-specific deliverability of MISO units to MISO load that was performed on this combined model that was representative of the expanded network of PJM/MISO footprint. The goal of this analysis was to identify if:

- a) Any additional constraints that need to be considered with respect to the deliverability of individual units to each RTOs own load, or
- b) Identify if any additional generation that could be deliverable to each footprint's load as a result of using a combined model.

Existing MISO network resources totaling to about 167,465MW were tested for deliverability to the MISO Load. Analysis on the joint model indicates that 159,756 MW of existing MISO Network Resources are deliverable to the MISO Load and about 7709 MW of existing MISO Network Resources were found to be restricted. The results of the MISO analysis are presented in Table 3-1. The table is organized per MISO Region and Transmission Owner. Full detailed results of the Step 1 analysis are available in Appendix A with the per unit restriction of each generator in Table A-1 and a list of constraints found in the Step 3 analysis in Table A-2

Region	Area Name	Sub Total of restrictions (MW)
MISO Central	AMIL	319
	AMMO	17
	DEI	316
	SIPC	356
MISO Central Restriction		1008
MISO East	HE	800
	ITCT	12
	NIPS	48
MISO East Restriction		860
MISO North	ALTW	179
	DPC	24
	GRE	124
	MEC	20

¹ [https://www.misoenergy.org/ layouts/MISO/ECM/Redirect.aspx?ID=90065](https://www.misoenergy.org/layouts/MISO/ECM/Redirect.aspx?ID=90065)



Region	Area Name	Sub Total of restrictions (MW)
	OTP	4
	WPS	20
	XEL	442
MISO North Restriction		812
MISO South	BCA	45
	CLEC	148
	EES	1711
	EES-EAI	1951
	EES-EMI	300
	Lafa	256
	LAGN	595
	PUPP	21
	LEPA	1
MISO South Restriction		5029
Total MISO Restriction		7709

Table 3-1 MISO Results of Fact-Finding #1 Step 1

3.2 MISO Fact-Finding #1 Step 2

Step 2 analysis was performed with the objective to demonstrate whether additional generators in the PJM footprint, on a unit-specific basis, would be deliverable to the entire MISO load should they request such qualification. A second objective was to identify areas where additional resources from the PJM could potentially be certified as deliverable to the MISO load across the seam in order to maximize the transmission service that can be made available to facilitate Capacity transfers between PJM and MISO, should such transmission service be requested.

In this analysis, potentially constraining flowgates from Steps 1 and 3, identified as flowgates on which a MISO or PJM generator had at least 5% DF, were tested to see if PJM generation was restricted in delivering to MISO load. It was found that total of 373 MW of PJM generation was restricted from delivering to MISO load. The results of the MISO analysis that demonstrate per generator restrictions per control area presented in Table 3-2 **Error! Reference source not found**. Full detailed results of the Step 2 analysis are available in Appendix B with the per unit restriction of each generator in **Error! Reference source not found**. and a list of constraints found in the Step 3 analysis in Table B-4

Region	Area Name	Sub Total of restrictions (MW)
PJM	CE	369
	FE	4



PJM Total Restriction	373
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Table 3-2 MISO Results of Fact-Finding #1 Step 2

3.3 MISO Fact-Finding #1 Step 3

As mentioned earlier, PJM and MISO mutually agreed to perform Step 3 before the Step 2 analysis. This step tested the deliverability of the combined MISO and PJM generation to the combined MISO and PJM Load. A combined total of 379,970 MW of Network Resources from the MISO and PJM footprint were evaluated during this step. This included 212,505 MW of Network Resources from PJM and 167,465 MW of Network Resources from MISO. It was found that 212,496 MW of Network Resources from PJM and 160,107 MW of Network Resources from MISO are deliverable to the combined PJM and MISO load. The restrictions per control area are presented in Table 3-3. Full detailed results of the Step 3 analysis are available in Appendix C with the per unit restriction of each generator in Table C-5 Table B-3 and a list of constraints found in the Step 3 analysis in Table C-6.

Region	Area Name	Sub Total of restrictions (MW)
MISO Central	AMIL	42
	AMMO	17
	DEI	309
	SIPC	356
MISO Central Restriction	724	
MISO East	HE	779
	ITCT	12
	NIPS	49
MISO East Restriction	840	
MISO North	ALTW	305
	DPC	53
	GRE	138
	MEC	21
	OTP	4
	WPS	31
	XEL	168
	ALTE	0
MISO North Restriction	720	
MISO South	BCA	43
	CLEC	153
	EES	1569
	EES-EAI	2106
	EES-EMI	344



Region	Area Name	Sub Total of restrictions (MW)
	Lafa	265
	LAGN	576
	PUPP	18
MISO South Restriction		5073
MISO Total Restriction		7357
PJM	FE	9
PJM Total Restriction		9
MISO + PJM Total Restriction		7367

Table 3-3 MISO Results of Fact-Finding #1 Step 3



4 MISO Fact-Finding #1 Results Summary

Analysis Description	Generation (MW)	Approximate ER (MW)	Tested NR level (MW)	Calculated Undeliverable Capacity Resources (MW)	Calculated Deliverable Capacity Resources (MW)	% Deliverable Capacity Resources
MISO Capacity Deliverability FF#1 - Step 1	190,405	22,940	167,465	7,709	159,756	95.40%

Table 4-1 MISO Results Summary Fact-Finding #1 - Step 1

Analysis Description	Generation (MW)	Approximate ER (MW)	Tested NR level (MW)	Calculated Restricted NR level (MW)	Unrestricted existing NR (MW)	Unrestricted existing NR (% of Tested NR)
MISO Capacity Deliverability FF#1 - Step 2	233,612	21,107	212,505	373	212,132	99.82%

Table 4-2 MISO Results Summary Fact-Finding #1 - Step 2

Analysis Description	Generation (MW)	Approximate ER (MW)	Tested NR level (MW)	Calculated Restricted NR level (MW)	Calculated Deliverable Capacity Resources (MW)	Calculated Deliverable Capacity Resources (% of Tested NR)
					Capacity Resources (MW)	Resources (%)
MISO Capacity Deliverability FF#1 - Step 3	190,405	22,940	167,465	7,358	160,107	95.61%
PJM Capacity Deliverability FF#1 - Step 3	233,612	21,107	212,505	9	212,496	100.00%
MISO + PJM Joint Capacity Deliverability FF#1 - Step 3	424,017	44,047	379,970	7,367	372,603	98.06%

Table 4-3 MISO Results Summary Fact-Finding #1 - Step 3



5 MISO Fact- Finding #2

5.1 -Proposed Capacity Import/Export Limit Methodology Overview

To determine the Capacity Import Limits and Capacity Export Limits (CIL/CELS) consistent with current processes, MISO elected to leverage and extend its existing Loss of Load Expectation (LOLE) study methodology. As part of the MISO Planning Resource Auction (PRA), CIL/CELS are calculated annually for each of MISO's Local Resource Zones (LRZs) to establish the amount of resources that can be imported into and exported out of each LRZ on a non-simultaneous basis. The CIL/CELS are used as an input to determine LRZ Local Clearing Requirements in the PRA as well as a verification of the auction clearing results through a simultaneous feasibility analysis.

The CIL/CELS calculated through this fact finding effort are meant to inform the ongoing discussion and analysis of capacity availability between MISO and PJM. As will be discussed further in the analysis below, different transfer source and sink combinations were studied to provide a range of CIL/CEL values. These fact finding analyses looked at combinations of using one of four MISO regions and one of two PJM regions for the source and sink in the transfers. The eligible MISO regions were i) all MISO, ii) MISO North/Central, iii) MISO South and iv) MISO LRZs with ties to PJM. The eligible PJM regions for source and sink were i) all PJM and ii) PJM Load Deliverability Areas (LDAs) with ties to MISO. The latter region consisted of PJM's Western LDA. These regions were chosen to see the range of resulting CIL/CELS when altering the assumptions of where the generation is sourcing or sinking – whether it is an entire footprint versus closer to the border in first tier zones. Going forward, further refinement to the resulting CIL/CELS can be made once a consensus is reached on the appropriate transfer definitions.

5.2 Fact-Finding #2 Modeling and Input Files

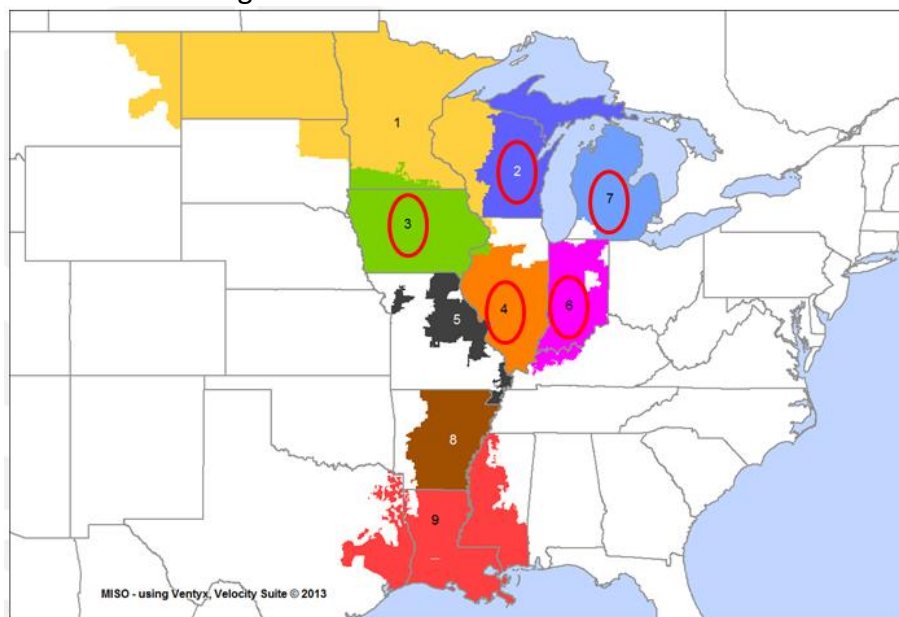
The transfer analysis for FF2 was completed using the base power flow modeling and MUST input files from the FF1 phase of the analysis. The FF1 model was developed jointly with PJM, and MISO areas were updated with Security Constrained Economic Dispatch (SCED). To prepare the model for the deliverability analysis, resources with Network Resource Interconnection Service (NRIS) were ramped up while resources with Energy Resource Interconnection Service (ERIS) were ramped down. Also, to support the deliverability analysis, generators with signed interconnection agreements were added and known topology updates and corrections were applied. To retain the updates from FF1, it was decided to update the FF1 model for FF2 analysis by reapplying SCED to the updated FF1 model.

Base model area interchange between MISO and PJM was set by the reservations outlined in the ERAG MMWG modeling worksheet. It is important to note the ERAG MMWG interchange does not represent all firm reservations. The goal of the study is to

identify the transmission limits between the RTOs, so the included reservations between MISO and PJM were removed, as seen in Table 6. Although this analysis determined total transfer limits, the incremental transmission capacity available can be found by subtracting off existing firm reservations on the appropriate path.

MUST contingency and monitored element files originated from MTEP13. Lines and transformers in MISO Local Balancing Authorities and Seams, including the whole PJM footprint, were monitored for overloads. Contingency files submitted by Transmission Owners and Seams entities through the MTEP13 study process were evaluated in the FF2 analysis. The MUST subsystem file was created to include the MISO and PJM subsystems to be used as the source and sink systems for the import and export analysis. Refer to Tables 4 and 5 of the appendix for the list of MISO and PJM power flow model areas included in the exporting and importing subsystems. The MISO subsystems were determined by operating region and Local Resource Zone (LRZ). Figure 1 shows all LRZs. Those circled in red – zones 2, 3, 4, 6 and 7 – have ties with PJM.

