

PJM/MISO Joint and Common Market
Capacity Deliverability
PJM Fact Finding #1

PJM Planning
Study Report
April 11, 2014
DRAFT



Executive Summary – Overall Findings

The study work summarized in this report discusses the analytical results of the capacity deliverability fact finding effort recommended by the Organization of PJM States Inc. (OPSI) and Organization of MISO States (OMS) as part of broader Joint and Common Market (JCM) discussions on capacity transfers between MISO and PJM. Specifically this report details the results of the studies completed to date by PJM related to Fact Finding #1 (“FF#1”).

The FF#1 effort undertaken by PJM and MISO encompassed three steps:

1. **Step #1 - Intra-RTO Generator Deliverability Testing** in which PJM and MISO performed generation deliverability studies on their respective systems using their respective generator deliverability methodologies on the jointly developed power flow case
2. **Step #2 – Incremental Generator Deliverability Testing** which expanded on Step 1 by examining groups of generators in the adjacent RTO as if those generators were in the RTO under study.
3. **Step #3 – Inter-RTO Generator Deliverability Testing** examined PJM and MISO as if they were one combined entity essentially subsuming capacity transfers in combined footprint operations.

Each step, discussed in this white paper, identified flow gate constraints limiting capacity deliverability. A flow gate is monitored facility/contingency outage pair, defining the condition for which an overload exists.

Specific Findings and Observations

- Joint deliverability studies performed on a combined system 2018 study year model identified transmission constraints that would limit the deliverability of generation to load, aggravated in many instances by capacity delivery from one RTO to the other.
- In Step #1, the Intra-RTO Generator Deliverability Testing, PJM identified eight internal flow gate constraints, primarily at or near the PJM/MISO border. These results were not unexpected in light



of changes arising out of combining the actual power flow cases each system used in their respective RTEP and MTEP processes. MISO's analysis of its own system on the PJM/MISO *combined* 2018 study year case using its own existing MTEP methodology identified 79 constraints within its own footprint.

- In Step #2, the Incremental Generator Deliverability Testing, PJM studies revealed that 78 of the 79 constraints identified by MISO in their Step #1 would also be limiting for a MISO to PJM transfer. Approximately 35% of MISO capacity resources (commonly referred to as network resources in MISO) would be limited by transmission constraints that would prevent their delivery to PJM load. No additional transfers from MISO to PJM could be accommodated due to transmission limitations in MISO. These transmission constraints would need to be resolved before considering the availability of additional capacity transfers from these units.
- The PJM Step #3 analyses, the Inter-RTO Generator Deliverability Testing, like the Step #1 studies also identified a number of transmission constraints primarily on MISO facilities. The PJM analyses identified 9 transmission facilities in PJM that would restrict deliverability under this scenario. Of these 9 facilities, 2 were 345 kV facilities and 7 were 138 kV facilities. In addition, the PJM analyses identified 168 transmission facilities in MISO that would restrict deliverability under this scenario. Of these 168 facilities, 19 were 230 kV and above facilities while the remaining 149 facilities were various voltages from 69 kV to 161 kV.
- Additional work is required to complete the PJM Step #2 analyses. The PJM step #2 analysis was only able to consider MISO transmission facilities that were loaded at 100% or more for MISO's intra-RTO generator deliverability testing due to limitations with the software tools used by MISO. Additional Step #2 analysis will be completed after MISO provides PJM with a listing of flowgates loaded between 90% and 100% of their applicable ratings for MISO intra-RTO deliverability testing.



1. Power Flow Analysis

Model Development

All analysis was conducted on a combined RTEP/MTEP power case reflecting 2018 study year assumptions. To create that case, the PJM model in MISO's 2018 MTEP case was removed and replaced with PJM's own up-to-date 2018 model. The PJM model included all applicable baseline and network upgrades - identified as part of PJM's own 2013 cycle of RTEP analyses - such that the PJM case was free of NERC criteria violations prior to case merge.

Contingencies

PJM studied 16,870 contingencies that focused on the PJM system, including 8,141 single (i.e. NERC category B); 1,463 tower (i.e. NERC category C); 1,358 bus (i.e. NERC category C); and 5,908 line-with-stuck-breaker (i.e. Category C) contingencies. MISO's generator deliverability methodology only encompasses single contingencies (i.e. NERC category B contingencies), over 7,549 of which they provided to PJM for testing.¹ At MISO's request, PJM also added automatic single bus-to-bus contingencies for all MISO areas. PJM notes that such an approach may or may not represent actual system topology. These amounted to 22,769 additional contingencies to yield 30,318 total contingencies. After removing duplicate contingencies the final number of contingencies on the MISO system totaled 19,872 contingencies (all NERC category B single contingencies). PJM studies identified flow gate facilities with loadings greater than 100% of the applicable facility rating. PJM studies monitored facilities both within the PJM footprint and those areas of MISO directly adjoining PJM.

2. FF#1, Step #1: Intra -RTO Generator Deliverability Analysis

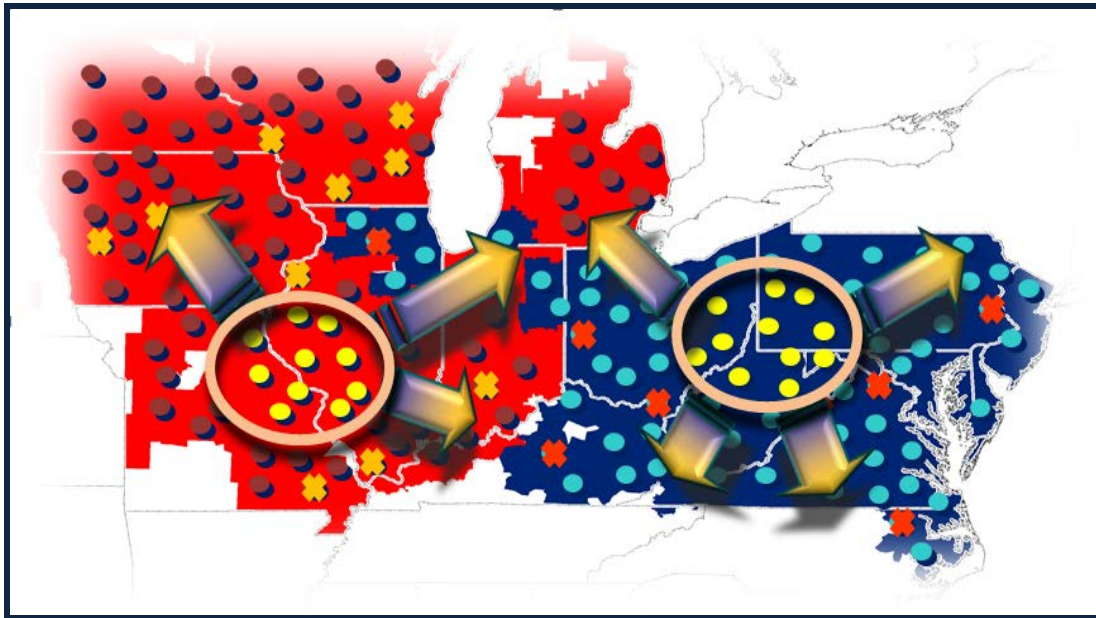
Step #1, intra-RTO generator deliverability testing, comprised PJM and MISO studies on their respective systems using their respective generator deliverability methodologies on the combined case, shown pictorially in **Figure 1**. Generator deliverability testing assesses the strength of the transmission system to ensure that the aggregate of generators in a given area can be reliably

¹ PJM found 740 errors among the 7,549 single contingencies provided by MISO. These were skipped in the studies conducted as part of FF#1.

transferred to the rest of the system. The test determines if transmission limits exist that prevent generation in a defined area to be exported to the rest of PJM; to determine if generation is “bottled” or not. (PJM also performs this test for each queued interconnection request as part of the respective System Impact Study for each.)

Respective RTEP and MTEP 2018 results provided benchmarks against which to compare combined case results given that a key outcome of Step #1 was to be the establishment of a new, baseline model of the combined PJM/MISO systems on which to proceed with Step #2 incremental generator deliverability testing.

Figure 1: *Intra-RTO Generator Deliverability Testing*



Step #1 - PJM Results

PJM results identified that 99.8% of all PJM capacity and 99.7% of all energy was deliverable to PJM load, calculated as shown in **Table 1**.

Table 1: FF#1 Step 1 PJM Deliverability Calculation

PJM Generation					
[A] Generation Modeled (MW)	[B] Approx ER (MW)	[C]=[B]-[A] CR Tested (MW)	[D] Restricted CR (MW)	[E]=[C]-[D] Unrestricted CR (MW)	[F]=[E]/[C] Unrestricted CR (% of total PJM CR)
231,569	21,107	210,462	334	210,128	99.84 %
			[DD] Restricted ER+CR (MW)	[EE]=[A]-[DD] Unrestricted CR+ER Generation (MW)	[FF]=[EE]/[A] Unrestricted generation (% of gen modeled)
			751	230,818	99.68 %

Notes:

- *Column A:* MW of generation modeled in PJM in 2018 study-year power flow case
- *Column B:* MW of generation modeled in PJM that are energy-only resources (ER)
- *Column C:* Column A minus Column B to yield the level of network capacity resources (CR) for which generator deliverability testing was conducted
- *Column D:* The amount of PJM network capacity resources (Column C) that were *restricted* by flow gate constraints identified under PJM generator deliverability tests.
- *Column E:* The amount of PJM network capacity resources (Column C) that were deliverable (*unrestricted*), i.e., NOT constrained by flowgates identified under PJM generator deliverability test.
- *Column F:* The percentage of PJM network capacity resources that are deliverable (Column E / Column C)
- *Column DD:* The amount of capacity resources AND energy resources *restricted* by flow gate constraints identified under PJM generator deliverability tests.
- *Column EE:* The amount of PJM capacity resources AND energy resources that were deliverable (*unrestricted*), i.e., NOT constrained by flowgates identified under PJM's generator deliverability test.
- *Column FF:* The percentage of PJM capacity resources AND energy resources that were deliverable (Column EE / Column A)



Table 2 summarizes the number of overloads PJM observed in its own footprint and in the areas of MISO immediately adjoining PJM. All were at 138 KV.

Table 2: FF#1 Step #1 – PJM's Study Results

System Studied	Voltage Level (kV)	Number of Overloads
PJM	138	8
MISO	138	13

PJM studies identified eight constrained flowgates in the PJM footprint, all at 138 kV:

1. Roche Vitamin – Eureka 138KV line
2. Richard – Naomi 138kV line
3. Lemoyne – Woodville 138kV line
4. Dixon – Stillman Valley 138kV line
5. Kewanee – Hennepin 138KV line
6. Roscoe – Harlem 138kVline
7. Washington CEC – Knox 138kV line
8. Clinch River – Clinchfield 138kV line

These results were not unexpected in light of expected changes arising out of combining the actual power flow cases each system used in their respective RTEP and MTEP processes. The first six of these eight, all close to the PJM/MISO seam, were already near 100% in PJM's own pre-merge base case model. PJM therefore attributes these six overloads to the replacement of PJM's MMWG representation model in MISO's own base case with PJM's own model as the cause of base power flow increases. The last two of the eight listed flowgates will not be constrained following the deactivation of the Burger #4 and Clinch River generating units before 2015. PJM's generation deliverability procedures require that planning process models maintain the deliverability of generation until one year after the unit actually



deactivates. PJM also monitored facilities in MISO areas immediately adjoining PJM, identifying 13 flowgate constraints. Eleven of these were existing overloads in MISO's own base case. Two were caused by the generator deliverability test on the merged case. The **Appendix** includes additional study details.

Step #1 – MISO's Analysis

MISO's analysis of its own system on the PJM/MISO combined 2018 study year case using its own existing MTEP methodology identified 79 constraints within its own footprint, as shown in **Table 3**. This corresponds to MISO capacity resource deliverability of 95.4% to its own load. As will be explained in the next section, the results of MISO's Step #1 analysis were used in PJM's Step #2 analysis.

Table 3: FF#1 Step #1 – MISO's Study Results

System Studied	Voltage Level (kV)	Number of Overloads*
MISO	500	2
MISO	230	14
MISO	161	9
MISO	138	13
MISO	120	2
MISO	115	18
MISO	69	21
TOTAL	---	79

*Note: Transformers are counted based on high-side terminal voltage

3. FF#1, Step 2: Incremental Generator Deliverability Analysis

The PJM Step #2 analyses expanded on Step 1 by examining *groups* of generators in the adjacent RTO as if those generators were in the RTO under study, shown pictorially in **Figure 2**. Individual generators or groups of generation were identified that could be “moved or delivered” to the adjacent RTO while respecting loading from the individual RTO deliverability testing in Step #1.

Figure 2: Incremental Generator Deliverability Analysis



The objective of Step #2 was to determine how to utilize the transmission capability available beyond - “incremental to” - that required for internal generation deliverability. First, PJM compiled the line loadings determined in Step #1 analysis for PJM facilities loaded at 90% or higher under PJM’s deliverability test and for MISO facilities loaded at 100% or higher under MISO’s deliverability test². Then, the incremental loadings on these facilities were calculated for transfers into PJM from groups of generators located in the MISO footprint. From these results, the specific generators or groups of generators contributing to the loading on various facilities were identified that could deliver capacity into PJM. Likewise, those that may not be deliverable to PJM based on flowgate constraints were also identified.

² MISO was unable to provide line loadings for facilities under 100%. Additional follow-up efforts will be required.



Then, in order to determine transfer capability, PJM performed a DFAX analysis on MISO-to-PJM transfers and PJM-to-MISO transfers for all flowgates identified in generator deliverability test studies that were above 90% of applicable ratings. The 90% provided a screening factor to identify flow gates that had some excess capability below 100% so that a “head room” calculation could be performed. Consistent with PJM operational standards, a 3% DFAX cut-off was used for this analysis.

PJM Step #2 Results

PJM’s Step #2 studies identified 78 facility constraints - summarized in **Table 4**. Two of the facility constraints, both at 138 KV, were identified on the PJM system. The remaining 76 facility constraints were on the MISO system as also summarized in **Table 4**.