Figure 1: MISO Local Resource Zones



5.3 Fact-Finding #2 Transfer Analysis

Transfer capability is highly dependent on source and sink definitions. The FF2 analysis was performed on varied definitions, both large and small. The larger definitions included all MISO and PJM areas while the smaller definitions included the MISO LRZs within a particular operating region and those with ties to PJM. An evaluation of the transfer capability from zones with ties was chosen in part due to a comparable approach in the LOLE power flow analyses in which power is imported to a zone from



the adjacent MISO LBAs. The smaller PJM definition was the Western Load Deliverability Area which contains all the PJM areas with MISO ties. The following source systems were considered: MISO LRZs with PJM ties, MISO North and Central regions, MISO South region, and all MISO. The sink systems included PJM Western Load Deliverability Area and all PJM. The results of this sensitivity provided a range of limits for both exports and imports. Refer to the results section of this report for all identified limits.

First Contingency Incremental Transfer Capability (FCITC) analysis was performed using MUST individual DC transfers. This analysis was performed applying a 3% Transfer Distribution Factor cutoff, so the impact of the transfer alone or with the contingency must be 3% of the facility rating. For the transfer alone, the 3% applies to the normal rating of the facility and the emergency rating for contingency conditions. Final results are based on simultaneous transfers, meaning power was transferred from all of the areas in the source system based on the available capacity of each unit in the system and the total capacity of the system.

The methods to produce the simultaneous results were found to be reasonable and will be the focus of this report. The results in the following tables and charts represent the incremental transfer capability since the firm reservations were removed from the model.

5.4 Fact-Finding #2 Results

The following tables and charts show the resulting CIL/CEL total transfer capability between MISO and PJM. Table 1 and Chart 1 show the MISO CELs to PJM. The total MISO CEL to PJM is between 5.8 and 7.7 GW, with MISO North/Central to PJM between 5.0 and 5.4 GW and MISO South to PJM between 2.1 and 2.5 GW.

Table 2 and Chart 2 show the MISO CILs from PJM. The total MISO CIL from PJM is between 10.3 and 14.0 GW, with MISO North/Central from PJM between 5.2 and 9.2 GW and MISO South from PJM at 1.0 GW.

These CIL/CEL calculations are based on the FF1 model containing PJM “non-diversified” load representation. MISO intends to also include, prior to final posting, results of a sensitivity studying PJM’s “diversified” loads which were used in PJM’s latest internal analysis of CILs.

Please refer to the Appendix D for detailed source and sink information.



Table 1: MISO Export Limits (MW)

Source	Sink	
Exporting MISO System	All PJM	Western Load Deliverability Area
MISO LRZs with ties to PJM	6,960	7,734
All MISO	6,083	5,750
MISO North & Central Regions	5,039	5,432
MISO South	2,463	2,121

Chart 1: MISO Export Limits (MW)

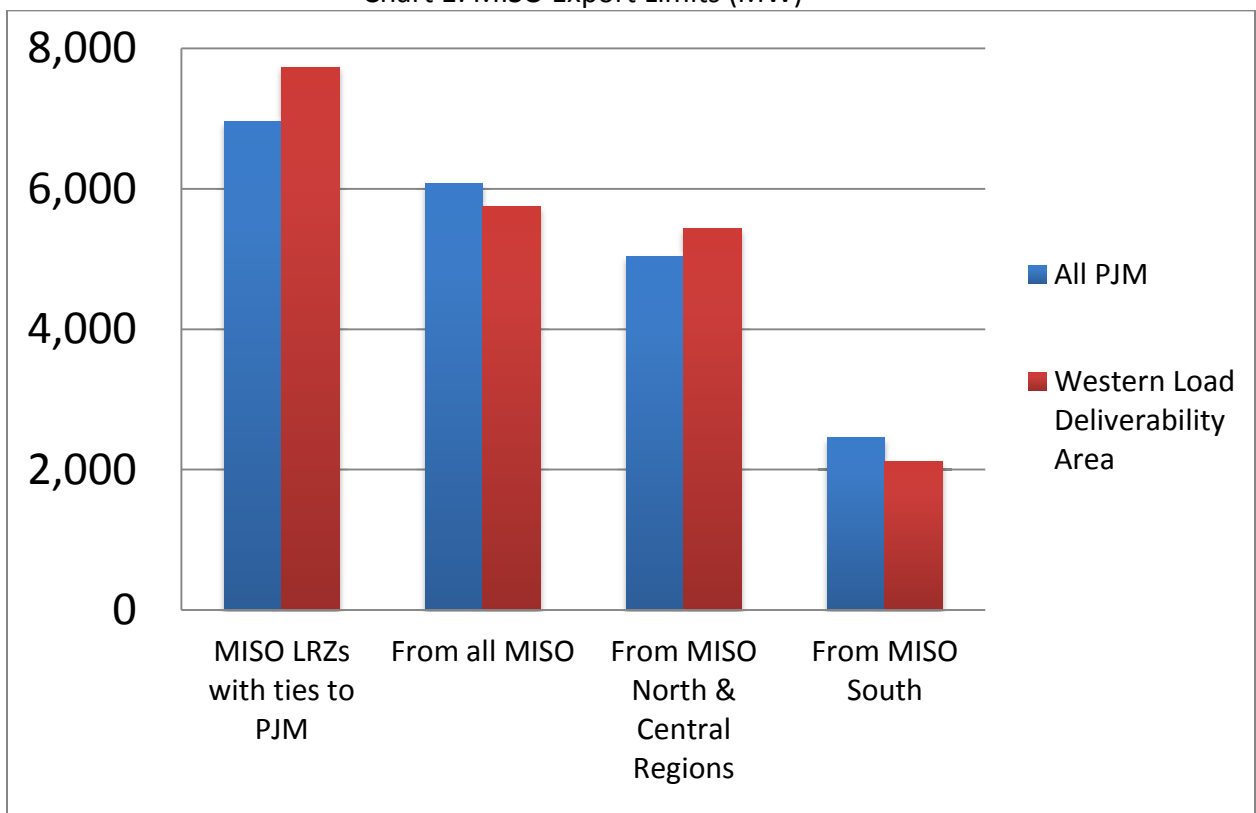
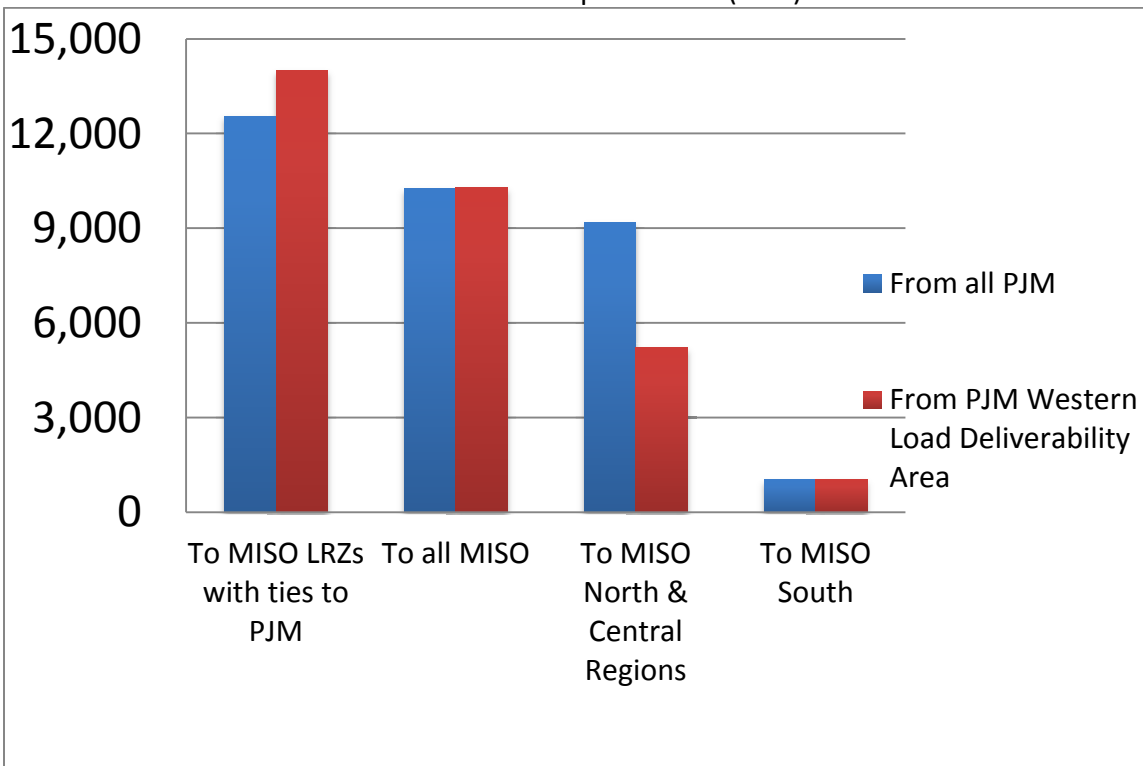


Table 2: MISO Import Limits (MW)

Sink	Source	
Importing MISO System	All PJM	Western Load Deliverability Area
MISO LRZs with ties to PJM	12,552	14,008
All MISO	10,259	10,291
MISO North & Central Regions	9,170	5,224
MISO South	1,030	1,042



Chart 2: MISO Import Limits (MW)





Appendix A MISO Fact-Finding #1 Step 1 Results

Table A-1 Per Generator Restrictions of Fact-Finding #1 Step 1

Region	Generator Name	MW Restricted
MISO Central	08CONRSV	62
	08WABR6	254
	1GRTW 1	92
	1GRTW 2	92
	1GRTW 3	47
	1GRTW 4	57
	1KEOK 7	2
	1KEOK 10	2
	1KEOK 12	3
	1KEOK 1-4	4
	1KEOK 5-6	2
	1MRNGEN4	180
	1MRNGEN5	88
	1MRNGEN6	88
	1NEWTON 1	8
	1NEWTON 2	8
	1RCEC G1	1
	1RCEC G2	1
	1RCEC G3	1
	1RCEC G4	1
1STTLR G1	7	
1STTLR G2	7	



Region	Generator Name	MW Restricted
MISO Central Total Restriction		1008
MISO East	07MEROM5	763
	07WORTH1	18
	07WORTH2	18
	17HOOSIER_W	9
	17ORION_BCW	12
	17WCE-GT1	8
	17WCE-GT2	8
	17WCE-ST	11
	19CARBN	0
	19DEAN12	2
	19DEAN34	2
	19REMER1	0
	19SC1	2
	19SC2	2
	19SC3	2
19SC4	2	
MISO East Total Restriction		860
MISO North	BFT 85G	2
	BFT 86G	3
	BFTG4DSG	2
	BLK D72G	41
	BLK D75G	57
	BLL 71G	14
	BLL 72G	14
	BLL 73G	13