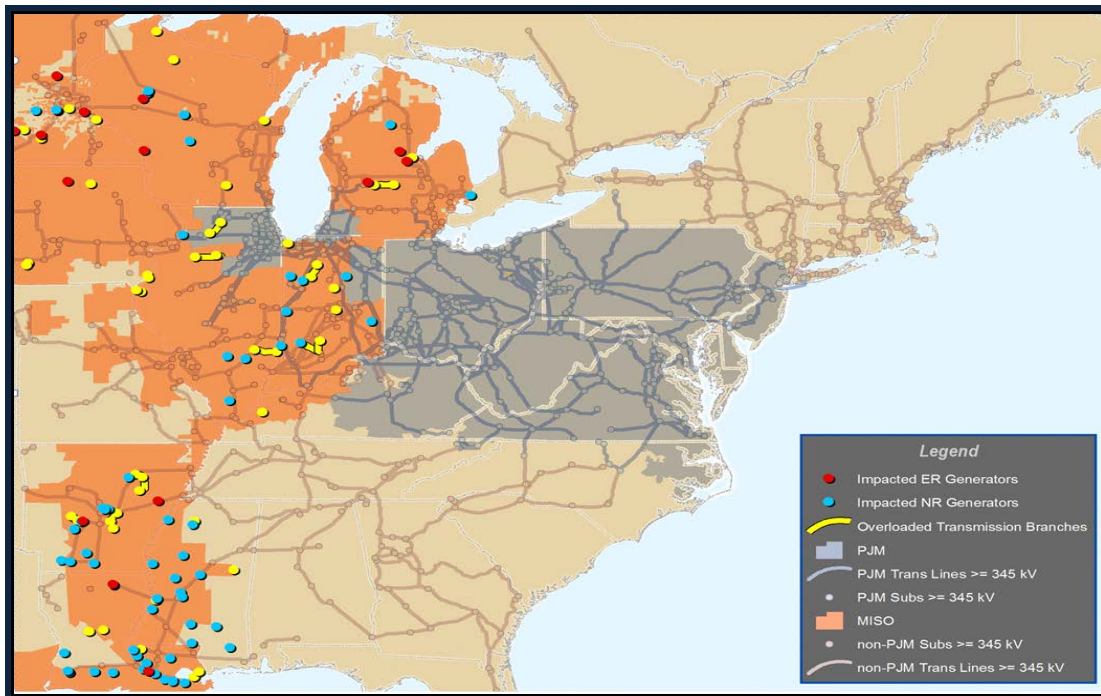
Table 4: FF#1 Step #2 – PJM’s Study Results

System Studied	Voltage Level (kV)	Number of Overloads*
PJM	138	2
PJM TOTAL	---	2
MISO	500	2
MISO	345	0
MISO	230	14
MISO	161	5
MISO	138	15
MISO	120	2
MISO	115	17
MISO	69	21
MISO TOTAL	---	76

*Note: Transformers are counted based on high-side terminal voltage

The PJM analyses showed the output from 433 MISO generators contributed to the loading on those constrained flow gate facilities noted above , and shown below on **Map 1**. Some 389 of these are MISO network capacity resources amounting to 58,253 MW, or approximately 35% of MISO's total. (The other 44 MISO generators out of the 433 are energy-only resources.)

Map 1: FF#1, Step #2 – PJM's Study Results

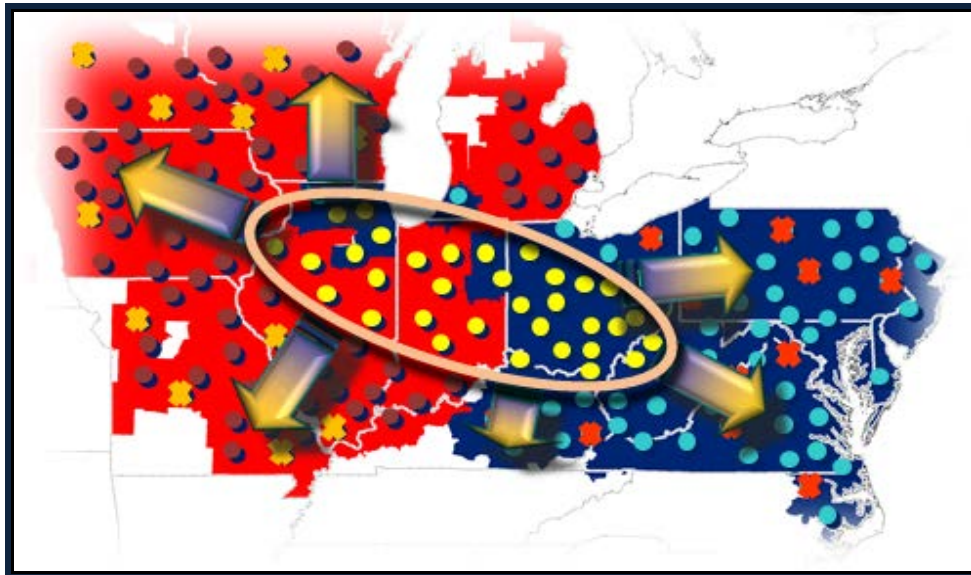


In summary, the PJM Step #2 analysis showed approximately 35% of MISO capacity resources (commonly referred to as network resources in MISO) would be limited by transmission constraints that would prevent their delivery to PJM load. These transmission constraints would need to be resolved before considering the availability of additional capacity transfers from these units using a Step #2 methodology. The **Appendix** includes additional study details.

4. FF#1, Step #3: Inter-RTO Generator Deliverability Analysis

PJM proceeded with Step #3 to examine what constraints would be observed if the PJM and MISO footprints were treated as one entity and a single deliverability test was conducted within that one entity. Like Step #1, PJM and MISO each performed their own studies on the 2018 study year combined power flow model using their own respective generator deliverability testing methodologies for capacity delivery to their own respective load. The generator deliverability testing in Step #3 - shown pictorially in **Figure 3** - assessed the strength of the transmission system to ensure that capacity from groups of generators could be reliably transferred to combined PJM and MISO load, as if both were operated as one entity.

Figure 3: *Inter- RTO Generator Deliverability Testing*



PJM Step #3 Results

PJM studies identified nine flow gate constraints in the PJM footprint that would restrict generator deliverability: two 345 kV facilities and seven 138 kV facilities, summarized in **Table 5**. Those same



PJM studies identified 168 constraints in the MISO footprint that would restrict deliverability: 19 facilities at 230 kV and 149 between 69 kV and 161 kV, also summarized in **Table 5**.

Table 5: FF#1 Step #3 PJM's Study Results

System Studied	Voltage Level (kV)	Number of Overloads*
PJM	345	3
PJM	138	6
PJM TOTAL	---	9
MISO	500	3
MISO	345	4
MISO	230	12
MISO	161	21
MISO	138	21
MISO	120	2
MISO	115	51
MISO	69	54
MISO TOTAL	---	168

*Note: Transformers are counted based on high-side terminal voltage

These results correlate to 96.81% deliverability of the combined network capacity resources across the combined footprint to combined load. Regionally, though, this corresponds to 99.2% PJM network capacity resource deliverability and 93.8% MISO network capacity resource deliverability to combined load. The **Appendix** includes additional study details.

5. FF#1 Next Steps

Additional work is required to complete the Step #2 analyses. The PJM step #2 analysis was only able to consider MISO transmission facilities that were loaded at 100% or more for MISO's intra-RTO generator deliverability testing due to limitations with the software tools used by MISO. Additional Step



#2 analysis will be completed after MISO provides PJM with a listing of flowgates loaded between 90% and 100% of their applicable ratings for MISO intra-RTO deliverability testing.



Revision History

1. April 14, 2014 – Original Draft Published by PJM

APPENDIX

Case: All studies are performed on the 2018 merged RTEP/METP case.

PJM contingencies (single-8141, tower-1463, bus-1358, line with stuck breaker-5908, total 16870 contingencies)

MISO contingencies (single only. NOTE: MISO only have single contingencies since their deliverability only runs on single contingencies) – MSIO provided 7549 single contingencies. Among these contingencies, there are 740 errors found. Those contingencies with errors were skipped in the studies. We also added auto single (bus to bus) contingencies for all MISO areas per MISO's request, which are 22769 contingencies. Total contingency number is 30318. (A lot of them are duplications; the non -duplicated are 19872 contingencies)

STEP 1: PJM gen deliv (Export: PJM; Import: PJM)

Monitored PJM + neighboring MISO areas

Contingencies:

PJM contingencies (single-8141, tower-1463, bus-1358, line with stuck breaker-5908, total 16870 contingencies)

MISO contingencies in the neighboring MISO areas(HE, DEI, SIGE, IPL, NIPS, METC, ITCT, WEC, AMMO, AMIL, CWLP, SIPC, EEI, LGEE, XEL, GRE, ALTW, MPW, MEC, NPPD, OPPD, WAPA, DPC, ALTE, WPS, MGE, WECC). 13423 single contingencies.

Violation:

PJM overloaded facilities:

FG #	Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
1	235436	01ROCHE	235329	01EUREKA	1F	138/138	201/201
2	239070	02RICHLD	238521	02NAOMI	1	138/138	202/202
3	239176	02WOOD+	238890	02LEMOYN	1	138/138	202/202
4	271333	DIXON ; R	272517	STILLMAN ;RT	1	138/138	222/222
5	271835	KEWANEE ;23	271655	HENNEPIN ; T	1	138/138	222/222
6	272378	ROSCOE BE;BT	271638	HARLEM ; B	1	138/138	222/222
7	239316	02WASHREC	238864	02KNOX	1	138/138	202/202
8	242605	05CLNCHR	242606	05CLNLFD	1	138/138	205/205

Flowgates 1-6 are caused by the RTEP and MTEP case merge. These flowgates are close to the PJM/MISO border. Therefore, the difference in MISO model between MTEP and MMWG causes the baseflow change. The loading for these flowgate are close to 100% anyway, so the baseflow change causes the final overloads.

Flowgates 7-8 are caused by retired units (Burger #4 and Clinch River units). PJM keeps the capacity right of retired units for one year. We have fixes pending for those just in case some queue project might use the capacity right within the one year. But we don't bring these fixes to board since most probably they are not needed.

FG#1: 01S70BUS1, 01S70BUS2, 01OGROV1 – constraint CR 46MW

FG#2: 02RICHG5 – constraint CR 11MW

R-048 E -- Constraint Energy 39MW

FG#3: V4-015 E, W2-001 E, U4-028 E, U4-029 E – constraint ER 216MW

FG#4: O-029 – constraint ER 35MW

FG#5: BSHIL;1U E – constraint ER 12MW

FG#6: ECOGROVE ;U1, R-016, O47 C, ROCKFORD ;11– constraint retired CR 72MW



FG#7: 02BURGG4 – constraint retired CR 135MW

FG#8: 05CRG2L – constraint retired CR 70MW

MISO overloaded facilities in PJM neighboring areas (I only monitored 208,216, 217, 218, 219, 357, 627, 635, and 694 since this is PJM->PJM deliverability, other part of MISO shouldn't be impacted)

FG #	Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
1	249752	08HEBVST	249756	08HEOWEN	1	138/138	208/208
2	249796	08MAPLE	249704	08CHRY2	1	138/138	208/208
3	255158	17MONTICELLO	255127	17E_WINAMAC	1	138/138	217/217
4	348921	4PRINCETN TP	348919	4LTV STL NTP	1	138/138	357/357
5	271655	HENNEPIN ; T	348918	4HENNEPIN S	1	138/138	222/357
6	249752	08HEBVST	249756	08HEOWEN	1	138/138	208/208
7	254608	16HRTCRSTAP	254626	16MOORSV	24	138/138	216/216
8	254641	16PRITCH	254576	16CNTRTN	21	138/138	216/216
9	256087	18BULLOCKB	256212	18BULLOCKW	Z1	138/138	218/218
10	256257	18DONLDS	263657	18REDWOOD	1	138/138	218/218
11	256524	18HWTHNJ	256566	18FOURMILEW	1	138/138	218/218
12	256322	18LOWELJ	256209	18MARQTT	1	138/138	218/218
13	256263	18RONDO	256259	18RIGGSV	1	138/138	218/218

Only flowgates 2 & 4 are impacting caused by the gen deliv. The rest are existing overloads in the MISO base case.

FG#1: U4-039 E – Constraint ER 160MW

FG#4: Q39 E -- Constraint ER 84MW

Based on the results above, the following is our conclusion for step #1:

Analysis Description	Generation (MW)	Approx ER (MW)	Tested CR level (MW)	Calculated Restricted CR level (MW)	Unrestricted CR (MW)	Unrestricted CR (% of total PJM CR)
PJM Capacity Deliverability FF#1 - Step 1	231,569	21,107	210,462	334	210,128	99.84%
				Calculated Restricted ER level (MW)	Unrestricted Generation(MW)	Unrestricted generation (% of total PJM gen)
				751	230,818	99.68%

Step #2: Incremental generator deliverability testing

For all 90% and above flowgates shown in PJM gen deliv and MISO gen deliv, perform a DFAX analysis on MISO ->PJM (and PJM->MISO) transfer.