Region	Generator Name	MW Restricted
	BLL 74G	14
	BLL C75G	53
	BLL C76G	53
	BRLGTN28	23
	BURLIN1G	67
	CCITY S8	14
	CCITYSG1	6
	COLVILL G	7
	COLVILL1 G	7
	FEN 84G	61
	FLAMBEAU	24
	FRENCH G	18
	G587	4
	GRE-CAMBRDG	0
	GRE-CGS 82	2
	GRE-COAL 41	61
	GRE-COAL 42	61
	HOLCOMB G	35
	HRDLKGEN	4
	KEYCT34G	26
	LANS5 3G	1
	LANS5 4G	5
	NEWULMS8	16
	PUL G31	4
	PUL G5	2
	PUL G6	3



Region	Generator Name	MW Restricted
	PUL G7	4
	PUL G8	6
	REDWING8	1
	ROQ GT 9	4
	SLAKES 8	79
MISO North Total Restriction		812
MISO South	1ALLI-T1	0
	1ANDRUS U1	90
	1B.WLSN U1	32
	1BAILEY U1	18
	1BAYORU1	2
	1BAYORU2	2
	1BAYORU3	1
	1BC1 U1	11
	1BC1 U2	11
	1BC1 U3	12
	1BC1 U4	12
	1BC2 U1	58
	1BC2 U2	57
	1BC2 U3	58
	1BLAK U1	9
	1BLAK U2	9
	1BLUF U1	309
	1BLUF U2	320
	1BURASGEN	0
	1C1KNWRI	36



Region	Generator Name	MW Restricted
	1C1TRCBL	83
	1C2TRCBL	83
	1C3KNWRI	36
	1C5KNWRI	36
	1C7KNWRI	28
	1CARP U1	6
	1CARP U2	6
	1CATH U1	11
	1CATH U2	11
	1CATH U3	21
	1CATH U4	116
	1CLSBAU3	92
	1CONOCU1	8
	1CONOCU2	8
	1CONOCU3	4
	1CYPR U1	28
	1CYPR U2	28
	1CYPR U3!	24
	1CYPR U4!	24
	1DEGR U1	10
	1DEGR U2	7
	1DUKHSG1	62
	1DUKHSG2	62
	1DUKHSS1	120
	1DUPONTU	13
	1FRNTR 1	16



Region	Generator Name	MW Restricted
	1FRNTR 2	16
	1FRNTR 3	15
	1FRNTR 4	29
	1G1INTHB	58
	1G1PANDA	2
	1G1RVRBN	104
	1G1SABIN	36
	1G2INTHB	58
	1G2PANDA	2
	1G2SABIN	36
	1G3INTHB	58
	1G3PANDA	1
	1G3SABIN	71
	1G4INTHB	58
	1G4PANDA	1
	1G4SABIN	529
	1G5PANDA	1
	1G5SABIN	470
	1G6PANDA	1
	1G7PANDA	2
	1G8PANDA	2
	1GOXY U1	3
	1GOXY U2	3
	1GOXY U3	3
	1GYP U1	6
	1GYP U2	9



Region	Generator Name	MW Restricted
	1GYP U3	12
	1ISES U1	121
	1ISES U2	121
	1ISLVCRK1	12
	1ISLVCRK2	12
	1ISLVCRK3	12
	1L&D2U1	4
	1L&D2U2	4
	1L&D2U3	4
	1LIBERTY	60
	1LSPWRU1	45
	1LYNC U2	16
	1LYNC U3	31
	1MABL UB	7
	1MCLE U1	2
	1MICH U2	5
	1MICH U3	12
	1NMIL CT1	4
	1NMIL CT2	4
	1NMIL ST1	5
	1NMIL U3	3
	1NMIL U4	16
	1NMIL U5	16
	1NUCORG1	3
	1NUCORG2	3
	1REML UA	2



Region	Generator Name	MW Restricted
	1S1INTHB	49
	1S1KNWRI	36
	1S1PANDA	4
	1S1TRCBL	88
	1S2KNWRI	36
	1S2PANDA	2
	1S3INTHB	49
	1S3PANDA	1
	1S4INTHB	49
	1S4PANDA	1
	1SKY U1	19
	1SLSBAU3	50
	1SOXY U1	7
	1SUNERGY	2
	1TOTAL	29
	1UCARBGT1	2
	1UCARBGT2	2
	1UCARBST1	0
	1UCARBST2	1
	1WAT U1	8
	1WAT U2	8
	1WAT U3	25
	1WAT U4	1
	6KAISER	0
	6VFWPK	54
	BONIN1	40



Region	Generator Name	MW Restricted
	BONIN2	70
	BONIN3	146
	G1NESBIT	26
	G2RODEMR	32
	G3MADISN	39
	G6-1COUGH	9
	G6COUGH	6
	G7-1COUGH	9
	G7-2COUGH	9
	G7COUGH	12
	HUNTER4	7
	MRGNCTY4	1
MISO South Total Restriction		5029
MISO Total Restriction		7709



Table A-2 MISO Constraints of Fact-Finding #1 Step 1

Region	Area Name	Branch	Contingency	MVA Rating	AC Post shift MVA	AC Loading %
MISO Central	AMIL	255127 17E_WINAMAC 138 255158 17MONTICELLO 138 1	1733_C2	138	140.8	102.0%
		340618 5LIVING 161 340621 5COLEEHV 161 1	029_JO-345B__8	223	230.1	103.2%
			029_JO-345R__7	223	230.1	103.2%
			029-45-L2913__	223	230.1	103.2%
			324104 7DAVIESS 345 340561 7WILSON 345 1	223	256.1	114.8%
			360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	223	241.3	108.2%
			360126 5SCALVERT KY 161 360140 5WESTLAKE KY 161 1	223	226.7	101.7%
			360326 5BARKLEY HP 161 361059 5PRINCETN TP 161 1	223	238.4	106.9%
			541T580	223	265.6	119.1%
			Unit:239035 02PERRG1 22.0 Id:1	223	240	107.6%
			Unit:264854 19ENFPP 22.0 Id:1	223	238.3	106.9%
			Unit:324035 1TRIM 2 24.0 Id:2	223	239.4	107.4%
		347831 4NEWTON 138 348126 4ROBNSNAM 138 1	346809 7CASEY 345 347830 7NEWTON 345 1	269	271	100.7%
			CSYW-NWTY-1	269	271	100.7%
	AMMO	344870 2KH2 XFMR 69.0 347195 2HAMLTNAM 69.0 1	630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.6	107.8%
			630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.6	107.8%
		347831 4NEWTON 138 348126 4ROBNSNAM 138 1	346809 7CASEY 345 347830 7NEWTON 345 1	269	271	100.7%
			CSYW-NWTY-1	269	271	100.7%
	DEI	249834 08ROCKVL 138 250773 08RCKVIL 69.0 1	LOE 13846 Brkr open at Wabash River	25	31.8	127.2%
		250312 08BROOKJ 69.0 250792 08ROSEBG 69.0 1	248732 07HUBBEL 69.0 248831 07HUBBL8 138 1	39.1	39.9	102.0%



			248732 07HUBBEL 69.0 248831 07HUBBL8 138 1	39.1	39.9	102.0%
		250365 08CN30TH 69.0 250383 08CONERV 69.0 1	250383 08CONERV 69.0 250384 08CON12J 69.0 1	45	52.7	117.1%
	SIPC	340618 5LIVING 161 340621 5COLEEHV 161 1	029_JO-345B__8	223	230.1	103.2%
			029_JO-345R__7	223	230.1	103.2%
			029-45-L2913__	223	230.1	103.2%
			324104 7DAVISS 345 340561 7WILSON 345 1	223	256.1	114.8%
			360097 8VOLUNTEER 500 360102 8PHIPPS B NP 500 1	223	241.3	108.2%
			360126 5SCALVERT KY 161 360140 5WESTLAKE KY 161 1	223	226.7	101.7%
			360326 5BARKLEY HP 161 361059 5PRINCETN TP 161 1	223	238.4	106.9%
			541T580	223	265.6	119.1%
			Unit:239035 02PERRG1 22.0 Id:1	223	240	107.6%
			Unit:264854 19ENFPP 22.0 Id:1	223	238.3	106.9%
			Unit:324035 1TRIM 2 24.0 Id:2	223	239.4	107.4%
		B\$1483 MARION1 1.00 350223 2MARIONPLANT69.0 1	3Wnd: OPEN B\$1484 MARION2 2	61.6	84.4	137.0%
		B\$1483 MARION1 1.00 350224 5MARIONPLANT 161 1	3Wnd: OPEN B\$1484 MARION2 2	61.6	86	139.6%
		B\$1484 MARION2 1.00 350223 2MARIONPLANT69.0 2	3Wnd: OPEN B\$1483 MARION1 1	100.8	106	105.2%
					106.6	105.8%
			3Wnd: OPEN B\$1483 MARION1 1	100.8	106	105.2%
					106.6	105.8%
		B\$1484 MARION2 1.00 350224 5MARIONPLANT 161 2	3Wnd: OPEN B\$1483 MARION1 1	100.8	109.4	108.5%
					110	109.1%
			3Wnd: OPEN B\$1483 MARION1 1	100.8	109.4	108.5%
MISO East	HE	248547 07WORTH8 138 249752 08HEBVST 138 1	B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	152.8	113.2%



			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	152.8	113.2%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	152.8	113.2%
		249692 08BEDFRD 138 249756 08HEOWEN 138 1	B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	144.6	107.1%
			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	144.6	107.1%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	144.6	107.1%
		249752 08HEBVST 138 249756 08HEOWEN 138 1	B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	148.8	110.2%
			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	148.8	110.2%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	148.8	110.2%
		249834 08ROCKVL 138 250773 08RCKVIL 69.0 1	LOE 13846 Brkr open at Wabash River	25	31.8	127.2%
	ITCT	264654 19STC4 120 265056 19TWR2497 120 1	b 19BUNCE-19STC2 120-1	293	295.1	100.7%
		264777 19MOHIC2 120 265056 19TWR2497 120 1	b 19BUNCE-19STC2 120-1	293	295.3	100.8%
	NIPS	255127 17E_WINAMAC 138 255158 17MONTICELLO 138 1	1733_C2	138	140.8	102.0%
		255160 17MARKTOWN_E 138 255258 17PRAXAIR-6 138 1	255161 17MARKTOWN_W 138 255189 17WCE 138 1	486	512.6	105.5%
			255161 17MARKTOWN_W 138 255189 17WCE 138 1	486	512.6	105.5%
			P1_2_13824	486	512.6	105.5%
			P1_2_13824	486	512.6	105.5%
MISO North	ALTW	344870 2KH2 XFMR 69.0 347195 2HAMLTNAM 69.0 1	630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.6	107.8%
			630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.6	107.8%
		630003 LANSING8 69.0 631053 LANSING5 161 1	631052 LANSINGW 161 681523 GENOA 5 161 1	69	69.2	100.4%
			B3.GNO TX	69	69.8	101.2%