If Max (DFAX) > 3% (means there are generators have impact on the transfer), list these flowgates

MISO->PJM (transfer capability = 0)

MISO deliverability results: MISO only provided the flowgates with 100% and above loading. There are 175 flowgates (79 facilities), among which there are 138 flowgates (70 branches) with Maximum DFAX greater than 3% and are listed below:

FG #	Fr Bus	Name	KVs	To Bus	Name	KVs	CK T	Area #	Rati ng	FN AC Flow	FN AC %	Cont Label	max DFAX
1	248547	07WORTH8	138	249752	08HEBVST	138	1	207/208	135	152.8	113.2%	B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	0.19628
2	248547	07WORTH8	138	249752	08HEBVST	138	1	207/208	135	152.8	113.2%	HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	0.19628
3	248547	07WORTH8	138	249752	08HEBVST	138	1	207/208	135	152.8	113.2%	HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	0.19628
7	249752	08HEBVST	138	249756	08HEOWE N	138	1	208	135	148.8	110.2%	B2 HE Worth-Bloom 345 + Bloom 345/230 xfrs	0.19628
8	249752	08HEBVST	138	249756	08HEOWE N	138	1	208	135	148.8	110.2%	HE_B2 248792 07WORTHN 345 248793 07BLOMNG-1	0.19628
9	249752	08HEBVST	138	249756	08HEOWE N	138	1	208	135	148.8	110.2%	HE_B3 248792 07WORTHN 345 248793 07BLOMNG-2	0.19628
11	250312	08BROOKJ	69	250792	08ROSEBG	69	1	208	39.1	39.9	102.0%	248732 07HUBBEL 69.0 248831 07HUBBL8 138 1	0.11803
16	264654	19STC4	120	265056	19TWR2497	120	1	219	293	295.1	100.7%	b 19BUNCE-19STC2 120-1	0.30922
17	264777	19MOHIC2	120	265056	19TWR2497	120	1	219	293	295.3	100.8%	b 19BUNCE-19STC2 120-1	0.03592
18	303133	4VATCAN	138	3353	4SCOTT1	138	1	332	225	275.4	122.4%	500230 COUGH 4 138 500720 PLAISAN4 138 1	0.12907

				79									
19	30313 3	4VATCAN	138	3353 79	4SCOTT1	138	1	332	225	275.4	122.4%	P1_2-1654	0.12907
20	31809 0	2PRENTISS	69	3184 41	5PRENTISS	161	1	349	50	55.5	111.0%	318267 5SW LONESTAR 161 318441 5PRENTISS 161 1	0.03284
21	33402 6	4GRIMES	138	3340 60	4MT.ZION	138	1	351	206	222.8	108.2%	P1_2-1860	0.21761
22	33432 6	6CYPRESS	230	3343 28	6BEVIL	230	1	351	685	743.9	108.6%	334325 8HARTBRG 500 334363 6HARTBRG 230 1	0.24837
23	33432 6	6CYPRESS	230	3343 28	6BEVIL	230	1	351	685	743.9	108.6%	P1_2-261	0.24837
24	33432 6	6CYPRESS	230	3343 28	6BEVIL	230	1	351	685	726.6	106.1%	P1_2-277	0.24837
25	33432 7	6AMELIA	230	3343 28	6BEVIL	230	1	351	685	717.5	104.7%	334325 8HARTBRG 500 334363 6HARTBRG 230 1	0.3977
26	33432 7	6AMELIA	230	3343 28	6BEVIL	230	1	351	685	717.5	104.7%	P1_2-261	0.3977
27	33432 7	6AMELIA	230	3343 28	6BEVIL	230	1	351	685	700.5	102.3%	P1_2-277	0.3977
28	33441 3	4PNEC BK	138	3344 14	4LINDE	138	1	351	287	289.4	100.8%	P1_2-304	0.22855
29	33441 3	4PNEC BK	138	3344 30	4SABINE	138	1	351	287	321.7	112.1%	P1_2-303	0.23997
30	33441 4	4LINDE	138	3344 30	4SABINE	138	1	351	288	323.1	112.2%	P1_2-304	0.22855
31	33443 4	6SABINE	230	3344 35	6MID CO	230	1	351	566	571.9	101.0%	334436 6P AC BK 230 334437 6KOLBS 230 1	0.0941
32	33443 4	6SABINE	230	3344 35	6MID CO	230	1	351	566	571.9	101.0%	P1_2-322	0.0941
33	33443 4	6SABINE	230	3344 35	6MID CO	230	1	351	566	690.8	122.0%	P1_2-330	0.12554
34	33443 4	6SABINE	230	3344 42	6GULFWA Y	230	1	351	519	653.5	125.9%	334434 6SABINE 230 334439 6VFWPK 230 1	0.07001
35	33443 4	6SABINE	230	3344 42	6GULFWA Y	230	1	351	519	548.5	105.7%	334439 6VFWPK 230 334442 6GULFWAY 230 1	0.07001

36	33443 4	6SABINE	230	3344 42	6GULFWA Y	230	1	351	519	653.5	125.9%	P1_2-316	0.07001
37	33443 6	6P AC BK	230	3344 37	6KOLBS	230	1	351	441	568.8	129.0%	334434 6SABINE 230 334435 6MID CO 230 1	0.65951
38	33443 9	6VFWPK	230	3344 42	6GULFWA Y	230	1	351	519	520.2	100.2%	334434 6SABINE 230 334442 6GULFWAY 230 1	0.22814
39	33443 9	6VFWPK	230	3344 42	6GULFWA Y	230	1	351	519	520.2	100.2%	P1_2-319	0.22814
40	33581 5	6PT.HUD	230	3358 25	6FANCY	230	1	351	593	624.6	105.3%	335815 6PT.HUD 230 2 335825 6FANCY 230 2	0.47862
41	33581 5	6PT.HUD	230	3358 25	6FANCY	230	1	351	593	624.6	105.3%	P1_2-772	0.47862
42	33581 5	6PT.HUD	230	3358 25	6FANCY	230	2	351	593	620.5	104.6%	335815 6PT.HUD 230 335825 6FANCY 230 1	0.47555
43	33581 5	6PT.HUD	230	3358 25	6FANCY	230	2	351	593	620.5	104.6%	P1_2-771	0.47555
44	33613 8	6FAIRVW	230	3361 90	6GYPSY	230	1	351	459	481.5	104.9%	336462 6MICO 230 500360 FRONTST6 230 1	0.03039
45	33613 8	6FAIRVW	230	3361 90	6GYPSY	230	1	351	459	481.5	104.9%	P1_2-981	0.03039
46	33613 8	6FAIRVW	230	5005 10	MADISON 6	230	1	351/5 02	459	481.5	104.9%	336462 6MICO 230 500360 FRONTST6 230 1	0.17273
47	33613 8	6FAIRVW	230	5005 10	MADISON 6	230	1	351/5 02	459	481.5	104.9%	P1_2-981	0.17273
48	33646 2	6MICO	230	5003 60	FRONTST6	230	1	351/5 02	641	659.8	102.9%	336130 8BOGALUS 500 336131 6ADMSCRK 230 1	0.31512
49	33646 2	6MICO	230	5003 60	FRONTST6	230	1	351/5 02	641	661.1	103.1%	336130 8BOGALUS 500 336562 8FRKLIN 500 1	0.31512
50	33646 2	6MICO	230	5003 60	FRONTST6	230	1	351/5 02	641	660.2	103.0%	P1_2-865	0.31512
51	33680 0	3B.WLSN	115	3369 60	3SE-VKS	115	1	326	161	163.7	101.7%	P1_2-1031	0.08618
52	33704 0	6ANDRUS	230	3370 42	3ANDRUS	115	1	326	392	424.3	108.2%	337040 6ANDRUS 230 337050 6INDOLA 230 1	0.3492
53	33704	6ANDRUS	230	3370	3ANDRUS	115	1	326	392	424.3	108.2%	P1_2-1114	0.3492

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54	33712 6	3BATESV	115	3371 35	3SARDIS	115	1	326	136	149.7	110.1%	337162 6FRPORT 230 1 230 337180 6HN LAK	0.07451
55	33712 6	3BATESV	115	3371 35	3SARDIS	115	1	326	136	149.7	110.1%	P1_2-1159	0.07451
56	33731 0	3BVRCRK	115	5000 70	BC PST 4	138	1	351/5 02	93	94.3	101.4%	500200 COLFAX 6 230 1 230 500770 RODEMR 6	0.05928
57	33731 0	3BVRCRK	115	5000 70	BC PST 4	138	1	351/5 02	93	94.3	101.4%	P1_2-1646	0.05928
58	33762 0	3WOODW- N	115	3379 62	3ALTHEI*	115	1	327	106	106.3	100.3%	337633 6WOODW 230 1 230 337968 6RICUS	0.10771
59	33762 0	3WOODW- N	115	3379 62	3ALTHEI*	115	1	327	106	115	108.5%	337967 3RICUS 230 1 115 337968 6RICUS	0.05723
60	33762 0	3WOODW- N	115	3379 62	3ALTHEI*	115	1	327	106	115	108.5%	P1_2-1441	0.05723
61	33765 1	8WH BLF	500	3379 57	8KEO	500	1	327	2165	2201.4	101.7%	337643 8SHERID 500 1 500 337808 8MABEL	0.62355
62	33765 1	8WH BLF	500	3379 57	8KEO	500	1	327	2165	2201.4	101.7%	P1_2-1312	0.62355
65	33768 6	3ARKLA	115	3376 95	3TIGRE *	115	1	327	201	218.6	108.8%	337643 8SHERID 500 1 500 337763 8MAGCOVE	0.09333
66	33768 6	3ARKLA	115	3376 95	3TIGRE *	115	1	327	201	218.6	108.8%	P1_2-1311	0.09333
67	33768 6	3ARKLA	115	3377 40	3HSEHVE	115	2	327	266	298.9	112.4%	337685 3HSEHVV 115 1 115 337686 3ARKLA	0.55342
68	33768 6	3ARKLA	115	3377 40	3HSEHVE	115	2	327	266	298.9	112.4%	P1_2-1324	0.55342
69	33769 5	3TIGRE *	115	3376 97	3PANTH*	115	1	327	201	217.6	108.3%	337643 8SHERID 500 1 500 337763 8MAGCOVE	0.09333
70	33769 5	3TIGRE *	115	3376 97	3PANTH*	115	1	327	201	217.6	108.3%	P1_2-1311	0.09333
71	33769 7	3PANTH*	115	3377 05	3CHEETA*	115	1	327	201	217.6	108.3%	337643 8SHERID 500 1 500 337763 8MAGCOVE	0.09333
72	33769 7	3PANTH*	115	3377 05	3CHEETA*	115	1	327	201	217.6	108.3%	P1_2-1311	0.09333

73	33771 8	3CARPE	115	3377 46	3MALV-S	115	1	327	111	116.3	104.8%	337643 8SHERID 500 337763 8MAGCOVE 500 1	0.10456
74	33771 8	3CARPE	115	3377 46	3MALV-S	115	1	327	111	116.3	104.8%	P1_2-1311	0.10456
75	33774 0	3HSEHVE	115	3377 41	3BUTERF	115	1	327	239	288.5	120.7%	337643 8SHERID 500 337763 8MAGCOVE 500 1	0.12292
76	33774 0	3HSEHVE	115	3377 41	3BUTERF	115	1	327	239	288.5	120.7%	P1_2-1311	0.12292
77	33774 1	3BUTERF	115	3378 00	3HASKEL	115	1	327	239	282.1	118.0%	337643 8SHERID 500 337763 8MAGCOVE 500 1	0.12292
78	33774 1	3BUTERF	115	3378 00	3HASKEL	115	1	327	239	282.1	118.0%	P1_2-1311	0.12292
79	33780 0	3HASKEL	115	3378 01	3BENT-S*	115	1	327	217	259.5	119.6%	337643 8SHERID 500 337763 8MAGCOVE 500 1	0.12292
80	33780 0	3HASKEL	115	3378 01	3BENT-S*	115	1	327	217	259.5	119.6%	P1_2-1311	0.12292
81	33780 1	3BENT-S*	115	3378 02	3BAUXIT	115	1	327	159	182.1	114.5%	337643 8SHERID 500 337763 8MAGCOVE 500 1	0.10743
82	33780 1	3BENT-S*	115	3378 02	3BAUXIT	115	1	327	159	182.1	114.5%	P1_2-1311	0.10743
83	33794 9	3LYNCH-W	115	3387 55	3REMINING# *	115	1	327	106	108.8	102.6%	337957 8KEO 500 338162 8WM-EHV 500 1	0.06188
84	33794 9	3LYNCH-W	115	3387 55	3REMINING# *	115	1	327	106	108.8	102.6%	P1_2-1440	0.06188
85	33796 2	3ALTHEI*	115	3387 38	3WABASE KA.W#	115	1	327	106	111.8	105.5%	337967 3RICUS 115 337968 6RICUS 230 1	0.05723
86	33796 2	3ALTHEI*	115	3387 38	3WABASE KA.W#	115	1	327	106	111.8	105.5%	P1_2-1441	0.05723
87	33796 4	3WABSKA	115	3387 38	3WABASE KA.W#	115	1	327	106	111.8	105.5%	337967 3RICUS 115 337968 6RICUS 230 1	0.03754
88	33796 4	3WABSKA	115	3387 38	3WABASE KA.W#	115	1	327	106	111.8	105.5%	P1_2-1441	0.03754
89	33813 0	5CALCR	161	5054 48	NORFORK5	161	1	327	148	156.4	105.7%	338145 8ISES 500 338187 8DELL 500 1	0.09446
90	33813	5CALCR	161	5054	NORFORK5	161	1	327	148	156.4	105.7%	P1_2-1492	0.09446