			B3.GNO TX	69	69.8	101.2%
			B3.GNO TXOG	69	69.8	101.2%
			B3.GNO TXOG	69	69.8	101.2%
		630034 AGENCY 8 69.0 630615 4TH ST 8 69.0 1	ITCM_B2_BURLINGTON_1_161	69	71.6	103.8%
			ITCM_B2_BURLINGTON_1_161	69	71.6	103.8%
		630038 BRLGTN28 69.0 630616 S BURL 8 69.0 1	630001 FLNTRDG8 69.0 630034 AGENCY 8 69.0 1	87	87.9	101.0%
			630001 FLNTRDG8 69.0 630037 BRLGTN18 69.0 1	87	96.8	111.3%
			630037 BRLGTN18 69.0 631109 BRLGTN 5 161 1	87	96.8	111.3%
			ITCM_B2_BURLINGTON_1_161	87	99.8	114.7%
		630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	3Wnd: OPEN B\$0836 CS KY3A 1	72	90.2	125.3%
			630381 SLAKEN 8 69.0 652568 CRESTN 8 69.0 1	72	90.2	125.3%
			630385 SLAKES 8 69.0 652569 CRESTON8 69.0 1	72	77.6	107.8%
			630419 ECRESTN8 69.0 630446 CRESTN8_ 69.0 1	72	87.6	121.7%
			630419 ECRESTN8 69.0 652569 CRESTON8 69.0 1	72	97.8	135.8%
			ITCM-B103-SW	72	84.3	117.1%
			ITCM-B107-SW	72	75.9	105.4%
			ITCM-B107-SW	72	75.9	105.4%
			OTTUMW1G	72	73.7	102.4%
			OTTUMW1G	72	73.7	102.4%
		630385 SLAKES 8 69.0 652569 CRESTON8 69.0 1	630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	72	77.6	107.8%
			630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	72	77.6	107.8%
		630443 ARISTAP8 69.0 630446 CRESTN8_ 69.0 1	630378 LORIMRR8 69.0 630379 LORIMOR8 69.0 1	38	42.1	110.8%
			630378 LORIMRR8 69.0 630381 SLAKEN 8 69.0 1	38	43.1	113.4%
			630379 LORIMOR8 69.0 630380 MURRAY 8 69.0 1	38	41.7	109.7%
	DPC	680242 LUBLIN 69.0 680505 LAKEHEAD 69.0 1	605331 COTTONS8 69.0 680191 PINE VAL 69.0 1	25	28.6	114.4%



			605332 NEILSVL8 69.0 680191 PINE VAL 69.0 1	25	28.1	112.4%
			699666 SUNNYVAL 115 699704 SHRMN ST 115 1	25	28.2	112.8%
			ATC_B2_8E5_GD	25	28.8	115.2%
			ATC_B2_W-127	25	28.2	112.8%
			B2.HYD-TCN	25	28.7	114.8%
		680481 LUBLINTP 69.0 680505 LAKEHEAD 69.0 1	605331 COTTONS8 69.0 680191 PINE VAL 69.0 1	25	27.7	110.8%
			605332 NEILSVL8 69.0 680191 PINE VAL 69.0 1	25	27.2	108.8%
			699666 SUNNYVAL 115 699704 SHRMN ST 115 1	25	27.3	109.2%
			ATC_B2_8E5_GD	25	27.9	111.6%
			ATC_B2_W-127	25	27.3	109.2%
			B2.HYD-TCN	25	27.6	110.4%
	GRE	615347 GRE-MCHENRY4 230 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.8	107.4%
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.7	102.6%
			B3.RB4-XFMR	105	112.8	107.4%
		615348 GRE-MCHENRY7 115 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.7	107.3%
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.6	102.5%
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.6	102.5%
			B3.RB4-XFMR	105	112.7	107.3%
		617034 GRE-BRAHAM 869.0 617046 GRE-GRASTON869.0 1	615051 GRE-CAMBRDG869.0 617050 GRE-INDSTTP869.0 1	42.4	43.1	101.7%
	MEC	636301 FLOYD 8 69.0 636307 GREENTP8 69.0 1	636280 WAVRLYJ8 69.0 636283 PLNFDJT8 69.0 1	28.7	30.8	107.3%
	OTP	615347 GRE-MCHENRY4 230 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.8	107.4%
			B3.RB4-XFMR	105	112.8	107.4%
		615348 GRE-MCHENRY7 115 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.7	107.3%
			B3.RB4-XFMR	105	112.7	107.3%
	WPS	698568 DANZ AVE 69.0 699588 PULLIAM	698569 VN BUREN 69.0 699588 PULLIAM 69.0 1	58	61.2	105.5%



		69.0 1				
			ATC_B2_R-70	58	61.2	105.5%
			ATC_B2_R-70	58	61.2	105.5%
	XEL	603061 BLK DOG7 115 603116 WILSON 7 115 1	603116 WILSON 7 115 603204 WILSON TAP7 115 Z	239	241.5	101.0%
			B2.WIL-BDS-NMC	239	310.5	129.9%
		603142 BAYFRNT7 115 605019 BAYFRT88 88.0 7	605019 BAYFRT88 88.0 605445 SAXONP88 88.0 1	57.5	65.5	113.9%
			605020 NORRIE 8 88.0 605445 SAXONP88 88.0 1	57.5	57.8	100.5%
			B2.BFT-NRR	57.5	65.6	114.1%
			B2.BFT-NRR	57.5	65.6	114.1%
		605079 NEWULMS8 69.0 605282 NEWULMP8 69.0 1	605001 NEWULMC8 69.0 605079 NEWULMS8 69.0 1	62.7	62.9	100.3%
		605181 REDWING8 69.0 605374 BAY CIT8 69.0 1	605264 HASTING8 69.0 606046 WEST HASTNG869.0 1	71.7	72.6	101.3%
		605296 WSTSALE8 69.0 605316 LAX 8 69.0 1	602023 LACROSS5 161 602025 MONROCO5 161 1	71.7	84	117.2%
		605569 JAMESTP8 69.0 617247 GRE-JMSTWTP869.0 1	601004 WILMART3 345 601072 SHEAS LK3 345 1	45.4	49.1	108.1%
		618415 GRE-WINTHRP869.0 618433 GRE-BRWN TP869.0 1	3Wnd: OPEN B\$0302 115/69 1	31.5	33.7	107.0%
		618431 GRE-BELL 869.0 618432 GRE-HSSNJCT869.0 1	3Wnd: OPEN B\$0302 115/69 1	25.3	26.4	104.3%
		618433 GRE-BRWN TP869.0 618436 GRE-SUMTER 869.0 1	3Wnd: OPEN B\$0302 115/69 1	31.5	33.6	106.7%
		680242 LUBLIN 69.0 680505 LAKEHEAD 69.0 1	B2.HYD-TCN	25	28.7	114.8%
		680481 LUBLINTP 69.0 680505 LAKEHEAD 69.0 1	B2.HYD-TCN	25	27.6	110.4%
MISO South	BCA	337126 3BATESV 115 337135 3SARDIS 115 1	337162 6FRPORT 230 337180 6HN LAK 230 1	136	149.7	110.1%
			P1_2-1159	136	149.7	110.1%
	CLEC	337310 3BVRCRK 115 500070 BC PST 4 138 1	500200 COLFAX 6 230 500770 RODEMR 6 230 1	93	94.3	101.4%
			P1_2-1646	93	94.3	101.4%



		500280 ELEESV 6 230 500770 RODEMR 6 230 1	337304 6MONTGY 230 500200 COLFAX 6 230 1	416	435.4	104.7%
			500200 COLFAX 6 230 500770 RODEMR 6 230 1	416	446.4	107.3%
			P1_2-1646	416	446.4	107.3%
	EES	334026 4GRIMES 138 334060 4MT.ZION 138 1	P1_2-1860	206	222.8	108.2%
			P1_2-1860	206	222.8	108.2%
		334326 6CYPRESS 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	743.9	108.6%
			P1_2-261	685	743.9	108.6%
			P1_2-277	685	726.6	106.1%
		334327 6AMELIA 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	717.5	104.7%
			P1_2-261	685	717.5	104.7%
			P1_2-277	685	700.5	102.3%
			P1_2-277	685	700.5	102.3%
		334413 4PNEC BK 138 334414 4LINDE 138 1	P1_2-304	287	289.4	100.8%
		334413 4PNEC BK 138 334430 4SABINE 138 1	P1_2-303	287	321.7	112.1%
		334414 4LINDE 138 334430 4SABINE 138 1	P1_2-304	288	323.1	112.2%
		334434 6SABINE 230 334435 6MID CO 230 1	334436 6P AC BK 230 334437 6KOLBS 230 1	566	571.9	101.0%
			P1_2-322	566	571.9	101.0%
			P1_2-330	566	690.8	122.0%
		334434 6SABINE 230 334442 6GULFWAY 230 1	334434 6SABINE 230 334439 6VFWPK 230 1	519	653.5	125.9%
			334439 6VFWPK 230 334442 6GULFWAY 230 1	519	548.5	105.7%
			P1_2-316	519	653.5	125.9%
		334436 6P AC BK 230 334437 6KOLBS 230 1	334434 6SABINE 230 334435 6MID CO 230 1	441	568.8	129.0%
		334439 6VFWPK 230 334442 6GULFWAY 230 1	334434 6SABINE 230 334442 6GULFWAY 230 1	519	520.2	100.2%



			P1_2-319	519	520.2	100.2%
		335815 6PT.HUD 230 335825 6FANCY 230 1	335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.6	105.3%
			335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.6	105.3%
			P1_2-772	593	624.6	105.3%
			P1_2-772	593	624.6	105.3%
		335815 6PT.HUD 230 335825 6FANCY 230 2	335815 6PT.HUD 230 335825 6FANCY 230 1	593	620.5	104.6%
			P1_2-771	593	620.5	104.6%
		336138 6FAIRVW 230 336190 6GYPSY 230 1	336462 6MICHO 230 500360 FRONTST6 230 1	459	481.5	104.9%
			P1_2-981	459	481.5	104.9%
		336138 6FAIRVW 230 500510 MADISON6 230 1	336462 6MICHO 230 500360 FRONTST6 230 1	459	481.5	104.9%
			P1_2-981	459	481.5	104.9%
		336462 6MICHO 230 500360 FRONTST6 230 1	336130 8BOGALUS 500 336131 6ADMSCRK 230 1	641	659.8	102.9%
			336130 8BOGALUS 500 336562 8FRKLIN 500 1	641	661.1	103.1%
			P1_2-865	641	660.2	103.0%
	EES-EAI	337040 6ANDRUS 230 337042 3ANDRUS 115 1	337040 6ANDRUS 230 337050 6INDOLA 230 1	392	424.3	108.2%
			337040 6ANDRUS 230 337050 6INDOLA 230 1	392	424.3	108.2%
			P1_2-1114	392	424.3	108.2%
			P1_2-1114	392	424.3	108.2%
		337620 3WOODW-N 115 337962 3ALTHEI* 115 1	337633 6WOODW 230 337968 6RICUS 230 1	106	106.3	100.3%
			337967 3RICUS 115 337968 6RICUS 230 1	106	115	108.5%
			P1_2-1441	106	115	108.5%
		337651 8WH BLF 500 337957 8KEO 500 1	337643 8SHERID 500 337808 8MABEL 500 1	2165	2201.4	101.7%
			P1_2-1312	2165	2201.4	101.7%
		337685 3HSEHVW 115 337686 3ARKLA 115 1	337686 3ARKLA 115 337740 3HSEHVE 115 2	239	242.1	101.3%



			P1_2-1335	239	242.1	101.3%
		337686 3ARKLA 115 337695 3TIGRE * 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.6	108.8%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.6	108.8%
			P1_2-1311	201	218.6	108.8%
			P1_2-1311	201	218.6	108.8%
		337686 3ARKLA 115 337740 3HSEHVE 115 2	337685 3HSEHVW 115 337686 3ARKLA 115 1	266	298.9	112.4%
			P1_2-1324	266	298.9	112.4%
		337695 3TIGRE * 115 337697 3PANTH* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	217.6	108.3%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	217.6	108.3%
			P1_2-1311	201	217.6	108.3%
			P1_2-1311	201	217.6	108.3%
		337697 3PANTH* 115 337705 3CHEETA* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	217.6	108.3%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	217.6	108.3%
			P1_2-1311	201	217.6	108.3%
			P1_2-1311	201	217.6	108.3%
		337718 3CARPE 115 337746 3MALV-S 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	111	116.3	104.8%
			P1_2-1311	111	116.3	104.8%
		337740 3HSEHVE 115 337741 3BUTERF 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	239	288.5	120.7%
			P1_2-1311	239	288.5	120.7%
		337741 3BUTERF 115 337800 3HASKEL 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	239	282.1	118.0%
			P1_2-1311	239	282.1	118.0%
		337800 3HASKEL 115 337801 3BENT-S* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	217	259.5	119.6%
			P1_2-1311	217	259.5	119.6%
		337801 3BENT-S* 115 337802 3BAUXIT 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	159	182.1	114.5%



			P1_2-1311	159	182.1	114.5%
		337949 3LYNCH-W 115 338755 3REMING#* 115 1	337957 8KEO 500 338162 8WWM-EHV 500 1	106	108.8	102.6%
			P1_2-1440	106	108.8	102.6%
		337962 3ALTHEI* 115 338738 3WABASEKA.W# 115 1	337967 3RICUS 115 337968 6RICUS 230 1	106	111.8	105.5%
			P1_2-1441	106	111.8	105.5%
		337964 3WABSKA 115 338738 3WABASEKA.W# 115 1	337967 3RICUS 115 337968 6RICUS 230 1	106	111.8	105.5%
			P1_2-1441	106	111.8	105.5%
		338130 5CALCR 161 505448 NORFORK5 161 1	338145 8ISES 500 338187 8DELL 500 1	148	156.4	105.7%
			338145 8ISES 500 338187 8DELL 500 1	148	156.4	105.7%
			P1_2-1492	148	156.4	105.7%
			P1_2-1492	148	156.4	105.7%
		338151 5NEWPO 161 338173 5NEW-IN 161 1	338145 8ISES 500 338187 8DELL 500 1	335	360.4	107.6%
			P1_2-1492	335	360.4	107.6%
		338161 5WWM-EHV 161 338162 8WWM-EHV 500 1	338162 8WWM-EHV 500 360075 8BHAM STEEL 500 1	450	528.7	117.5%
			P1_2-1504	450	528.4	117.4%
			TVA-L 360075-338162 #1	450	528.7	117.5%
		338172 5NEW-AB 161 338173 5NEW-IN 161 1	338145 8ISES 500 338187 8DELL 500 1	335	350.1	104.5%
			338145 8ISES 500 338187 8DELL 500 1	335	350.1	104.5%
			P1_2-1492	335	350.1	104.5%
			P1_2-1492	335	350.1	104.5%
		338213 5WALNUT 161 338705 5HOXIES# 161 1	338145 8ISES 500 338187 8DELL 500 1	167	177.2	106.1%
			338145 8ISES 500 338187 8DELL 500 1	167	177.2	106.1%
			P1_2-1492	167	177.2	106.1%
			P1_2-1492	167	177.2	106.1%



		338813 5MIDWAY# 161 505460 BULL SH5 161 1	338138 5MORFLD 161 338142 5ISES-1 161 1	162	165.8	102.3%
	EES-EMI	318090 2PRENTISS 69.0 318441 5PRENTISS 161 1	318267 5SW LONESTAR 161 318441 5PRENTISS 161 1	50	55.5	111.0%
		336800 3B.WLSN 115 336960 3SE-VKS 115 1	P1_2-1031	161	163.7	101.7%
		337040 6ANDRUS 230 337042 3ANDRUS 115 1	337040 6ANDRUS 230 337050 6INDOLA 230 1	392	424.3	108.2%
			337040 6ANDRUS 230 337050 6INDOLA 230 1	392	424.3	108.2%
			P1_2-1114	392	424.3	108.2%
			P1_2-1114	392	424.3	108.2%
		337126 3BATESV 115 337135 3SARDIS 115 1	337162 6FRPORT 230 337180 6HN LAK 230 1	136	149.7	110.1%
			P1_2-1159	136	149.7	110.1%
	Lafa	303133 4VATCAN 138 335379 4SCOTT1 138 1	500230 COUGH 4 138 500720 PLAISAN4 138 1	225	275.4	122.4%
			P1_2-1654	225	275.4	122.4%
	LAGN	334326 6CYPRESS 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	743.9	108.6%
			P1_2-261	685	743.9	108.6%
			P1_2-277	685	726.6	106.1%
		334327 6AMELIA 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	717.5	104.7%
			P1_2-261	685	717.5	104.7%
			P1_2-277	685	700.5	102.3%
			P1_2-277	685	700.5	102.3%
		335815 6PT.HUD 230 335825 6FANCY 230 1	335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.6	105.3%
			335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.6	105.3%
			P1_2-772	593	624.6	105.3%
			P1_2-772	593	624.6	105.3%
		335815 6PT.HUD 230 335825 6FANCY 230 2	335815 6PT.HUD 230 335825 6FANCY 230 1	593	620.5	104.6%



			P1_2-771	593	620.5	104.6%
	LEPA	336138 6FAIRVW 230 336190 6GYPSY 230 1	336462 6MICHO 230 500360 FRONTST6 230 1	459	481.5	104.9%
			P1_2-981	459	481.5	104.9%
		336138 6FAIRVW 230 500510 MADISON6 230 1	336462 6MICHO 230 500360 FRONTST6 230 1	459	481.5	104.9%
			P1_2-981	459	481.5	104.9%
		336462 6MICHO 230 500360 FRONTST6 230 1	336130 8BOGALUS 500 336131 6ADMSCRK 230 1	641	659.8	102.9%
			336130 8BOGALUS 500 336562 8FRKLIN 500 1	641	661.1	103.1%
			P1_2-865	641	660.2	103.0%
	PUPP	337651 8WH BLF 500 337957 8KEO 500 1	337643 8SHERID 500 337808 8MABEL 500 1	2165	2201.4	101.7%
			P1_2-1312	2165	2201.4	101.7%



Appendix B MISO Fact-Finding #1 Step 2 Results

Table B-3 Per Generator Restrictions of Fact-Finding #1 Step 2

Region	Generator Name	Total Restrictions (MW)
PJM	02RICHG1	0.1
	02RICHG4	1.4
	02RICHG5	1.4
	02RICHG6	1.4
	UNIV PK N;1	25.6
	UNIV PK N;2	25.6
	UNIV PK N;3	25.6
	UNIV PK N;4	25.6
	UNIV PK N;5	25.6
	UNIV PK N;6	25.6
	UNIV PK N;7	25.6
	UNIV PK N;8	25.6
	UNIV PK N;9	25.6
	UNIV PK N;0	25.6
	UNIV PK N;X	25.6
	UNIV PK N;Y	25.6
	U4-033	22.0
	GSG-6 ;R	21.9
	ECOGROVE ;U	17.1
Total		372.9



Table B-4 Constraint List of Fact-Finding #1 Step 2

Region	Area Name	Branch	Contingency	Max of MVA Rating	Max of AC Postshift MVA	Max of AC Loading %
PJM	CE	270729 E FRANKFO; R 345 B\$0935 E FRA 83 1.00 1	270729 E FRANKFO; R 345 270767 GOODINGS ;1R 345 1	480	553.6	115.3%
		271385 E FRANKFO; R 138 B\$0935 E FRA 83 1.00 1	270729 E FRANKFO; R 345 270767 GOODINGS ;1R 345 1	480	545.5	113.6%
		271638 HARLEM ; B 138 272378 ROSCOE BE;BT 138 1	156-L15624__	175	176.0	100.6%
			271192 CHERRY VA; B 138 271202 ESS B465 ;BT 138 1	175	176.0	100.6%
		272363 ESS H440 ; R 138 272365 ESS H440 ;RT 138 1	186-L16914__	109	122.0	111.9%
			272365 ESS H440 ;RT 138 272516 STEWARD ; B 138 1	109	122.0	111.9%
	FE	238521 02NAOMI 138 239070 02RICHLD 138 1	C1-BUS-WR002B	191	195.8	102.5%



Appendix C MISO Fact-Finding #1 Step 3 Results

Table C-5 Per Generator Restrictions of Fact-Finding #1 Step 3

Region	Generator Name	Total
MISO Central	08CONRSV	61.6
	1KEOK 7	2.1
	1KEOK 10	1.8
	1KEOK 12	3.2
	1KEOK 1-4	3.6
	1KEOK 5-6	1.4
	1MRNGEN4	180
	1MRNGEN5	88
	1MRNGEN6	88
	1STTLR G1	7.1
	1STTLR G2	7.1
	1NEWTON 1	6.9
	1NEWTON 2	6.9
	1RCEC G1	0.8
	1RCEC G2	0.8
	1RCEC G3	0.8
	1RCEC G4	0.8
	08WABR6	247.3
	2AVENA	0.4
	1KNMDY G1	0.9



	1KNMDY G2	0.9
	1CONSTU1	1.4
	1CONSTU2	1.4
	1CONSTU3	2.7
	1COFFEN 1	3.1
	1COFFEN 2	5.3
MISO Central Total		724.3
MISO East	07MEROM5	742.7
	07WORTH1	18.4
	07WORTH2	18.4
	17HOOSIER_W	9.4
	17ORION_BCW	12.3
	17WCE-GT1	8
	17WCE-GT2	8
	17WCE-ST	10.9
	19CARBN	0.2
	19DEAN12	1.9
	19DEAN34	1.9
	19REMER1	0.2
	19SC1	2
	19SC2	2
19SC3	2.1	
19SC4	2	
MISO East Total		840.4
MISO North	BFT 85G	2.5



BFT 86G	3.3
BFTG4DSG	2.3
BLK D72G	2.2
BLK D75G	3.1
BLL 71G	0.8
BLL 72G	0.8
BLL 73G	0.7
BLL 74G	0.8
BLL C75G	2.9
BLL C76G	2.9
BRLGTN28	20.5
BURLIN1G	59.8
CCITY S8	14.2
CCITYSG1	6.5
COLVILL G	8.5
COLVILL1 G	8.5
FEN 84G	61
FLAMBEAU	23.9
FRENCH G	18
G587	4
GRE-CAMBRDG	2.8
GRE-CGS 82	15.9
GRE-COAL 41	59.9
GRE-COAL 42	59.4
HRDLKGEN	3.8
KEYCT34G	26
LANS5 3G	5.6



	LANS5 4G	35.5
	NEWULMS8	16.2
	PUL G31	3.7
	PUL G5	2.4
	PUL G6	3.1
	PUL G7	3.8
	PUL G8	6.2
	REDWING8	1
	ROQ GT 9	3.7
	SLAKES 8	79
	GENOA53G	29.4
	N CENT8	0.3
	OTTUMW1G	100.7
	WES G3	3.5
	WES G1	0.6
	WES G2	0.9
	WES G32	0.5
	WES G31	0.2
	GRFTHR F G1	0.1
	WES G4	6
	PETENWEL HG	0.1
	JUNEAU J31	0
	CAR G1	0.1
	SHERC33G	2.9
MISO North Total		720.5
MISO South	1ALLI-T1	0.6