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91	33815 1	5NEWPO	161	3381 73	5NEW-IN	161	1	327	335	360.4	107.6%	338145 8ISES 500 338187 8DELL 500 1	0.12198
92	33815 1	5NEWPO	161	3381 73	5NEW-IN	161	1	327	335	360.4	107.6%	P1_2-1492	0.12198
93	33816 1	5WM-EHV	161	3381 62	8WM-EHV	500	1	327	450	528.7	117.5%	338162 8WM-EHV 500 360075 8BHAM STEEL 500 1	0.23719
94	33816 1	5WM-EHV	161	3381 62	8WM-EHV	500	1	327	450	528.4	117.4%	P1_2-1504	0.23719
95	33816 1	5WM-EHV	161	3381 62	8WM-EHV	500	1	327	450	528.7	117.5%	TVA-L 360075-338162 #1	0.23719
112	34487 0	2KH2 XFMR	69	3471 95	2HAMLTN AM	69	1	356/3 57	72	77.6	107.8%	630368 WKEOKUK8 69.0 630371 ROQUETE8 69.0 1	0.05207
113	34783 1	4NEWTON	138	3481 26	4ROBNSN AM	138	1	357	269	271	100.7%	346809 7CASEY 345 347830 7NEWTON 345 1	0.11385
114	34783 1	4NEWTON	138	3481 26	4ROBNSN AM	138	1	357	269	271	100.7%	CSYW-NWTY-1	0.11385
115	50028 0	ELEESV 6	230	5007 70	RODEMR 6	230	1	502	416	435.4	104.7%	337304 6MONTGY 230 500200 COLFAX 6 230 1	0.19364
116	50028 0	ELEESV 6	230	5007 70	RODEMR 6	230	1	502	416	446.4	107.3%	500200 COLFAX 6 230 500770 RODEMR 6 230 1	0.19364
117	50028 0	ELEESV 6	230	5007 70	RODEMR 6	230	1	502	416	446.4	107.3%	P1_2-1646	0.19364
118	60306 1	BLK DOG7	115	6031 16	WILSON 7	115	1	600	239	241.5	101.0%	603116 WILSON 7 115 603204 WILSON TAP7 115 Z	0.34538
119	60306 1	BLK DOG7	115	6031 16	WILSON 7	115	1	600	239	310.5	129.9%	B2.WIL-BDS-NMC	0.49124
123	60507 9	NEWULMS 8	69	6052 82	NEWULMP 8	69	1	600	62.7	62.9	100.3%	605001 NEWULMC8 69.0 605079 NEWULMS8 69.0 1	1
124	60518 1	REDWING8	69	6053 74	BAY CIT8	69	1	600	71.7	72.6	101.3%	605264 HASTING8 69.0 606046 WEST HASTNG869.0 1	0.22114
125	60529 6	WSTSALE8	69	6053 16	LAX 8	69	1	600	71.7	84	117.2%	602023 LACROSS5 161 602025 MONROCO5 161 1	0.15891
126	60556 9	JAMESTP8	69	6172 47	GRE- JMSTWTP8	69	1	600	45.4	49.1	108.1%	601004 WILMART3 345 601072 SHEAS LK3 345 1	0.06954

127	61534 7	GRE-MCHENRY4	230	B\$03 42	230/115	1	1	615	105	112.8	107.4%	3Wnd: OPEN B\$0343 230/115 1	0.0932
128	61534 7	GRE-MCHENRY4	230	B\$03 42	230/115	1	1	615	105	107.7	102.6%	659106 LELAND04 230 659108 LOGAN 4 230 1	0.05787
129	61534 7	GRE-MCHENRY4	230	B\$03 42	230/115	1	1	615	105	112.8	107.4%	B3.RB4-XFMR	0.0932
130	61534 8	GRE-MCHENRY7	115	B\$03 42	230/115	1	1	615	105	112.7	107.3%	3Wnd: OPEN B\$0343 230/115 1	0.39072
131	61534 8	GRE-MCHENRY7	115	B\$03 42	230/115	1	1	615	105	107.6	102.5%	659106 LELAND04 230 659108 LOGAN 4 230 1	0.37278
132	61534 8	GRE-MCHENRY7	115	B\$03 42	230/115	1	1	615	105	112.7	107.3%	B3.RB4-XFMR	0.39072
133	61703 4	GRE-BRAHAM 8	69	6170 46	GRE-GRASTON8	69	1	615	42.4	43.1	101.7%	615051 GRE-CAMBRDG869.0 617050 GRE- INDSTTP869.0 1	0.29464
134	61841 5	GRE-WINTHRP8	69	6184 33	GRE-BRWN TP8	69	1	600	31.5	33.7	107.0%	3Wnd: OPEN B\$0302 115/69 1	0.21314
135	61843 1	GRE-BELL 8	69	6184 32	GRE-HSSNJCT8	69	1	600	25.3	26.4	104.3%	3Wnd: OPEN B\$0302 115/69 1	0.21314
136	61843 3	GRE-BRWN TP8	69	6184 36	GRE-SUMTER 8	69	1	600	31.5	33.6	106.7%	3Wnd: OPEN B\$0302 115/69 1	0.21314
140	63003 4	AGENCY 8	69	6306 15	4TH ST 8	69	1	627	69	71.6	103.8%	ITCM_B2_BURLINGTON_1_161	0.32961
141	63003 8	BRLGTN28	69	6306 16	S BURL 8	69	1	627	87	87.9	101.0%	630001 FLNTRDG8 69.0 630034 AGENCY 8 69.0 1	0.27244
142	63003 8	BRLGTN28	69	6306 16	S BURL 8	69	1	627	87	96.8	111.3%	630001 FLNTRDG8 69.0 630037 BRLGTN18 69.0 1	0.27244
143	63003 8	BRLGTN28	69	6306 16	S BURL 8	69	1	627	87	96.8	111.3%	630037 BRLGTN18 69.0 631109 BRLGTN 5 161 1	0.27244
144	63003 8	BRLGTN28	69	6306 16	S BURL 8	69	1	627	87	99.8	114.7%	ITCM_B2_BURLINGTON_1_161	0.28618
145	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	90.2	125.3%	3Wnd: OPEN B\$0836 CS KY3A 1	0.09646
146	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	90.2	125.3%	630381 SLAKEN 8 69.0 652568 CRESTN 8 69.0 1	0.09646
148	63038	SLAKEN 8	69	6303	SLAKES 8	69	1	627	72	87.6	121.7%	630419 ECRESTN8 69.0 630446	0.04846

	1			85								CRESTN8_ 69.0 1	
149	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	97.8	135.8%	630419 ECRESTN8 69.0 652569 CRESTON8 69.0 1	0.04846
150	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	84.3	117.1%	ITCM-B103-SW	0.44627
151	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	75.9	105.4%	ITCM-B107-SW	0.11874
152	63038 1	SLAKEN 8	69	6303 85	SLAKES 8	69	1	627	72	73.7	102.4%	OTTUMW1G	0.05379
153	63038 5	SLAKES 8	69	6525 69	CRESTON8	69	1	635	72	77.6	107.8%	630381 SLAKEN 8 69.0 630385 SLAKES 8 69.0 1	1
154	63044 3	ARISTAP8	69	6304 46	CRESTN8_	69	1	627	38	42.1	110.8%	630378 LORIMRR8 69.0 630379 LORIMOR8 69.0 1	0.03543
155	63044 3	ARISTAP8	69	6304 46	CRESTN8_	69	1	627	38	43.1	113.4%	630378 LORIMRR8 69.0 630381 SLAKEN 8 69.0 1	0.03543
156	63044 3	ARISTAP8	69	6304 46	CRESTN8_	69	1	627	38	41.7	109.7%	630379 LORIMOR8 69.0 630380 MURRAY 8 69.0 1	0.03543
157	63630 1	FLOYD 8	69	6363 07	GREENTP8	69	1	635	28.7	30.8	107.3%	636280 WAVRLYJ8 69.0 636283 PLNFDJT8 69.0 1	0.10599
158	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.6	114.4%	605331 COTTONS8 69.0 680191 PINE VAL 69.0 1	0.06455
159	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.1	112.4%	605332 NEILSVL8 69.0 680191 PINE VAL 69.0 1	0.06455
160	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.2	112.8%	699666 SUNNYVAL 115 699704 SHRMN ST 115 1	0.0614
161	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.8	115.2%	ATC_B2_8E5_GD	0.06887
162	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.2	112.8%	ATC_B2_W-127	0.0614
163	68024 2	LUBLIN	69	6805 05	LAKEHEAD	69	1	680	25	28.7	114.8%	B2.HYD-TCN	0.06615
166	68048 1	LUBLINTP	69	6805 05	LAKEHEAD	69	1	680	25	27.3	109.2%	699666 SUNNYVAL 115 699704 SHRMN ST 115 1	0.04145
168	68048 1	LUBLINTP	69	6805 05	LAKEHEAD	69	1	680	25	27.3	109.2%	ATC_B2_W-127	0.04145

170	69856 8	DANZ AVE	69	6995 88	PULLIAM	69	1	696	58	61.2	105.5%	698569 VN BUREN 69.0 699588 PULLIAM 69.0 1	0.07634
171	69856 8	DANZ AVE	69	6995 88	PULLIAM	69	1	696	58	61.2	105.5%	ATC_B2_R-70	0.07634
172	B\$148 3	MARION1	1	3502 23	2MARION PLANT	69	1	361	61.6	84.4	137.0%	3Wnd: OPEN B\$1484 MARION2 2	0.05543
173	B\$148 3	MARION1	1	3502 24	5MARION PLANT	161	1	361	61.6	86	139.6%	3Wnd: OPEN B\$1484 MARION2 2	0.45366
174	B\$148 4	MARION2	1	3502 23	2MARION PLANT	69	2	361	100.8	106	105.2%	3Wnd: OPEN B\$1483 MARION1 1	0.06796
175	B\$148 4	MARION2	1	3502 24	5MARION PLANT	161	2	361	100.8	109.4	108.5%	3Wnd: OPEN B\$1483 MARION1 1	0.55625

PJM deliverability results:

Part I: over 100% flowgates with Maximum DFAX >3%. There are 22 flowgates (10 branches)

FG #	Fr Bus	Name	To Bus	Name	CK T	KVs	Areas	Rati ng	FN AC Flow	FN AC %	Cont Label	Cont Type	MISO -> PJM TDF (0.5MW above)	Max DFAX
6	254641	16PRITCH	254576	16CNT RTN	21	138/138	216/216	247	273.4	110.69	'LINE 16GLENS 138.0 TO 16MULLNX 138.0 TO 16PRITCH-31-4'	single	0.00246	0.30326

7	254641	16PRITCH	254576	16CNT RTN	21	138/1 38	216/2 16	247	273.3	110.6 5	'254627(16MULLNX)-254641(16PRITCH)_22'	single	0.00246	0.30326
8	254641	16PRITCH	254576	16CNT RTN	21	138/1 38	216/2 16	247	271.9	110.0 8	'254608(16HRTCRTAP)-254641(16PRITCH)_24'	single	0.00218	0.28203
9	254641	16PRITCH	254576	16CNT RTN	21	138/1 38	216/2 16	247	269.5	109.1 1	'254608(16HRTCRTAP)-254626(16MOORSV)_24'	single	0.00218	0.28203
10	254641	16PRITCH	254576	16CNT RTN	21	138/1 38	216/2 16	247	269.3	109.0 3	'254600(16GLENS)-254627(16MULLNX)_22'	single	0.00246	0.30326
11	254608	16HRTCRTAP	254626	16MO ORSV	24	138/1 38	216/2 16	191	210.9	110.4 2	'LINE 16PRITCH TO 16CNTRTN TO 16STHPRT 138.0 C-12'	single	0.00147	0.1847
12	254608	16HRTCRTAP	254626	16MO ORSV	24	138/1 38	216/2 16	191	210.7	110.3 1	'254576(16CNTRTN)-254641(16PRITCH)_21'	single	0.00148	0.18422
13	254608	16HRTCRTAP	254626	16MO ORSV	24	138/1 38	216/2 16	191	195.9	102.5 7	'254576(16CNTRTN)-254609(16HONYCK)_21'	single	0.00147	0.17123
14	254608	16HRTCRTAP	254626	16MO ORSV	24	138/1 38	216/2 16	191	192.9	100.9 9	'254609(16HONYCK)-254660(16STHPRT)_21'	single	0.00147	0.17123
15	254608	16HRTCRTAP	254626	16MO ORSV	24	138/1 38	216/2 16	191	192.1	100.5 8	'LINE 16GLENS 138.0 TO 16MULLNX 138.0 TO 16PRITCH-31-4'	single	0.00152	0.17986
16	256322	18LOWELJ	256209	18MAR QTT	1	138/1 38	218/2 18	173	188.3	108.8 4	'256298(18VERGEN)-256540(18RATIGANJ)_1'	single	0.00151	0.12906
17	256322	18LOWELJ	256209	18MAR QTT	1	138/1 38	218/2 18	173	186.9	108.0 3	'B 18NBLDNG-18VERGEN 138-1'	single	0.00151	0.12906
18	256322	18LOWELJ	256209	18MAR QTT	1	138/1 38	218/2 18	173	186.5	107.8	'256233(18NBLDNG)-256540(18RATIGANJ)_1'	single	0.00151	0.12906
19	249752	08HEBVST	249756	08HEO WEN	1	138/1 38	208/2 08	135	137.3	101.7	'B2 HE WORTH-BLOOM 345 + BLOOM 345/230 XFRS'	single	0.00164	0.19628
20	256087	18BULLOC KB	256212	18BULL OCKW	Z1	138/1 38	218/2 18	192	192.1	100.0 5	'256290(18TITBAW)-259407(BISLAND 2)_1'	single	-0.00074	0.1097
18 1	249752	08HEBVST	249756	08HEO WEN	1	138/1 38	208/2 08	135	137.3	101.7	'6136_B2'	single	0.00164	0.19628
18 8	249796	08MAPLE	249704	08CHR YS2	1	138/1 38	208/2 08	146	163.62	112.0 7	'1733_C2'	breaker	-0.00348	0.05244
20 4	255158	17MONTI CELLO	255127	17E_W INAMA C	1	138/1 38	217/2 17	138	140.7	101.9 6	'1733_C2'	breaker	-0.00040	0.09117
29 3	271333	DIXON ; R	272517	STILLM AN ;RT	1	138/1 38	222/2 22	212	213.92	101.1	'006-45-BT3-4__'	breaker	0.00416	0.03351
31 8	271835	KEWANEE ;23	271655	HENNE PIN ; T	1	138/1 38	222/2 22	232. 3	236.56	101.8 3	'074_KE-138__1'	bus	0.00262	0.03746
31 9	271835	KEWANEE ;23	271655	HENNE PIN ; T	1	138/1 38	222/2 22	232. 3	236.56	101.8 3	'074-38-L7423__'	breaker	0.00262	0.03746
32 0	271835	KEWANEE ;23	271655	HENNE PIN ; T	1	138/1 38	222/2 22	232. 3	236.56	101.8 3	'074-38-L7413__'	breaker	0.00262	0.03746

All overloaded branches (78 branches) which the transfer will have significant impact on

Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
254641	16PRITCH	254576	16CNTRTN	21	138/138	216/216
254608	16HRTCRSTAP	254626	16MOORSV	24	138/138	216/216
256322	18LOWELJ	256209	18MARQTT	1	138/138	218/218
256087	18BULLOCKB	256212	18BULLOCKW	Z1	138/138	218/218
249796	08MAPLE	249704	08CHRY2	1	138/138	208/208
255158	17MONTICELLO	255127	17E_WINAMAC	1	138/138	217/217
271333	DIXON ; R	272517	STILLMAN ; RT	1	138/138	222/222
271835	KEWANEE ;23	271655	HENNEPIN ; T	1	138/138	222/222
248547	07WORTH8	249752	08HEBVST	138/138	1	207/208
249752	08HEBVST	249756	08HEOWEN	138/138	1	208
250312	08BROOKJ	250792	08ROSEBG	69/69	1	208
264654	19STC4	265056	19TWR2497	120/120	1	219
264777	19MOHIC2	265056	19TWR2497	120/120	1	219
303133	4VATCAN	335379	4SCOTT1	138/138	1	332/351
318090	2PRENTISS	318441	5PRENTISS	69/161	1	349
334026	4GRIMES	334060	4MT.ZION	138/138	1	351
334326	6CYPRESS	334328	6BEVIL	230/230	1	351
334327	6AMELIA	334328	6BEVIL	230/230	1	351
334413	4PNEC BK	334414	4LINDE	138/138	1	351
334413	4PNEC BK	334430	4SABINE	138/138	1	351
334414	4LINDE	334430	4SABINE	138/138	1	351
334434	6SABINE	334435	6MID CO	230/230	1	351
334434	6SABINE	334442	6GULFWAY	230/230	1	351
334436	6P AC BK	334437	6KOLBS	230/230	1	351
334439	6VFWPK	334442	6GULFWAY	230/230	1	351
335815	6PT.HUD	335825	6FANCY	230/230	1	351
335815	6PT.HUD	335825	6FANCY	230/230	2	351
336138	6FAIRVW	336190	6GYPSY	230/230	1	351
336138	6FAIRVW	500510	MADISON6	230/230	1	351/502

336462	6MICH0	500360	FRONTST6	230/230	1	351/502
336800	3B.WLSN	336960	3SE-VKS	115/115	1	326
337040	6ANDRUS	337042	3ANDRUS	230/115	1	326
337126	3BATESV	337135	3SARDIS	115/115	1	326
337310	3BVRCK	500070	BC PST 4	115/138	1	351/502
337620	3WOODW-N	337962	3ALTHEI*	115/115	1	327
337651	8WH BLF	337957	8KEO	500/500	1	327
337686	3ARKLA	337695	3TIGRE *	115/115	1	327
337686	3ARKLA	337740	3HSEHVE	115/115	2	327
337695	3TIGRE *	337697	3PANTH*	115/115	1	327
337697	3PANTH*	337705	3CHEETA*	115/115	1	327
337718	3CARPE	337746	3MALV-S	115/115	1	327
337740	3HSEHVE	337741	3BUTERF	115/115	1	327
337741	3BUTERF	337800	3HASKEL	115/115	1	327
337800	3HASKEL	337801	3BENT-S*	115/115	1	327
337801	3BENT-S*	337802	3BAUXIT	115/115	1	327
337949	3LYNCH-W	338755	3REMIING#*	115/115	1	327
337962	3ALTHEI*	338738	3WABASEKA.W#	115/115	1	327
337964	3WABSKA	338738	3WABASEKA.W#	115/115	1	327
338130	5CALCR	505448	NORFORK5	161/161	1	327/515
338151	5NEWPO	338173	5NEW-IN	161/161	1	327
338161	5WM-EHV	338162	8WM-EHV	161/500	1	327
344870	2KH2 XFMR	347195	2HAMLTNAM	69/69	1	357
347831	4NEWTON	348126	4ROBNSNAM	138/138	1	357
500280	ELEESV 6	500770	RODEMUR 6	230/230	1	502
603061	BLK DOG7	603116	WILSON 7	115/115	1	600
605079	NEWULMS8	605282	NEWULMP8	69/69	1	600
605181	REDWING8	605374	BAY CIT8	69/69	1	600
605296	WSTSALE8	605316	LAX 8	69/69	1	600
605569	JAMESTP8	617247	GRE-JMSTWTP8	69/69	1	600

615347	GRE-MCHENRY4	B\$0342	230/115	230/1	1	615
615348	GRE-MCHENRY7	B\$0342	230/115	115/1	1	615
617034	GRE-BRAHAM 8	617046	GRE-GRASTON8	69/69	1	615
618415	GRE-WINTHRP8	618433	GRE-BRWN TP8	69/69	1	600
618431	GRE-BELL 8	618432	GRE-HSSNJCT8	69/69	1	600
618433	GRE-BRWN TP8	618436	GRE-SUMTER 8	69/69	1	600
630034	AGENCY 8	630615	4TH ST 8	69/69	1	627
630038	BRLGTN28	630616	S BURL 8	69/69	1	627
630381	SLAKEN 8	630385	SLAKES 8	69/69	1	627
630385	SLAKES 8	652569	CRESTON8	69/69	1	627/652
630443	ARISTAP8	630446	CRESTN8_	69/69	1	627
636301	FLOYD 8	636307	GREENTP8	69/69	1	635
680242	LUBLIN	680505	LAKEHEAD	69/69	1	680
680481	LUBLINTP	680505	LAKEHEAD	69/69	1	680
698568	DANZ AVE	699588	PULLIAM	69/69	1	696
B\$1483	MARION1	350223	2MARIONPLANT	1/69	1	361
B\$1483	MARION1	350224	5MARIONPLANT	1/161	1	361
B\$1484	MARION2	350223	2MARIONPLANT	1/69	2	361
B\$1484	MARION2	350224	5MARIONPLANT	1/161	2	361

There are 433 IMPACTED generators in MISO. Among these, there are 389 NR generators and total impacted capacity value is 58253MW (34.8% of total MISO capacity). The impacted generators are listed below (NOTE: in the published results the impacted capacity value is 58275MW, the 22MW difference are due to an error one generator capacity value, it is corrected here):

NBus	Name	Area	NR value
6027	G587	600	20

6033	G531	615	ER
248773	07MEROM5	207	955
248889	07WORTH1	207	83.5
248890	07WORTH2	207	83.5
251852	08CONRSV	208	86
255441	17SGR_CK-CTA	217	165
255442	17SGR_CK-CTB	217	168
255443	17SGR_CK-STG	217	217
264510	19PUTNM	219	13.75
264640	19REMER1	219	12.25
264756	19SC123P	219	23.07
264795	19CARBN	219	12.8
264820	19DEAN12	219	144
264821	19DEAN34	219	144
264859	19SC4	219	151
264860	19SC3	219	160
264861	19SC2	219	154
264862	19SC1	219	151
303001	1BC1 U1	332	110
303002	1BC1 U2	332	110
303003	1BC1 U3	332	124.2
303004	1BC1 U4	332	124.2
303006	1BC2 U1	332	593
303007	1BC2 U2	332	575
303008	1BC2 U3	332	588
303010	1KOCH U1	332	46
303011	1KOCH U2	332	45
303012	1KOCH U3	332	36
303013	1KOCH U4	332	34
303017	1IG1BAYOU	332	80

303018	1IG2BAYOU	332	80
303019	1IG3BAYOU	332	80
303020	1IG4BAYOU	332	80
303024	1G3INTHB	332	175.9
303025	1S3INTHB	332	148.5
303026	1G4INTHB	332	175.9
303027	1S4INTHB	332	148.5
303031	1G1INTHB	332	175.9
303032	1S1INTHB	332	148.5
303033	1G2INTHB	332	175.9
303034	1S2INTHB	332	148.5
318007	5MOROW161	349	400
318008	5MOSEL161	349	300
318009	2MOSEL 69	349	177
318010	2PAULDING	349	20
318011	2BENN GT	349	16
318206	2SYLVAGEN	349	129
334030	1FRNTR 1	351	165
334031	1FRNTR 2	351	165
334032	1FRNTR 3	351	155.8
334033	1FRNTR 4	351	292.7
334070	1G1LEWIS	351	260
334071	1G2LEWIS	351	260
334232	1PELCNRD U1	351	85
334233	1PELCNRD U2	351	85
334282	4RAYBURN	351	52
334298	1CYPR U1	351	85
334299	1CYPR U2	351	85
334335	4TOLEDO	351	69.9
334392	1EXXONGT1	351	112.5

334393	1EXXONGT2	351	112.5
334394	1EXXONGT3	351	112.5
334431	1G1SABIN	351	212
334432	1G2SABIN	351	212
334433	1G3SABIN	351	418.3
334439	6VFWPK	351	54.4
334440	1G4SABIN	351	529
334441	1G5SABIN	351	470
334445	6SOSIDE	351	211.1
334446	6SLTGRAS	351	99.8
334456	1CONOCU1	351	45.3
334457	1CONOCU2	351	45.3
334458	1CONOCU3	351	24.5
334467	1DUPONTU	351	75
334503	2GOODYER	351	30.9
334629	2SK HUNT	351	43.6
334630	2MAGNOLIA	351	23.9
334708	2PHBLACK	351	2.6
334738	1BAYORU1	351	10.2
334739	1BAYORU2	351	10.2
334740	1BAYORU3	351	7.8
335072	6ROSEBF	351	34.2
335075	1DYNGYU1	351	170
335076	1DYNGYU2	351	170
335137	2PPC NO	351	211.8
335177	1RSCO R4	351	54
335178	1RSCO R5	351	124.9
335179	1RSCO R6	351	124.9
335201	1G1NELSON	351	112
335202	1G2NELSON	351	112

335203	1G3NELSON	351	145.4
335204	1G4NELSON	351	484.8
335206	1G6NELSON	351	550
335370	1ACADIA_S26!	351	240.5
335371	1G2-1ACAD	351	179.7
335372	1G2-2ACAD	351	179.7
335541	1IDOWAEP1	351	91.1
335542	1IDOWAEP2	351	91.1
335543	1IDOWAEP3	351	91.1
335544	1IDOWAEP4	351	91.1
335545	1IDOWAEP5	351	103
335546	6DOWCOGN	351	348
335570	1IC1CARVL	351	187
335571	1IC2CARVL	351	187
335572	1IS1CARVL	351	181
335577	1CSHELLG1	351	45
335578	1CSHELLG2	351	45
335592	4SOUTHWD	351	75.8
335611	1G1WGLEN	351	150
335612	1G2WGLEN	351	207
335613	1G3WGLEN	351	ER
335614	1G4WGLEN	351	540
335615	1G5WGLEN	351	ER
335638	1FORMOU1	351	18
335640	1G1ENCO	351	39.6
335644	1G5EXXON	351	110
335647	1G4EXXON	351	64.5
335680	1G10LAST	351	ER
335681	1G11LAST	351	ER
335682	1G12LAST	351	ER

335684	1G1LASTA	351	75
335696	1CLSUCOG1	351	13.6
335806	4REPAPCO	351	65.4
335831	1G1RVRBN	351	1050.4
336002	1GA GULF	351	240
336090	1ALLI-T1	351	15.5
336151	1WAT U1	351	381.1
336152	1WAT U2	351	381.1
336153	1WAT U3	351	1125.7
336156	1WAT U4	351	38
336167	1GOXY U1	351	154.7
336168	1GOXY U2	351	154.7
336169	1GOXY U3	351	154.7
336170	1SOXY U1	351	295.8
336176	1UCARBGT1	351	95.8
336177	1UCARBGT2	351	95.8
336178	1UCARBST1	351	17.1
336179	1UCARBST2	351	38.5
336191	1GYP U3	351	535
336221	1GYP U1	351	250
336222	1GYP U2	351	410
336240	1NMIL CT1	351	179
336241	1NMIL CT2	351	179
336242	1NMIL ST1	351	212
336251	1NMIL U4	351	734
336252	1NMIL U5	351	740
336265	6KAISER	351	14.5
336283	1NMIL U3	351	128
336446	1MICH U2	351	235
336464	1MICH U3	351	540

336571	1ISLVCRK1	326	75
336572	1ISLVCRK2	326	75
336573	1ISLVCRK3	326	75
336801	1B.WLSN U1	326	506.3
336821	1GGULF U1	326	1518.2
336831	1B.WLSN U2	326	731.3
336851	1IG1DUKEH	326	158.3
336853	1IG2DUKEH	326	158.3
336854	1IS1DUKEH	326	177.5
336941	1REX BRN U5	326	10
336943	1REX BRN U3	326	69.3
336944	1REX BRN U4	326	211.8
336978	3MUN-YAZ	326	30
337006	1ATTALA G1	326	169.6
337007	1ATTALA G2	326	169.6
337008	1ATTALA S1	326	190.2
337041	1ANDRUS U1	326	740
337054	3GRNWOD	326	75
337083	1DELTA U1	326	ER
337084	1DELTA U2	326	ER
337098	3CLARKMUN	326	45
337102	1IMEPCLG1	326	75
337103	1IMEPCLG2	326	75
337105	1IMEPCLG3	326	75
337106	1IMEPCLG4	326	75
337124	1SLSBAU3	326	98.8
337125	1CLSBAU3	326	182.2
337323	1MURRU12	351	38.7
337324	1MURRU34	351	38.7
337325	1MURRU56	351	38.7

337326	1MURRU78	351	38.7
337347	3HODGE	351	2.8
337416	1STER U6	351	ER
337417	1STER 7A	351	50
337418	1STER 7B	351	50
337419	1STER 7C	351	86
337421	1G1OCHIT	351	164
337422	1S1OCHIT	351	103
337423	1G2OCHIT	351	164
337424	1S2OCHIT	351	103
337425	1G3OCHIT	351	164
337426	1S3OCHIT	351	103
337428	1C1PERYV	351	185
337429	1C2PERYV	351	185
337430	1C3PERYV	351	185
337432	1S1PERYV	351	180
337504	1COUC U2	327	130
337631	1SKY U1	327	18.8
337632	1SKY U2	327	5.2
337652	1BLUF U1	327	815
337653	1BLUF U2	327	844
337666	1DEGR U1	327	46
337667	1DEGR U2	327	32
337688	1CATH U2	327	50.3
337689	1CATH U3	327	98.5
337691	1CATH U1	327	51.2
337692	1CATH U4	327	539
337694	1REML UA	327	11
337711	1BLAK U1	327	43
337712	1BLAK U2	327	43