1ANDRUS U1	112.3
1BAILEY U1	17.8
1BC1 U1	10.8
1BC1 U2	10.8
1BC1 U3	12.2
1BC1 U4	12.2
1BC2 U1	57
1BC2 U2	56.5
1BC2 U3	56.5
1BLAK U1	11.6
1BLAK U2	11.6
1BLUF U1	219
1BLUF U2	226.7
1BURASGEN	0.5
1C1KNWRI	25.5
1C1TRCBL	59
1C2TRCBL	59
1C3KNWRI	25.5
1C5KNWRI	25.5
1C7KNWRI	19.6
1CARP U1	7.9
1CARP U2	7.9
1CATH U1	13.8
1CATH U2	13.5
1CATH U3	26.5
1CATH U4	144.8
1CLSBAU3	88.7



	1CYPR U1	26.6
	1CYPR U2	26.6
	1CYPR U3!	22.9
	1CYPR U4!	22.9
	1DEGR U1	10.1
	1DEGR U2	7
	1DUKHSG1	43.7
	1DUKHSG2	43.7
	1DUKHSS1	85.2
	1G1INTHB	55
	1G1PANDA	2
	1G1RVRBN	103.3
	1G2INTHB	55
	1G2PANDA	2
	1G3INTHB	55
	1G3PANDA	1
	1G4INTHB	55
	1G4PANDA	1
	1G4SABIN	529
	1G5PANDA	1
	1G5SABIN	470
	1G6PANDA	1
	1G7PANDA	1.5
	1G8PANDA	1.5
	1GOXY U1	5.9
	1GOXY U2	5.9
	1GOXY U3	5.9



	1GYP U1	9.5
	1GYP U2	15.7
	1GYP U3	20.6
	1ISES U1	122.3
	1ISES U2	123.2
	1ISLVCRK1	12.4
	1ISLVCRK2	12.4
	1ISLVCRK3	12.4
	1L&D2U1	5
	1L&D2U2	5
	1L&D2U3	5
	1LSPWRU1	43.1
	1LYNC U2	17
	1LYNC U3	27.6
	1MABL UB	4.8
	1MCLE U1	1.6
	1MICH U2	9.1
	1MICH U3	20.4
	1NMIL CT1	6.8
	1NMIL CT2	6.8
	1NMIL ST1	8
	1NMIL U3	4.8
	1NMIL U4	27.6
	1NMIL U5	28.4
	1NUCORG1	4.7
	1NUCORG2	4.7
	1REML UA	2.4



1S1INTHB	46.5
1S1KNWRI	25.5
1S1PANDA	3
1S1TRCBL	62.2
1S2KNWRI	25.5
1S2PANDA	1.5
1S3INTHB	46.5
1S3PANDA	1
1S4INTHB	46.5
1S4PANDA	1
1SKY U1	18.8
1SLSBAU3	48.1
1SOXY U1	11.2
1SUNERGY	3.3
1TOTAL	28.6
1UCARBGT1	3.6
1UCARBGT2	3.6
1UCARBST1	0.6
1UCARBST2	1.5
1WAT U1	14.4
1WAT U2	14.4
1WAT U3	42.6
1WAT U4	1.4
6KAISER	0.5
6VFWPK	54.4
BONIN1	40
BONIN2	75



	BONIN3	150
	G1NESBIT	27.2
	G2RODEM	33.2
	G3MADISN	40.2
	G6-1COUGH	9
	G6COUGH	5.8
	G7-1COUGH	9
	G7-2COUGH	9
	G7COUGH	12.4
	HUNTER4	7.7
	1MABL UA	4.8
	1MABL UC	4.8
	1MABL UD	4.8
	1ANO U1	251.7
	1ANO U2	288.3
	1CSHELLG1	1.7
	3CLARKMUN	2.9
	1IMEPCLG1	13.6
	1IMEPCLG2	13.6
	1IMEPCLG3	13.6
	1IMEPCLG4	13.6
MISO South Total		5072.4
Total MISO Restriction		7357.6
PJM	02RICHG1	0.3
	02RICHG4	2.9



	02RICHG5	2.9
	02RICHG6	2.9
Total PJM Restriction		9
Total MISO + PJM Restriction		7366.6

Table C-6 Constraint List of Fact-Finding #1 Step 3

Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
MISO Central	AMIL	255127 17E_WINAMAC 138 255158 17MONTICELLO 138 1	1733_C2	138	140.8	102.0%
		347831 4NEWTON 138 348126 4ROBNSNAM 138 1	346809 7CASEY 345 347830 7NEWTON 345 1	269	270.8	100.7%
			CSYW-NWTY-1	269	270.8	100.7%
		347946 4PANA 138 348068 4RAMSEY CIPS 138 1	021-45-BT2-6__	264	264.2	100.1%
			021-45-BT6-8__	264	265.2	100.5%
			SPS-2105&U1__	264	264.2	100.1%
		AMMO	344870 2KH2 XFMR 69.0 347195 2HAMLTNAM 69.0 1	630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.2
			630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.2	107.2%
	347831 4NEWTON 138 348126 4ROBNSNAM 138 1		346809 7CASEY 345 347830 7NEWTON 345 1	269	270.8	100.7%
			CSYW-NWTY-1	269	270.8	100.7%
	347946 4PANA 138 348068 4RAMSEY CIPS 138 1		021-45-BT2-6__	264	264.2	100.1%
			021-45-BT6-8__	264	265.2	100.5%
			SPS-2105&U1__	264	264.2	100.1%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
	DEI	249834 08ROCKVL 138 250773 08RCKVIL 69.0 1	LOE 13846 Brkr open at Wabash River	25	31.8	127.2%
		250312 08BROOKJ 69.0 250792 08ROSEBG 69.0 1	248732 07HUBBEL 69.0 248831 07HUBBL8 138 1	39.1	39.9	102.0%
			248732 07HUBBEL 69.0 248831 07HUBBL8 138 1	39.1	39.9	102.0%
		250365 08CN30TH 69.0 250383 08CONERV 69.0 1	250383 08CONERV 69.0 250384 08CON12J 69.0 1	45	52.7	117.1%
	SIPC	B\$1483 MARION1 1.00 350223 2MARIONPLANT69.0 1	3Wnd: OPEN B\$1484 MARION2 2	61.6	84.4	137.0%
		B\$1483 MARION1 1.00 350224 5MARIONPLANT 161 1	3Wnd: OPEN B\$1484 MARION2 2	61.6	85.9	139.4%
		B\$1484 MARION2 1.00 350223 2MARIONPLANT69.0 2	3Wnd: OPEN B\$1483 MARION1 1	100.8	106.5	105.7%
			3Wnd: OPEN B\$1483 MARION1 1	100.8	106.5	105.7%
		B\$1484 MARION2 1.00 350224 5MARIONPLANT 161 2	3Wnd: OPEN B\$1483 MARION1 1	100.8	110	109.1%
MISO East	HE	248547 07WORTH8 138 249752 08HEBVST 138 1	135_B2_WOMOAB	135	137	101.5%
			6136_B2	135	153.1	113.4%
			B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	153.1	113.4%
			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	153.1	113.4%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	153.1	113.4%
		249692 08BEDFRD 138 249756 08HEOWEN 138 1	6136_B2	135	144.9	107.3%
			B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	144.9	107.3%
			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	144.9	107.3%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	144.9	107.3%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
		249752 08HEBVST 138 249756 08HEOWEN 138 1	6136_B2	135	149.1	110.4%
			B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	135	149.1	110.4%
			HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	135	149.1	110.4%
			HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	135	149.1	110.4%
		249834 08ROCKVL 138 250773 08RCKVIL 69.0 1	LOE 13846 Brkr open at Wabash River	25	31.8	127.2%
	ITCT	264654 19STC4 120 265056 19TWR2497 120 1	b 19BUNCE-19STC2 120-1	293	295.1	100.7%
		264777 19MOHIC2 120 265056 19TWR2497 120 1	b 19BUNCE-19STC2 120-1	293	295.3	100.8%
	NIPS	255127 17E_WINAMAC 138 255158 17MONTICELLO 138 1	1733_C2	138	140.8	102.0%
		255160 17MARKTOWN_E 138 255258 17PRAXAIR-6 138 1	255161 17MARKTOWN_W 138 255189 17WCE 138 1	486	512.9	105.5%
			255161 17MARKTOWN_W 138 255189 17WCE 138 1	486	512.9	105.5%
			P1_2_13824	486	512.9	105.5%
			P1_2_13824	486	512.9	105.5%
MISO North	ALTE	698840 ACEC BADGERW 138 699808 PETENWEL 138 1	601028 EAU CL 3 345 694003 ARPIN B4 345 1	82	82.2	100.2%
	ALTW	344870 2KH2 XFMR 69.0 347195 2HAMLTNAM 69.0 1	630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.2	107.2%
			630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	72	77.2	107.2%
		630003 LANSING8 69.0 631053 LANSING5 161 1	631052 LANSINGW 161 681523 GENOA 5 161 1	69	74.7	108.3%
			631052 LANSINGW 161 681523 GENOA 5 161 1	69	74.7	108.3%
			631053 LANSING5 161 681530 POSTVIL5 161 1	69	74	107.2%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			631053 LANSING5 161 681530 POSTVIL5 161 1	69	74	107.2%
		630038 BRLGTN28 69.0 630616 S BURL 8 69.0 1	630001 FLNTRDG8 69.0 630034 AGENCY 8 69.0 1	87	88.3	101.5%
			630001 FLNTRDG8 69.0 630034 AGENCY 8 69.0 1	87	88.3	101.5%
			630001 FLNTRDG8 69.0 630037 BRLGTN18 69.0 1	87	97.1	111.6%
			630037 BRLGTN18 69.0 631109 BRLGTN 5 161 1	87	97.1	111.6%
		630042 CNTRVL_8 69.0 630373 N CENT8 69.0 1	631134 TRICNTY5 161 635870 BEACON 5 161 1	48	48.3	100.6%
		630048 WAPELLO8 69.0 631110 WAPELLO5 161 1	630048 WAPELLO8 69.0 631110 WAPELLO5 161 2	131	135.7	103.6%
		630048 WAPELLO8 69.0 631110 WAPELLO5 161 2	630048 WAPELLO8 69.0 631110 WAPELLO5 161 1	131	135.7	103.6%
		630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	3Wnd: OPEN B\$0836 CS KY3A 1	72	90.5	125.7%
			630381 SLAKEN 8 69.0 652568 CRESTN 8 69.0 1	72	90.5	125.7%
			630385 SLAKES 8 69.0 652569 CRESTON8 69.0 1	72	77.6	107.8%
			630419 ECRESTN8 69.0 630446 CRESTN8_ 69.0 1	72	87.8	121.9%
			630419 ECRESTN8 69.0 652569 CRESTON8 69.0 1	72	98	136.1%
			630441 LENXTAP8 69.0 630443 ARISTAP8 69.0 1	72	74.9	104.0%
			630443 ARISTAP8 69.0 630446 CRESTN8_ 69.0 1	72	75.5	104.9%
			Unit:629075 OTTUMW1G 24.0 Id:1	72	73.8	102.5%
		630385 SLAKES 8 69.0 652569 CRESTON8 69.0 1	630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	72	77.5	107.6%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	72	77.5	107.6%
		630443 ARISTAP8 69.0 630446 CRESTN8_69.0 1	630378 LORIMRR8 69.0 630379 LORIMOR8 69.0 1	38	42.3	111.3%
			630378 LORIMRR8 69.0 630381 SLAKEN 8 69.0 1	38	43.3	113.9%
			630379 LORIMOR8 69.0 630380 MURRAY 8 69.0 1	38	41.9	110.3%
	DPC	630003 LANSING8 69.0 631053 LANSING5 161 1	631053 LANSING5 161 681530 POSTVIL5 161 1	69	74	107.2%
			631053 LANSING5 161 681530 POSTVIL5 161 1	69	74	107.2%
		680242 LUBLIN 69.0 680505 LAKEHEAD 69.0 1	605331 COTTONS8 69.0 680191 PINE VAL 69.0 1	25	28.8	115.2%
			605332 NEILSVL8 69.0 680191 PINE VAL 69.0 1	25	28.3	113.2%
			699666 SUNNYVAL 115 699704 SHRMMN ST 115 1	25	28.3	113.2%
		680481 LUBLINTP 69.0 680505 LAKEHEAD 69.0 1	605331 COTTONS8 69.0 680191 PINE VAL 69.0 1	25	27.9	111.6%
			605332 NEILSVL8 69.0 680191 PINE VAL 69.0 1	25	27.4	109.6%
			699666 SUNNYVAL 115 699704 SHRMMN ST 115 1	25	27.4	109.6%
		698840 ACEC BADGERW 138 699808 PETENWEL 138 1	601028 EAU CL 3 345 694003 ARPIN B4 345 1	82	82.2	100.2%
	GRE	615347 GRE-MCHENRY4 230 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.7	107.3%
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.6	102.5%
		615348 GRE-MCHENRY7 115 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.6	107.2%
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.6	102.5%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			659106 LELANDO4 230 659108 LOGAN 4 230 1	105	107.6	102.5%
		615461 GRE-RUSH CY869.0 617048 GRE-RUSH TP869.0 1	615051 GRE-CAMBRDG869.0 617050 GRE-INDSTTP869.0 1	64.5	65.1	100.9%
			615051 GRE-CAMBRDG869.0 617050 GRE-INDSTTP869.0 1	64.5	65.1	100.9%
		617034 GRE-BRAHAM 869.0 617046 GRE-GRASTON869.0 1	615051 GRE-CAMBRDG869.0 617050 GRE-INDSTTP869.0 1	42.4	47.9	113.0%
	MEC	636301 FLOYD 8 69.0 636307 GREENTP8 69.0 1	636280 WAVRLYJ8 69.0 636283 PLNFDJT8 69.0 1	28.7	30.9	107.7%
	OTP	615347 GRE-MCHENRY4 230 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.7	107.3%
		615348 GRE-MCHENRY7 115 B\$0342 230/115 1.00 1	3Wnd: OPEN B\$0343 230/115 1	105	112.6	107.2%
	WPS	698568 DANZ AVE 69.0 699588 PULLIAM 69.0 1	698569 VN BUREN 69.0 699588 PULLIAM 69.0 1	58	61.1	105.3%
			698569 VN BUREN 69.0 699588 PULLIAM 69.0 1	58	61.1	105.3%
		698840 ACEC BADGERW 138 699808 PETENWEL 138 1	601028 EAU CL 3 345 694003 ARPIN B4 345 1	82	82.2	100.2%
		699786 ROCKY RN 115 699788 NORTHPT 115 1	694065 ROCKY RN BV 345 699676 GARDR PK 345 1	59	60.5	102.5%
			694065 ROCKY RN BV 345 699676 GARDR PK 345 1	59	60.5	102.5%
	XEL	603061 BLK DOG7 115 603116 WILSON 7 115 1	603116 WILSON 7 115 603204 WILSON TAP7 115 Z	239	241.8	101.2%
			603116 WILSON 7 115 603204 WILSON TAP7 115 Z	239	241.8	101.2%
		603142 BAYFRNT7 115 605019 BAYFRT88 88.0 7	605019 BAYFRT88 88.0 605445 SAXONP88 88.0 1	57.5	65.5	113.9%
			605019 BAYFRT88 88.0 605445 SAXONP88 88.0 1	57.5	65.5	113.9%
			605020 NORRIE 8 88.0 605445 SAXONP88 88.0 1	57.5	57.7	100.3%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			605020 NORRIE 8 88.0 605445 SAXONP88 88.0 1	57.5	57.7	100.3%
		605079 NEWULMS8 69.0 605282 NEWULMP8 69.0 1	605001 NEWULMC8 69.0 605079 NEWULMS8 69.0 1	62.7	62.8	100.2%
			605001 NEWULMC8 69.0 605079 NEWULMS8 69.0 1	62.7	62.8	100.2%
		605084 WINTHRP8 69.0 618415 GRE- WINTHRP869.0 1	3Wnd: OPEN B\$0302 115/69 1	35.9	36	100.3%
		605181 REDWING8 69.0 605374 BAY CIT8 69.0 1	605264 HASTING8 69.0 606046 WEST HASTNG869.0 1	71.7	72.8	101.5%
		605296 WSTSALE8 69.0 605316 LAX 8 69.0 1	602023 LACROSS5 161 602025 MONROCOS 161 1	71.7	84.4	117.7%
		605569 JAMESTP8 69.0 617247 GRE- JMSTWTP869.0 1	601004 WILMART3 345 601072 SHEAS LK3 345 1	45.4	49.3	108.6%
		618415 GRE-WINTHRP869.0 618433 GRE- BRWN TP869.0 1	3Wnd: OPEN B\$0302 115/69 1	31.5	33.7	107.0%
		618431 GRE-BELL 869.0 618432 GRE- HSSNJCT869.0 1	3Wnd: OPEN B\$0302 115/69 1	25.3	26.4	104.3%
		618433 GRE-BRWN TP869.0 618436 GRE- SUMTER 869.0 1	3Wnd: OPEN B\$0302 115/69 1	31.5	33.7	107.0%
		698840 ACEC BADGERW 138 699808 PETENWEL 138 1	601028 EAU CL 3 345 694003 ARPIN B4 345 1	82	82.2	100.2%
MISO South	BCA	337126 3BATESV 115 337135 3SARDIS 115 1	337162 6FRPORT 230 337180 6HN LAK 230 1	136	149.3	109.8%
	CLEC	337310 3BVRCKR 115 500070 BC PST 4 138 1	500200 COLFAX 6 230 500770 RODEMR 6 230 1	93	94.7	101.8%
		500280 ELEESV 6 230 500770 RODEMR 6 230 1	337304 6MONTGY 230 500200 COLFAX 6 230 1	416	436.2	104.9%
			500200 COLFAX 6 230 500770 RODEMR 6 230 1	416	447.2	107.5%
	EES	334326 6CYPRESS 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	739.9	108.0%
		334327 6AMELIA 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	713.6	104.2%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
		334434 6SABINE 230 334435 6MID CO 230 1	334436 6P AC BK 230 334437 6KOLBS 230 1	566	571.7	101.0%
		334434 6SABINE 230 334442 6GULFWAY 230 1	334434 6SABINE 230 334439 6VFWPK 230 1	519	653.3	125.9%
			334439 6VFWPK 230 334442 6GULFWAY 230 1	519	548.4	105.7%
		334436 6P AC BK 230 334437 6KOLBS 230 1	334434 6SABINE 230 334435 6MID CO 230 1	441	568.6	128.9%
		334439 6VFWPK 230 334442 6GULFWAY 230 1	334434 6SABINE 230 334442 6GULFWAY 230 1	519	520	100.2%
		335815 6PT.HUD 230 335825 6FANCY 230 1	335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.1	105.2%
			335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.1	105.2%
		335815 6PT.HUD 230 335825 6FANCY 230 2	335815 6PT.HUD 230 335825 6FANCY 230 1	593	620	104.6%
			335815 6PT.HUD 230 335825 6FANCY 230 1	593	620	104.6%
		336138 6FAIRVW 230 336190 6GYPSY 230 1	336137 6SLIDEL 230 500360 FRONTST6 230 1	459	479.7	104.5%
			336462 6MICH0 230 500360 FRONTST6 230 1	459	498.1	108.5%
			336462 6MICH0 230 500360 FRONTST6 230 1	459	498.1	108.5%
		336138 6FAIRVW 230 500510 MADISON6 230 1	336137 6SLIDEL 230 500360 FRONTST6 230 1	459	479.7	104.5%
			336462 6MICH0 230 500360 FRONTST6 230 1	459	498.1	108.5%
			336462 6MICH0 230 500360 FRONTST6 230 1	459	498.1	108.5%
		336462 6MICH0 230 500360 FRONTST6 230 1	336130 8BOGALUS 500 336131 6ADMSCRK 230 1	641	683.2	106.6%
			336130 8BOGALUS 500 336131 6ADMSCRK 230 1	641	683.2	106.6%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			336130 8BOGALUS 500 336562 8FRKLIN 500 1	641	683.7	106.7%
			336130 8BOGALUS 500 336562 8FRKLIN 500 1	641	683.7	106.7%
			500510 MADISON6 230 500520 MANDEV 6 230 1	641	662	103.3%
	EES-EAI	337040 6ANDRUS 230 337042 3ANDRUS 115 1	337040 6ANDRUS 230 337050 6INDOLA 230 1	392	432.5	110.3%
			337040 6ANDRUS 230 337050 6INDOLA 230 1	392	432.5	110.3%
		337620 3WOODW-N 115 337962 3ALTHEI* 115 1	337967 3RICUS 115 337968 6RICUS 230 1	106	115.4	108.9%
		337651 8WH BLF 500 337957 8KEO 500 1	337643 8SHERID 500 337808 8MABEL 500 1	2165	2196.1	101.4%
		337685 3HSEHVW 115 337686 3ARKLA 115 1	337686 3ARKLA 115 337740 3HSEHVE 115 2	239	242.2	101.3%
		337686 3ARKLA 115 337695 3TIGRE * 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	219.4	109.2%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	219.4	109.2%
		337686 3ARKLA 115 337740 3HSEHVE 115 2	337685 3HSEHVW 115 337686 3ARKLA 115 1	266	299	112.4%
			337685 3HSEHVW 115 337686 3ARKLA 115 1	266	299	112.4%
			337686 3ARKLA 115 337740 3HSEHVE 115 1	266	294.8	110.8%
			337686 3ARKLA 115 337740 3HSEHVE 115 1	266	294.8	110.8%
		337695 3TIGRE * 115 337697 3PANTH* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.5	108.7%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.5	108.7%
		337697 3PANTH* 115 337705 3CHEETA* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.5	108.7%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
			337643 8SHERID 500 337763 8MAGCOVE 500 1	201	218.5	108.7%
		337718 3CARPE 115 337746 3MALV-S 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	111	118.7	106.9%
		337740 3HSEHVE 115 337741 3BUTERF 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	239	290.1	121.4%
		337741 3BUTERF 115 337800 3HASKEL 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	239	283.6	118.7%
		337800 3HASKEL 115 337801 3BENT-S* 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	217	261	120.3%
		337801 3BENT-S* 115 337802 3BAUXIT 115 1	337643 8SHERID 500 337763 8MAGCOVE 500 1	159	183.4	115.3%
			337643 8SHERID 500 337763 8MAGCOVE 500 1	159	183.4	115.3%
		337949 3LYNCH-W 115 338755 3REMING#* 115 1	337957 8KEO 500 338162 8WM-EHV 500 1	106	108.7	102.5%
		337962 3ALTHEI* 115 338738 3WABASEKA.W# 115 1	337967 3RICUS 115 337968 6RICUS 230 1	106	112.2	105.8%
		337964 3WABSKA 115 338738 3WABASEKA.W# 115 1	337967 3RICUS 115 337968 6RICUS 230 1	106	112.2	105.8%
		338130 5CALCR 161 505448 NORFORK5 161 1	338145 8ISES 500 338187 8DELL 500 1	148	157.8	106.6%
		338151 5NEWPO 161 338173 5NEW-IN 161 1	338145 8ISES 500 338187 8DELL 500 1	335	361.1	107.8%
		338161 5WM-EHV 161 338162 8WM-EHV 500 1	338162 8WM-EHV 500 360075 8BHAM STEEL 500 1	450	549	122.0%
			360023 8FREEPORT TN 500 360075 8BHAM STEEL 500 1	450	541.8	120.4%
			TVA-L 360023-360075 #1	450	548.7	121.9%
			TVA-L 360075-338162 #1	450	549	122.0%
		338172 5NEW-AB 161 338173 5NEW-IN 161 1	338145 8ISES 500 338187 8DELL 500 1	335	350.9	104.7%
			338145 8ISES 500 338187 8DELL 500 1	335	350.9	104.7%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
		338213 5WALNUT 161 338705 5HOXIES# 161 1	338145 8ISES 500 338187 8DELL 500 1	167	178.1	106.6%
			338145 8ISES 500 338187 8DELL 500 1	167	178.1	106.6%
	EES-EMI	318090 2PRENTISS 69.0 318441 5PRENTISS 161 1	318267 5SW LONESTAR 161 318441 5PRENTISS 161 1	50	55.5	111.0%
		337040 6ANDRUS 230 337042 3ANDRUS 115 1	337040 6ANDRUS 230 337050 6INDOLA 230 1	392	432.5	110.3%
			337040 6ANDRUS 230 337050 6INDOLA 230 1	392	432.5	110.3%
		337098 3CLARKMUN 115 337099 3CLARKD 115 1	337100 6MEPSCLK 230 337107 6MOONLAK 230 1	278	300.4	108.1%
			337100 6MEPSCLK 230 337107 6MOONLAK 230 1	278	300.4	108.1%
		337098 3CLARKMUN 115 337100 6MEPSCLK 230 1	337100 6MEPSCLK 230 337107 6MOONLAK 230 1	250	304.5	121.8%
			337100 6MEPSCLK 230 337107 6MOONLAK 230 1	250	304.5	121.8%
		337100 6MEPSCLK 230 337107 6MOONLAK 230 1	337098 3CLARKMUN 115 337099 3CLARKD 115 1	278	295.8	106.4%
			337098 3CLARKMUN 115 337099 3CLARKD 115 1	278	295.8	106.4%
			337098 3CLARKMUN 115 337100 6MEPSCLK 230 1	278	297.9	107.2%
			337098 3CLARKMUN 115 337100 6MEPSCLK 230 1	278	297.9	107.2%
		337126 3BATESV 115 337135 3SARDIS 115 1	337162 6FRPORT 230 337180 6HN LAK 230 1	136	149.3	109.8%
	Lafa	303133 4VATCAN 138 335379 4SCOTT1 138 1	500230 COUGH 4 138 500720 PLAISAN4 138 1	225	275.7	122.5%
		502405 BONIN 2 69.0 502408 STGEORG2 69.0 1	502405 BONIN 2 69.0 502419 LUKE2 69.0 1	120	125.7	104.8%
	LAGN	334326 6CYPRESS 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	739.9	108.0%