337719	1CARP U1	327	29.5
337720	1CARP U2	327	29.5
337757	1DUKHSS1	327	317
337758	1DUKHSG1	327	162.6
337759	1DUKHSG2	327	162.6
337760	1DUKHSS2	327	ER
337761	1DUKHSG3	327	ER
337762	1DUKHSG4	327	ER
337764	1C1TRCBL	327	219.8
337765	1C2TRCBL	327	219.8
337766	1S1TRCBL	327	231.5
337953	1LYNC U2	327	68
337954	1LYNC U3	327	130
337999	1RITC U1	327	ER
338000	1RITC U2	327	0
338024	1MOSE U1	327	ER
338026	1MOSE U2	327	ER
338143	1ISES U1	327	836
338146	1ISES U2	327	842
338401	1LSPWRU1	331	88.5
338402	1LSPWRU3	331	157.8
338403	1LSPWRU2	331	88.5
338404	1LSPWRU4	331	157.8
338442	1G1PANDA	337	163.5
338443	1S1PANDA	337	247.4
338444	1G2PANDA	337	163.5
338445	1G3PANDA	337	83.1
338446	1S2PANDA	337	125.7
338447	1G4PANDA	337	83.1
338448	1G5PANDA	337	83.1

338449	1S3PANDA	337	83.1
338450	1G6PANDA	337	83.1
338451	1G7PANDA	337	125.7
338452	1S4PANDA	337	83.1
338453	1G8PANDA	337	125.7
338482	1MURY U1	339	40.1
338500	1MCLE U1	327	134
338501	1L&D2U1	327	34
338502	1L&D2U2	327	34
338503	1L&D2U3	327	34
338507	1C1KNWRI	327	95
338508	1C3KNWRI	327	95
338509	1C5KNWRI	327	95
338510	1S1KNWRI	327	95
338511	1C7KNWRI	327	73
338512	1S2KNWRI	327	95
338513	1BAILEY U1	327	122
344876	1KNMDY G1	356	103
344877	1KNMDY G2	356	103
345994	1RCEC G1	356	76
345995	1RCEC G2	356	76
345996	1RCEC G3	356	76
345997	1RCEC G4	356	76
347832	1NEWTON 1	357	633
347833	1NEWTON 2	357	633
350231	1MRNGEN1	361	0
350232	1MRNGEN2	361	0
350233	1MRNGEN3	361	0
350234	1MRNGEN4	361	180
350235	1MRNGEN5	361	88

350236	1MRNGEN6	361	88
350237	1DUMGEN	361	ER
500110	BOISE 4	502	1.5
500205	G1COLUMB	502	0
500420	HUNTER4	502	125.1
500430	IPAPER 4	502	95.7
500608	G8NATCH	502	1.9
500610	G10NATCH	502	2.7
500710	PVKRFT 4	502	0.8
500764	REDRVRGEN	502	1.9
500915	G1WKRAFT	502	7.5
501801	G1DOLHIL	502	651.5
501811	G1NESBIT	502	440
501812	G2RODEMR	502	537
501813	G3MADISN	502	650
501821	G1TECHE	502	23
501823	G3TECHE	502	349
501910	G1 ACAD	502	265
501911	G1-1ACAD	502	198
501912	G1-2ACAD	502	198
501960	G6COUGH	502	93.7
501961	G6-1COUGH	502	145.5
501970	G7COUGH	502	199.8
501971	G7-1COUGH	502	145.5
501972	G7-2COUGH	502	145.5
502433	LABBE1	503	50
502434	LABBE2	503	50
502435	HARGIS1	503	50
502436	HARGIS2	503	50
502437	BONIN3	503	146

502438	BONIN2	503	70
502439	BONIN1	503	40
503301	MARGNCTY4	504	48
503302	PLAQUEM2	504	44
503303	NEWROAD6	504	9
503304	RAYNE 2	504	6
503305	HOUMA 3	504	75.4
600011	BLK D75G	600	161
600012	BLK D72G	600	115
600019	MNRIVRG1	600	49.9
600022	BLL 71G	600	39
600023	BLL 72G	600	39
600024	BLL 73G	600	36
600025	BLL 74G	600	39
600043	BLL C75G	600	151
600044	BLL C76G	600	151
600047	MEC-CT1	600	188.5
600053	BYLSBY9G	600	ER
600054	KEYCT12G	600	ER
600055	KEYCT34G	600	26
600059	VELVA W	600	0
600063	COLVILL1 G	600	175
600064	COLVILL G	600	175
600129	HOLCOMB G	600	35.3
603154	CORNELL7	600	33.2
603189	GLNCOMU7	600	41.15
605012	WILMART8	600	ER
605024	BIGFALL8	600	7.5
605079	NEWULMS8	600	80.6
605081	SLPY MU8	600	ER

605086	FARFXNU8	600	ER
605154	KENYNVL8	600	1.08
605181	REDWING8	600	20
605250	SHAKOPE8	600	15
605308	HATFLD 8	600	6
605534	DOUGHTY8	600	ER
613290	PRINPLNT	615	ER
613320	REDWD FL	600	8.3
615001	GRE-COAL 41G	615	633.4
615002	GRE-COAL 42G	615	628.4
615010	GRE-STANT41G	615	202.9
615051	GRE-CAMBRDG8	615	29.4
615052	GRE-CGS 82G	615	170
615065	GRE-HASTNGSG	615	ER
620115	HRDLKGEN	620	39.9
629071	BURLIN1G	627	222
629134	CRESTN_9	627	ER
629149	ANITA	627	3
630038	BRLGTN28	627	76
630373	N CENT8	627	62.4
630385	SLAKES 8	627	79
630614	N LONDON	627	7.95
636302	CCITY S8	635	32.6
636309	CCITYSG1	635	15
680099	LAFARG_8	680	ER
680102	VIOLA_8	680	ER
680114	CASHTO_8	600	ER
680120	ELROY MN	680	ER
680132	NEWLIS_8	680	ER
680157	MERRIL_8	600	ER

680334	FLAMBEAU	680	23.9
680545	TIMBERLINE_G	680	ER
693527	MEWD CT	696	53.5
693574	LINCOLN WTG	697	1.056
693575	RED RVR WTG	697	1.188
693783	JUNEAU J31	694	12.39
693786	PETENWEL HG	696	20.67
698330	CAR G1	694	17.6
699624	CUSTER CT1	696	22.8
699651	LAKFNT1	696	27.14
699652	LAKFNT2	696	22
699653	LAKF G9	696	56
501824	G4TECHE	502	41.4
335227	1AGRICE	351	12
335056	1BASELL	351	19.9
337458	PID266GEN	351	36.5
337336	PID268GEN	351	38.8
336417	1SUNERGY	351	87.6
334447	1TOTAL	351	28.6
336072	1NUCORG1	351	123.9
336073	1NUCORG2	351	123.9
303035	1KOCH U5	332	14.6
334345	1CYPR U3!	351	73.1
334346	1CYPR U4!	351	73.1
335016	1CII_LONESTR	351	33.4
334313	1WOODVILLE	351	50
336099	1BURASGEN	351	14
251896	08WBSHC5	208	32
254821	PRITCHARD1	216	32.1
254822	PRITCHARD2	216	35.2

254823	PRITCHARD3	216	38.8
254824	PRITCHARD4	216	51.7
254825	PRITCHARD5	216	55.1
254826	PRITCHARD6	216	95.8
254845	STOUT 5	216	100.2
254846	STOUT 6	216	98.5
254854	STOUT CT4	216	74.5
254855	STOUT CT5	216	78.5
254856	STOUT CT6	216	153.1
255473	17HOOSIER_WF	217	20
255476	17ORION_BCWF	217	26.1
256337	18MCVST1	218	ER
256388	18MCVG3	218	88
256389	18MCVG4	218	88
256390	18MCVG5	218	88
256391	18MCVG6	218	88
256392	18MCVG7	218	88
256393	18MCVG8	218	88
256394	18MCVG9	218	88
256395	18MCVG10	218	88
256396	18MCVG11	218	88
256397	18MCVG12	218	88
256398	18MCVG13	218	88
256399	18MCVG14	218	88
256423	GRAYLING C	218	36
256478	MIO H	218	ER
256481	SANFORD H	218	ER
256482	SECORD H	218	ER
256484	EDENVIL H	218	ER
256485	SMALLWOOD H	218	ER

256578	18MCVST2	218	ER
257514	18LOWELL	218	ER
259446	LARCHC	218	ER
348193	1STTLR G1	357	15.04
348194	1STTLR G2	357	15.04
349121	1HAVANA G6	357	482
629070	BVRCH52G	627	241.3
630337	DERCREK8	627	ER
636655	RIVSID5G	635	124
636656	SB 47 5	635	ER
638091	GENESEO8	635	ER
10188	J238_GEN	216	488

In PJM’s study results, flowgates are also listed which have loading between 90% and 100%. Basically assuming all the overloads identified in MISO gen delliv and PJM gen deliv are solved, these flowgates would define what would be the next transfer capability between MISO to PJM. What would be the impact generators if transfer happens? There are 37 additional branches (97 flowgates).

Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
256186	18KARN	256051	18AT-K-T	1	138/138	218/218
256016	18MCV	256027	18TITBAW	2	345/345	218/218

263802	18GM138	263809	18WILLOW	1	138/138	218/218
263801	18ECK1	263802	18GM138	1	138/138	218/218
265056	19TWR2497	264777	19MOHIC2	1	120/120	219/219
264654	19STC4	265056	19TWR2497	1	120/120	219/219
249756	08HEOWEN	249692	08BEDFRD	1	138/138	208/208
264963	19STC2	264776	19MOHIC1	1	120/120	219/219
699059	PAD 138	698058	NW_BELOIT	1	138/138	694/694
631205	KARST5	631052	LANSINGW	1	161/161	627/627
264923	19BLMFD5	264922	19BLMFD4	Z1	120/120	219/219
264638	19PONTC3	265175	19TAMPATP	1	120/120	219/219
256016	18MCV	256027	18TITBAW	1	345/345	218/218
255158	17MONTICELLO	255127	17E_WINAMAC	1	138/138	217/217
347831	4NEWTON	348126	4ROBNSNAM	1	138/138	357/357
254641	16PRITCH	254627	16MULLNX	22	138/138	216/216
698058	NW_BELOIT	699048	BLK 138	1	138/138	694/694
264777	19MOHIC2	264919	19AXLE	1	120/120	219/219
254626	16MOORSV	254572	16CAMBY	84	138/138	216/216
254576	16CNTRTN	254609	16HONYCK	21	138/138	216/216
254659	16SW	254621	16LILLY	10	138/138	216/216
242940	05MUSKNG	242937	05KAMMER	1	345/345	205/205
242930	05SCANTO	242943	05SCANTO	3	765/345	205/205
249741	08GRTOW2	249796	08MAPLE	1	138/138	208/208
249741	08GRTOW2	249719	08DELCO	1	138/138	208/208
249756	08HEOWEN	249692	08BEDFRD	1	138/138	208/208
250057	08M.FORT	250131	08WILEY2	1	138/138	212/212
254608	16HRTCRSTAP	254626	16MOORSV	24	138/138	216/216
254641	16PRITCH	254576	16CNTRTN	21	138/138	216/216
255158	17MONTICELLO	255127	17E_WINAMAC	1	138/138	217/217
256113	18CONVSJ	256090	18CALHNP	1	138/138	218/218
256322	18LOWELJ	256209	18MARQTT	1	138/138	218/218

256301	18VERONA	256113	18CONVSJ	1	138/138	218/218
347831	4NEWTON	348126	4ROBNSNAM	1	138/138	357/357
348068	4RAMSEY CIPS	347946	4PANA	1	138/138	357/357
314918	8NO ANNA	314934	8SPOTSYL	1	500/500	345/345
270717	DRESDEN ; R	275180	DRESDEN ;3M	1	345/138	222/222
275180	DRESDEN ;3M	271336	DRESDEN ; B	1	138/138	222/222
271839	KEWANEE ;22	271835	KEWANEE ;23	1	138/138	222/222
272479	SKOKIE 88; R	272467	SKOKIE 85;6T	1	138/138	222/222
247508	U2-090 C	243218	05DESOTO	1	345/345	205/205

NOTE: the grey highlighted facility may or may not belong to this category depending on the rating. According to MISO, the case rating is not correct, but we haven't received the updated rating yet.

The generators connected to the 1388 generator buses (among total 1566 generator buses in MISO) will be impacted. A sensitivity using 5% DFAX cutoff (Vs 3% generator DFAX cutoff used) has been performed. The results are as following:

Among all the overloaded flowgates identified in MISO deliverability test and PJM deliverability test, there are 70 (Vs 78) branches which the MISO to PJM transfer will have impact on. There are 368 (Vs 433) IMPACTED generators (more specifically generator buses) in MISO. Among these, 336 (Vs 389) of them are NR generator buses and total impacted capacity value is 53369MW (VS 58253MW). The total MISO capacity is around 167473MW. So total impact capacity is about 31.9% (Vs 34.8%).

STEP 3: PJM gen deliv (Export: PJM+MISO; Import: PJM+MISO)

Monitored PJM + MISO areas

Contingencies:

PJM contingencies (single-8141, tower-1463, bus-1358, line with stuck breaker-5908, total 16870 contingencies)

MISO singles: 19872 single contingencies

Violation:

PJM overloaded facilities:

1	239070	02RICHLD	238521	02NAOMI	1	138/138	202/202
2	243212	05BENTON	243250	05BENTON	1	345/138	205/205
3	271333	DIXON ; R	272517	STILLMAN ;RT	1	138/138	222/222
4	271835	KEWANEE ;23	271655	HENNEPIN ; T	1	138/138	222/222
5	247502	T-094	243212	05BENTON	1	345/345	205/205
6	247508	U2-090 C	243218	05DESOTO	1	345/345	205/205
7	272378	ROSCOE BE;BT	271638	HARLEM ; B	1	138/138	222/222
8	239316	02WASHREC	238864	02KNOX	1	138/138	202/202
9	242605	05CLNCHR	242606	05CLNLFD	1	138/138	205/205

NOTE: I do notice that the following line disappear in the joint study. The reason is bunch of MISO units are now to relief the loading.