Region	Area Name	Branch	Contingency	MVA Rating	AC Postshift MVA	AC Loading %
		334327 6AMELIA 230 334328 6BEVIL 230 1	334325 8HARTBRG 500 334363 6HARTBRG 230 1	685	713.6	104.2%
		335815 6PT.HUD 230 335825 6FANCY 230 1	335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.1	105.2%
			335815 6PT.HUD 230 335825 6FANCY 230 2	593	624.1	105.2%
		335815 6PT.HUD 230 335825 6FANCY 230 2	335815 6PT.HUD 230 335825 6FANCY 230 1	593	620	104.6%
			335815 6PT.HUD 230 335825 6FANCY 230 1	593	620	104.6%
	PUPP	337651 8WH BLF 500 337957 8KEO 500 1	337643 8SHERID 500 337808 8MABEL 500 1	2165	2196.1	101.4%
PJM	FE	238521 02NAOMI 138 239070 02RICHLD 138 1	C1-BUS-WR002B	191	195.8	102.5%



Appendix D MISO FACT – FINDING #2

Table D-7 MISO Fact-Finding #2 Constraint Details

From	To	Limit	TDF	Limiting Constraint	Contingency
All PJM	MISO North & Central	9,170	3%	270796 KINCAID ; B 345 347962 7PAWNEE 345 1	C:PWRT-TAZW-CE Open 270855 POWERTON ; R 345 349662 7TAZEWELL 345 1
All PJM	MISO LRZs 2 - 7 (PJM ties)	12,552	4%	242933 05RPMONE 345 243231 05ROB PK 345 1	242928 05MARYSV 765 246999 05SORENS 765 1
All PJM	All MISO	10,259	3%	270796 KINCAID ; B 345 347962 7PAWNEE 345 1	C:COFF-ROXF-51 Open 346895 7COFFEEN 345 348151 7ROXFORD 345 1
All PJM	MISO South	1,030	4%	335190 6NLSN 230 335192 8NELSON 500 1	C:P1_2-259 Open 334320 8CYPRESS 500 334325 8HARTBRG 500 1
MISO LRZs 2 - 7 (PJM ties)	All PJM	6,960	4%	270828 NELSON ; B 345 270932 WALTO; B 345 1	C:B-EX-973 Open 270678 BYRON ; B 345 274768 LEE CO EC;BP 345 1
All MISO	All PJM	6,083	5%	270828 NELSON ; B 345 270932 WALTO; B 345 1	C:B-EX-973 Open 270678 BYRON ; B 345 274768 LEE CO EC;BP 345 1
MISO North & Central	All PJM	5,039	6%	270828 NELSON ; B 345 270932 WALTO; B 345 1	C:B-EX-973 Open 270678 BYRON ; B 345 274768 LEE CO EC;BP 345 1
MISO South	All PJM	2,463	6%	345435 7MAYWOOD 345 345992 7SPENCER 345 1	C:COFY-PANN-1 Open 346895 7COFFEEN 345 347945 7PANA 345 1
Western PJM LDA	MISO LRZs 2 - 7 (PJM ties)	14,008	4%	270919 WEMPLETOW; R 345 699058 PAD 345 345 1	Base Case
Western PJM	All MISO	10,291	3%	270796 KINCAID ; B 345 347962 7PAWNEE 345 1	C:COFF-ROXF-51



From	To	Limit	TDF	Limiting Constraint	Contingency
LDA					
					Open 346895 7COFFEEN 345 348151 7ROXFORD 345 1
Western PJM LDA	MISO North & Central	5,224	3%	247508 U2-090 C 345 243218 05DESOTO 345 1	243218 05DESOTO 345 247508 U2-090 C 345 2
Western PJM LDA	MISO South	1,042	4%	335190 6NLSON 230 335192 8NELSON 500 1	C:P1_2-259
					Open 334320 8CYPRESS 500 334325 8HARTBRG 500 1
MISO LRZs 2 - 7 (PJM ties)	Western PJM LDA	7,734	4%	270828 NELSON ; B 345 270932 WALTO; B 345 1	C:B-EX-973
					Open 270678 BYRON ; B 345 274768 LEE CO EC;BP 345 1
All MISO	Western PJM LDA	5,750	3%	348847 7BROKAW 345 270853 PONTIAC ; R 345 1	270668 BLUEMOUND; B 345 270852 PONTIAC ; B 345 1
MISO North & Central	Western PJM LDA	5,432	6%	270828 NELSON ; B 345 270932 WALTO; B 345 1	C:B-EX-973
					Open 270678 BYRON ; B 345 274768 LEE CO EC;BP 345 1
MISO South	Western PJM LDA	2,121	7%	345435 7MAYWOOD 345 345992 7SPENCER 345 1	C:COFY-PANN-1
					Open 346895 7COFFEEN 345 347945 7PANA 345 1

Table D-8 PJM Import and Export Subsystems

PJM Subsystems		
All PJM Areas	AREA 201 / AP	AREA 229 / PPL
	AREA 202 / ATSI	AREA 230 / PECO
	AREA 205 / AEP	AREA 231 / PSE&G
	AREA 209 / DAY	AREA 232 / BGE
	AREA 212 / DEO&K	AREA 233 / PEPCO
	AREA 215 / DLCO	AREA 234 / AE
	AREA 220 / IPRV	AREA 235 / DP&L
	AREA 222 / CE	AREA 236 / UGI
	AREA 225 / PJM	AREA 237 / RECO
	AREA 226 / PENELEC	AREA 320 / EKPC
	AREA 227 / METED	AREA 345 / DVP
	AREA 228 / JCP&L	
PJM Western Load Deliverability Area	AREA 201 / AP	AREA 212 / DEO&K
	AREA 202 / ATSI	AREA 215 / DLCO
	AREA 205 / AEP	AREA 222 / CE
	AREA 209 / DAY	AREA 320 / EKPC

Table D-9 MISO Local Resource Zone definitions for Import and Export

MISO Subsystems			
Area Name	Region	Area or Zone Number	Local Resource Zone
HE	Central	207	6
DEI	Central	208	6
SIGE	Central	210	6
IPL	Central	216	6
NIPS	Central	217	6
METC	Central	218	7
ITCT	Central	219	7
BREC	Central	314	6
CWLD	Central	333	5
AMMO	Central	356	5
AMIL	Central	357	4
CWLP	Central	360	4
SIPC	Central	361	4
WEC	North	295	2
XEL	North	600	1
MP	North	608	1
SMMPA	North	613	1
GRE	North	615	1
OTP	North	620	1
ITCM	North	627	3
MPW	North	633	3
MEC	North	635	3
MDU	North	661	1

MISO Subsystems			
Area Name	Region	Area or Zone Number	Local Resource Zone
DPC	North	680	1
ALTE	North	694	2
WPS	North	696	2
MGE	North	697	2
UPPC	North	698	2
MRES (zone)	North	1624	1
MRES (zone)	North	1625	1
MRES (zone)	North	1626	1
EMI	South	326	9
EAI	South	327	8
PLUM	South	328	8
OMLP	South	329	8
BCA	South	331	9
LAGN	South	332	9
WMU	South	334	8
CWAY	South	335	8
BUBA	South	336	8
PUPP	South	337	8
DERS	South	338	9
NLR	South	339	8
SMEPA	South	349	9
EES	South	351	9
CLEC	South	502	9
Lafa	South	503	9

MISO Subsystems			
Area Name	Region	Area or Zone Number	Local Resource Zone
LEPA	South	504	9
ETEC (zone)	South	541	9

Table D-10 Reservations removed from FF1 model

Area Number	Area Name	Change to Model AI
201	AP	-3
202	FE	179
205	AEP	137.6
207	HE	-10
208	DEI	-461
209	DAY	75
210	SIGE	-72.6
212	DEO&K	461
218	METC	8
222	CE	-816
295	WEC	90
357	AMIL	-443
627	ALTW	264
635	MEC	451
694	ALTE	140