239176	02WOOD+	238890	02LEMOYN	1
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MISO overloaded facilities :

FG #	Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
1	249741	08GRTOW2	249796	08MAPLE	1	138/138	208/208
2	249796	08MAPLE	249704	08CHRY2	1	138/138	208/208
3	997896	115/69	615524	GRE-DEER RV8	1	1/69	615/615
4	997893	115/69	615542	GRE-GLNDALE8	2	1/69	600/600
5	997892	115/69	615542	GRE-GLNDALE8	1	1/69	600/600
6	255158	17MONTICELLO	255127	17E_WINAMAC	1	138/138	217/217
7	256071	18BILMRJ	256567	18BLENDON1	1	138/138	218/218
8	256002	18CAMPBL	999264	CAMPBELL5	5	345/1	218/218
9	256524	18HWTN	256566	18FOURMILEW	1	138/138	218/218
10	256322	18LOWELJ	256209	18MARQTT	1	138/138	218/218
11	256016	18MCV	256027	18TITBAW	2	345/345	218/218
12	256016	18MCV	256027	18TITBAW	1	345/345	218/218
13	256263	18RONDO	256259	18RIGGSV	1	138/138	218/218
14	256026	18THETFD	264580	19JEWEL	1	345/345	218/219
15	264654	19STC4	265056	19TWR2497	1	120/120	219/219
16	265056	19TWR2497	264777	19MOHIC2	1	120/120	219/219
17	997927	230/115	615348	GRE-MCHENRY7	1	1/115	615/615
18	997877	230/69	619977	GRE-WILLMAR8	1	1/69	615/615
19	300387	2BEVIER	300400	2MACNLK	1	69/69	330/330
20	324447	2BONNIE	324050	2JONESVILLE	1	69/69	363/363
21	350200	2CARRIERMILS	350213	2HAMILTON	99	69/69	361/361
22	324554	2GRBURG	324830	2CMPBVEK	1	69/69	363/363
23	362124	2LOVELLTN	362887	2CEDAR BLUFF	1	69/69	347/347
24	362122	2MELTON H HP	362496	2WATTROAD TN	1	69/69	347/347
25	362128	2NOTTELY HP	362130	2NOTTELY GA	1	69/69	347/347
26	362151	2OCOEE #3 HP	362006	2BASIN TN	1	69/69	347/347

27	362014	2SOLWAY TN	362027	2TURKEY CRK	1	69/69	347/347
28	334271	2TEX-HIL	334270	2LOVELSL	1	69/69	351/351
29	324977	2TOMSCT	324446	2BOND	1	69/69	363/363
30	362027	2TURKEY CRK	362124	2LOVELLTN	1	69/69	347/347
31	324990	2WAITSBR	324787	2UNION U	1	69/69	363/363
32	362186	2WATAUGA HP	362187	2ELIZABETHTN	1	69/69	347/347
33	362496	2WATTROAD TN	362124	2LOVELLTN	1	69/69	347/347
34	336280	39MILE	336084	3BARATA	1	115/115	351/351
35	337962	3ALTHEI*	338738	3WABASEKA.W#	1	115/115	327/327
36	337686	3ARKLA	337740	3HSEHVE	2	115/115	327/327
37	337686	3ARKLA	337695	3TIGRE *	1	115/115	327/327
38	337686	3ARKLA	337685	3HSEHVW	1	115/115	327/327
39	336800	3B.WLSN	336960	3SE-VKS	1	115/115	326/326
40	336800	3B.WLSN	336804	3VKSBRG	1	115/115	326/326
41	337126	3BATESV	337135	3SARDIS	1	115/115	326/326
42	337801	3BENT-S*	337802	3BAUXIT	1	115/115	327/327
43	337741	3BUTERF	337800	3HASKEL	1	115/115	327/327
44	337718	3CARPE	337746	3MALV-S	1	115/115	327/327
45	337098	3CLARKMUN	337099	3CLARKD	1	115/115	326/326
46	336080	3CLOVEL	336081	3GMEADW	1	115/115	351/351
47	337800	3HASKEL	337801	3BENT-S*	1	115/115	327/327
48	337150	3HN LAK	337144	3GRNBRK	1	115/115	326/326
49	337740	3HSEHVE	337741	3BUTERF	1	115/115	327/327
50	337685	3HSEHVW	337734	3HS-IND	1	115/115	327/327
51	337734	3HS-IND	337733	3HS-UC	1	115/115	327/327
52	337715	3HS-MIL	337714	3HS-ROY	1	115/115	327/327
53	337733	3HS-UC	337731	3HS-E*	1	115/115	327/327
54	365584	3N PRIMARY 32	365512	3FRONT ST 4	1	115/115	347/347
55	365584	3N PRIMARY 32	365903	3DUNLAP 76	1	115/115	347/347
56	337697	3PANTH*	337705	3CHEETA*	1	115/115	327/327

57	365604	3S PRIMARY 31	365514	3THIRD ST 3	1	115/115	347/347
58	337351	3SAILES	337350	3TEXASE	1	115/115	351/351
59	337061	3SAWYR*	337062	3ELLIOT	1	115/115	326/326
60	337136	3SNTOB	337137	3CLDWTR	1	115/115	326/326
61	337415	3STERLING%	337449	3OKRIDG	1	115/115	351/351
62	336033	3TEREBN	303202	3GRENWD	1	115/115	351/332
63	337350	3TEXASE	337349	3LUCKY	1	115/115	351/351
64	337695	3TIGRE *	337697	3PANTH*	1	115/115	327/327
65	336037	3VLNTIN	336080	3CLOVEL	1	115/115	351/351
66	338738	3WABASEKA.W#	337964	3WABSKA	1	115/115	327/327
67	337060	3WINONA	337061	3SAWYR*	1	115/115	326/326
68	337620	3WOODW-N	337962	3ALTHEI*	1	115/115	327/327
69	334084	4CLVELND	334119	4TARKING	1	138/138	351/351
70	324236	4CRUN 6	324237	4CRUNSS	1	138/138	363/363
71	334026	4GRIMES	334060	4MT.ZION	1	138/138	351/351
72	334414	4LINDE	334413	4PNEC BK	1	138/138	351/351
73	348921	4PRINCETN TP	348919	4LTV STL NTP	1	138/138	357/357
74	335805	4PT HUD	303190	4THOMPSN CRK	1	138/138	351/332
75	334430	4SABINE	334413	4PNEC BK	1	138/138	351/351
76	334430	4SABINE	334414	4LINDE	1	138/138	351/351
77	335379	4SCOTT1	303133	4VATCAN	1	138/138	351/332
78	630615	4TH ST 8	630034	AGENCY 8	1	69/69	627/627
79	303190	4THOMPSN CRK	335808	4TP.STAR	1	138/138	332/351
80	335589	4WYNDTTE	335590	4CONWAY	1	138/138	351/351
81	338130	5CALCR	505448	NORFORK5	1	161/161	327/515
82	360724	5FREEPORT #1	365935	5SHELBY DR74	1	161/161	347/347
83	360724	5FREEPORT #1	365579	5OAKVILLE 44	1	161/161	347/347
84	337939	5GOLDCR*	337926	5QUITMN	1	161/161	327/327
85	338705	5HOXIES#	338213	5WALNUT	1	161/161	327/327
86	338152	5ISES-2	338142	5ISES-1	Z1	161/161	327/327

87	350224	5MARIONPLANT	998914	MARION1	1	161/1	361/361
88	350224	5MARIONPLANT	998913	MARION2	2	161/1	361/361
89	318007	5MOROW161	318004	5PURVIS	1	161/161	349/349
90	318007	5MOROW161	318004	5PURVIS	2	161/161	349/349
91	338173	5NEW-IN	338172	5NEW-AB	1	161/161	327/327
92	338151	5NEWPO	338173	5NEW-IN	1	161/161	327/327
93	318441	5PRENTISS	318090	2PRENTISS	1	161/69	349/349
94	324160	5RVR Q T	324159	5RIVER Q	1	161/161	363/363
95	338169	5TRUMAN	338707	5TRUM-W#	1	161/161	327/327
96	300129	5WASHBRN	300763	2WASHBRN	1	161/69	330/330
97	338161	5WM-EHV	338414	5WM-POK	1	161/161	327/334
98	300123	5WPLAIN	301123	2WSTPL3	2	161/69	330/330
99	300123	5WPLAIN	301123	2WSTPL3	1	161/69	330/330
100	337040	6ANDRUS	337042	3ANDRUS	1	230/115	326/326
101	334328	6BEVIL	334327	6AMELIA	1	230/230	351/351
102	334326	6CYPRESS	334328	6BEVIL	1	230/230	351/351
103	334437	6KOLBS	334436	6P AC BK	1	230/230	351/351
104	337100	6MEPSCLK	337098	3CLARKMUN	1	230/115	326/326
105	337100	6MEPSCLK	337107	6MOONLAK	1	230/230	326/326
106	334434	6SABINE	334442	6GULFWAY	1	230/230	351/351
107	608730	78L TAP7	608733	NATIONL7	1	115/115	608/608
108	324114	7TRIMBLE	324314	4TRIMBLE	1	345/138	363/363
109	337808	8MABEL	337860	8KNWRIVL	1	500/500	327/327
110	360097	8VOLUNTEER	360102	8PHIPPS B NP	1	500/500	347/347
111	337651	8WH BLF	337957	8KEO	1	500/500	327/327
112	338162	8WM-EHV	338161	5WM-EHV	1	500/161	327/327
113	608600	BISONMP4	657756	SQBUTTE4	1	230/230	608/620
114	603061	BLK DOG7	603116	WILSON 7	1	115/115	600/600
115	608626	BOSWELL4	608629	CALUMET4	1	230/230	608/608
116	659151	BOTTNOJCTCP7	652455	BOTTNO 7	1	115/115	652/652

117	630038	BRLGTN28	630616	S BURL 8	1	69/69	627/627
118	999264	CAMPBELL5	256095	18CAMPBELLB	5	1/138	218/218
119	608722	FORBES 7	608725	44L TAP7	1	115/115	608/608
120	652510	FTRANDL7	640349	SPENCER7	1	115/115	652/640
121	652442	GARRISN7	652590	SNAKECR7	1	115/115	652/652
122	997624	GLENHAM TR1	661035	GLENHAM7	1	1/115	661/661
123	661038	GLENHAM4	997624	GLENHAM TR1	1	230/1	652/652
124	618433	GRE-BRWN TP8	618436	GRE-SUMTER 8	1	69/69	600/600
125	615434	GRE-BURNVIL8	616963	GRE-COLNHLL8	1	69/69	600/600
126	615523	GRE-DEER RV7	997896	115/69	1	115/1	615/615
127	615541	GRE-GLNDALE7	997893	115/69	2	115/1	600/600
128	615541	GRE-GLNDALE7	997892	115/69	1	115/1	600/600
129	615347	GRE-MCHENRY4	997927	230/115	1	230/1	615/615
130	617056	GRE-MORA 8	613160	MORA	1	69/69	615/615
131	619975	GRE-WILLMAR4	997877	230/69	1	230/1	615/615
132	618415	GRE-WINTHRP8	618433	GRE-BRWN TP8	1	69/69	600/600
133	630128	HAYWD#18	630129	HAYWD#28	1	69/69	627/627
134	505420	HERGETT5	998766	HGT X2	1	161/1	515/515
135	505420	HERGETT5	998767	HGT X1	1	161/1	515/515
136	998767	HGT X1	505423	HERGETT2	1	1/69	515/515
137	998766	HGT X2	505423	HERGETT2	1	1/69	515/515
138	605569	JAMESTP8	617247	GRE-JMSTWTP8	1	69/69	600/600
139	631205	KARST5	631052	LANSINGW	1	161/161	627/627
140	698805	LAKE MIN	698740	WINON TI	1	69/69	698/698
141	680505	LAKEHEAD	680481	LUBLINTP	1	69/69	680/680
142	631053	LANSING5	630003	LANSING8	1	161/69	627/627
143	631052	LANSINGW	681523	GENOA 5	1	161/161	627/680
144	605316	LAX 8	605296	WSTSALE8	1	69/69	600/600
145	630019	LIBERTY8	630489	NWVIENR8	1	69/69	627/627
146	605099	LTCHMUT8	613110	LITCHFLD	1	69/69	600/615

147	680242	LUBLIN	680505	LAKEHEAD	1	69/69	680/680
148	998914	MARION1	350223	2MARIONPLANT	1	1/69	361/361
149	998913	MARION2	350223	2MARIONPLANT	2	1/69	361/361
150	698995	MASS	698805	LAKE MIN	1	69/69	295/698
151	608628	MCARTHY4	608627	SHANNON4	1	230/230	608/608
152	602024	MRSHLND5	605320	MARSHLA8	2	161/69	600/600
153	699788	NORTHPT	699786	ROCKY RN	1	115/115	696/696
154	999302	OAKC BK1	250737	08OKLND	1	1/69	208/208
155	659347	PIONEER GEN7	659624	STATELINEMW7	1	115/115	652/652
156	505438	POP BLF5	998761	PBL X3	1	161/1	515/515
157	698806	RKLAND	698995	MASS	1	69/69	698/295
158	500770	RODEMR 6	500280	ELEESV 6	1	230/230	502/502
159	698791	ROJT 2	698806	RKLAND	1	69/69	698/698
160	698879	SGR CK4	699360	NLK GV T	1	138/138	295/295
161	630385	SLAKES 8	630381	SLAKEN 8	1	69/69	627/627
162	999316	SPENCER	250830	08SPNC23	1	1/69	208/208
163	698809	TOLLFREE	698787	VICTORIA	1	69/69	698/698
164	652453	TOWNER 7	659151	BOTTNOJCTCP7	1	115/115	652/652
165	698787	VICTORIA	698791	ROJT 2	1	69/69	698/698
166	698804	WHP SWS	698795	WPINE VI	1	69/69	295/698
167	631045	WNBAGOS5	630097	WBGOJ S8	1	161/69	627/627
168	698795	WPINE VI	698809	TOLLFREE	1	69/69	698/698

Count of facilities	KV Level																			
area	1/115	1/138	1/69	115/1	115/115	120/120	138/138	161/1	161/161	161/69	230/1	230/115	230/230	345/1	345/138	345/345	500/161	500/500	69/69	Grand Total
208/208			2				2													4
217/217							1													1
218/218		1					4							1		2				8
218/219																1				1
219/219						2														2
295/295							1													1
295/698																			2	2
326/326					8							2	1							11
327/327					17				6								1	2		26
327/334									1											1
327/515									1											1
330/330										3									1	4
332/351							1													1
347/347					3				2									1	8	14
349/349									2	1										3
351/332					1		2													3
351/351					6		6						4						1	17
357/357							1													1
361/361			2					2											1	5
363/363							1		1						1				4	7
502/502													1							1
515/515			2					3												5
600/600			2	2	1					1									5	11
600/615																			1	1
608/608					2								2							4
608/620													1							1
615/615	1		2	1							2								1	7
627/627									1	2									5	8

627/680									1											1
652/640					1															1
652/652					4						1									5
661/661	1																			1
680/680																			2	2
696/696					1															1
698/295																			1	1
698/698																			5	5
Grand Total	2	1	10	3	44	2	19	5	15	7	3	2	9	1	1	3	1	3	37	168

In this test:

MISO NR: 167078.5MW

There are around 1225MW (see the following table for details), which are not connected to MISO, but shown in their NR list. PJM gen deliv methodology doesn't test this kind of NR. So these 1225MW are not tested in my test.

Bus Number	PMAX		area
274849	54.45		222
300008	56.7		330
300443	24		330
364781	164.5		347
364782	164.5		347
364783	164.5		347
364784	317		347
505417	53.9		515
505419	71		515
505446	67.5		515
505453	71.2		515
656585	15.72		652

PJM CR: 210462 MW ER: 21106.8 MW, so total tested PJM Generation: 231568.9MW

Results:

PJM:

Undeliverable Energy: 515.4MW

Undeliverable Capacity: 1675.3 MW,

Therefore: 99.2% PJM CR is deliverable; 99.1% of PJM total generation is deliverable

PJM : restricted generation list:

Bus #	Name	Area	Pmin	Pmax	Pgen	Status	
235623	01OGROV1	201	90	157.6	150.5		8.788569112
236841	01S70BUS1	201	0	18.2	17.4		17.4
236842	01S70BUS2	201	0	18.2	17.4		17.4
238592	02BURGG4	202	0	156	0	NEW	134.4846797
239064	02RICHG1	202	0	11	10.5		11
239067	02RICHG4	202	40	118	112.7		5.505125643
242902	05CRG2L	205	80	230	219.6		67.06997258
247508	U2-090 C	205	0	26	0	NEW	26
247523	U4-039 C	205	0	104	0	NEW	104
247528	05COVRT1	205	180	215.6	0	NEW	215.6
247529	05COVRT2	205	180	215.6	0	NEW	215.6
247530	05COVRT3	205	180	215.6	0	NEW	215.6
247531	05COVRT4	205	95	129.4	0	NEW	129.4
247532	05COVRT5	205	95	129.4	0	NEW	129.4
247533	05COVRT6	205	95	129.4	0	NEW	88.39314582
247543	V3-007 C	205	0	26	0	NEW	14.64146894
247927	U4-039 E	205	0	696	0	NEWENERGY	23.31802812
272363	ESS H440 ; R	222	0	22	21		8.892319213

274822	ROCKFORD ;11	222	135	150	143.2		14.85441247
274855	GSG-6 ;RU	222	0.2	21.9	20.9		20.9
274856	ECOGROVE ;U1	222	0	20	19.1		20
274877	BISHOP HL;1U	222	0	20	19.1		20
274878	BISHOP HL;2U	222	0	20	19.1		20
274920	O47 C	222	0	2	0	NEW	2
290089	Q-039 C	222	0	21	0	NEW	21
290090	Q-039 E	222	0	84	0	NEWENERGY	42.5560024
293513	O-009 C1	222	0	20.5	0	NEW	17.425
293514	O-009 C2	222	0	10.4	0	NEW	8.84
293515	O-009 C3	222	0	11.5	0	NEW	9.775
293516	O-009 E1	222	0	82	0	NEWENERGY	69.7
293517	O-009 E2	222	0	41.7	0	NEWENERGY	35.445
293518	O-009 E3	222	0	45.9	0	NEWENERGY	39.015
293712	O-029 C	222	0	21.9	20.9		20.9
293713	O-029 C	222	0	12	11.5		11.5
293714	O-029 C	222	0	11.1	10.6		10.6
293715	O-029 E	222	0	87.7	0	NEWENERGY	74.545
293716	O-029 E	222	0	48.1	0	NEWENERGY	40.885
293717	O-029 E	222	0	44.2	0	NEWENERGY	37.57
294401	BSHIL;1U E	222	0	80	0	NEWENERGY	57.19137601
294670	P-037 C	222	0	28	0	NEW	23.8
294671	P-037 E	222	0	112	0	NEWENERGY	95.2
295990	R-016 C1	222	0	12.6	0	NEW	12.6
295992	R-016 C2	222	0	12.6	0	NEW	12.6
299902	K-002 C	222	0	16	15.3		15.3
905471	W4-084	222	0	4	0	NEW	4

MISO:

Among the 168 overloaded MISO facilities, there are 89 facilities on which the overloads can't be relieved by backing off Generators (I assume all the generator with DFAX >3% can be back off). It's more like a basecase issue.

Fr Bus	Name	To Bus	Name	CKT	KVs	Areas
256322	18LOWELJ	256209	18MARQTT	1	138/138	218/218
256263	18RONDO	256259	18RIGGSV	1	138/138	218/218
350200	2CARRIERMILS	350213	2HAMILTON	99	69/69	361/361
350224	5MARIONPLANT	998914	MARION1	1	161/1	361/361
998914	MARION1	350223	2MARIONPLANT	1	1/69	361/361
999302	OAKC BK1	250737	08OKLND	1	1/69	208/208
999316	SPENCER	250830	08SPNC23	1	1/69	208/208
997893	115/69	615542	GRE-GLNDALE8	2	1/69	600/600
997892	115/69	615542	GRE-GLNDALE8	1	1/69	600/600
997877	230/69	619977	GRE-WILLMAR8	1	1/69	615/615
608730	78L TAP7	608733	NATIONL7	1	115/115	608/608
608722	FORBES 7	608725	44L TAP7	1	115/115	608/608
997624	GLENHAM TR1	661035	GLENHAM7	1	1/115	661/661
661038	GLENHAM4	997624	GLENHAM TR1	1	230/1	652/652
615434	GRE-BURNVIL8	616963	GRE-COLNHLL8	1	69/69	600/600
615541	GRE-GLNDALE7	997893	115/69	2	115/1	600/600
615541	GRE-GLNDALE7	997892	115/69	1	115/1	600/600
617056	GRE-MORA 8	613160	MORA	1	69/69	615/615
619975	GRE-WILLMAR4	997877	230/69	1	230/1	615/615
630128	HAYWD#18	630129	HAYWD#28	1	69/69	627/627
605316	LAX 8	605296	WSTSALE8	1	69/69	600/600
630019	LIBERTY8	630489	NWVIENR8	1	69/69	627/627
605099	LTCHMUT8	613110	LITCHFLD	1	69/69	600/615
680242	LUBLIN	680505	LAKEHEAD	1	69/69	680/680
602024	MRSHLND5	605320	MARSHLA8	2	161/69	600/600

631045	WNBAGOS5	630097	WBGOJ S8	1	161/69	627/627
255158	17MONTICELLO	255127	17E WINAMAC	1	138/138	217/217
300387	2BEVIER	300400	2MACNLK	1	69/69	330/330
324447	2BONNIE	324050	2JONESVILLE	1	69/69	363/363
362124	2LOVELLTN	362887	2CEDAR BLUFF	1	69/69	347/347
362122	2MELTON H HP	362496	2WATTROAD TN	1	69/69	347/347
362128	2NOTTELY HP	362130	2NOTTELY GA	1	69/69	347/347
362151	2OCOE #3 HP	362006	2BASIN TN	1	69/69	347/347
362014	2SOLWAY TN	362027	2TURKEY CRK	1	69/69	347/347
324977	2TOMSCT	324446	2BOND	1	69/69	363/363
362027	2TURKEY CRK	362124	2LOVELLTN	1	69/69	347/347
362186	2WATAUGA HP	362187	2ELIZABETH TN	1	69/69	347/347
362496	2WATTROAD TN	362124	2LOVELLTN	1	69/69	347/347
365584	3N PRIMARY 32	365512	3FRONT ST 4	1	115/115	347/347
365584	3N PRIMARY 32	365903	3DUNLAP 76	1	115/115	347/347
365604	3S PRIMARY 31	365514	3THIRD ST 3	1	115/115	347/347
360724	5FREEPORT #1	365935	5SHELBY DR74	1	161/161	347/347
360724	5FREEPORT #1	365579	5OAKVILLE 44	1	161/161	347/347
300129	5WASHBRN	300763	2WASHBRN	1	161/69	330/330
300123	5WPLAIN	301123	2WSTPL3	2	161/69	330/330
300123	5WPLAIN	301123	2WSTPL3	1	161/69	330/330
659151	BOTTNOJCTCP7	652455	BOTTNO 7	1	115/115	652/652
652510	FTRANDL7	640349	SPENCER7	1	115/115	652/640
652442	GARRISN7	652590	SNAKECR7	1	115/115	652/652
661038	GLENHAM4	997624	GLENHAM TR1	1	230/1	652/652
505420	HERGETT5	998766	HGT X2	1	161/1	515/515
505420	HERGETT5	998767	HGT X1	1	161/1	515/515
998767	HGT X1	505423	HERGETT2	1	1/69	515/515
998766	HGT X2	505423	HERGETT2	1	1/69	515/515
659347	PIONEER GEN7	659624	STATELINEMW7	1	115/115	652/652

505438	POP BLF5	998761	PBL X3	1	161/1	515/515
652453	TOWNER 7	659151	BOTTNOJCTCP7	1	115/115	652/652
324554	2GRBURG	324830	2CMPBVEK	1	69/69	363/363
324990	2WAITSBR	324787	2UNION U	1	69/69	363/363
362496	2WATTROAD TN	362124	2LOVELL TN	1	69/69	347/347
324236	4CRUN 6	324237	4CRUNSS	1	138/138	363/363
324160	5RVR Q T	324159	5RIVER Q	1	161/161	363/363
324114	7TRIMBLE	324314	4TRIMBLE	1	345/138	363/363
652442	GARRISN7	652590	SNAKECR7	1	115/115	652/652
334271	2TEX-HIL	334270	2LOVELSL	1	69/69	351/351
336280	39MILE	336084	3BARATA	1	115/115	351/351
337962	3ALTHEI*	338738	3WABASEKA.W#	1	115/115	327/327
336080	3CLOVEL	336081	3GMEADW	1	115/115	351/351
337150	3HN LAK	337144	3GRNBRK	1	115/115	326/326
337685	3HSEHVV	337734	3HS-IND	1	115/115	327/327
337734	3HS-IND	337733	3HS-UC	1	115/115	327/327
337715	3HS-MIL	337714	3HS-ROY	1	115/115	327/327
337351	3SAILES	337350	3TEXASE	1	115/115	351/351
337061	3SAWYR*	337062	3ELLIOT	1	115/115	326/326
337415	3STERLING%	337449	3OKRIDG	1	115/115	351/351
336033	3TEREBN	303202	3GRENWD	1	115/115	351/332
337350	3TEXASE	337349	3LUCKY	1	115/115	351/351
336037	3VLNTIN	336080	3CLOVEL	1	115/115	351/351
338738	3WABASEKA.W#	337964	3WABSKA	1	115/115	327/327
337060	3WINONA	337061	3SAWYR*	1	115/115	326/326
337620	3WOODW-N	337962	3ALTHEI*	1	115/115	327/327
334084	4CLVELND	334119	4TARKING	1	138/138	351/351
335805	4PT HUD	303190	4THOMPSN CRK	1	138/138	351/332
335379	4SCOTT1	303133	4VATCAN	1	138/138	351/332
303190	4THOMPSN CRK	335808	4TP.STAR	1	138/138	332/351

338169	5TRUMAN	338707	5TRUM-W#	1	161/161	327/327
338161	5WM-EHV	338414	5WM-POK	1	161/161	327/334
334437	6KOLBS	334436	6P AC BK	1	230/230	351/351
334434	6SABINE	334442	6GULFWAY	1	230/230	351/351

For the rest of the facilities which are impacted by gen deliv, we have the following:

Undeliverable Energy: 879.8MW

Undeliverable Capacity: 10375.0 MW,

Therefore: 93.8% MISO tested NR (167078.5MW) is deliverable;

MISO : restricted generation list:

Bus #	Name	Area	Pmin	Pmax	Pgen	Status	Max gen back off
6027	G587	600	0	20	16.9		7.633399209
10188	J238_GEN	216	0	725	656.6		173.0264925
248889	07WORTH1	207	0	83.5	70.4		83.5
248890	07WORTH2	207	0	83.5	70.4		10.85149655
251852	08CONRSV	208	4	86	76		31.85493752
251897	08WHTLD1	208	50	115	101.6		115
251898	08WHTLD2	208	50	115	101.6		115
251899	08WHTLD3	208	50	115	101.6		115
251900	08WHTLD4	208	50	115	101.6		20.93718593
251901	08EDWCT1	208	161.8	237	0		237
251902	08EDWCT2	208	161.8	237	0		237
251903	08EDWST	208	177.6	328	0		328
251904	08TRICO1	208	0	20	17.7		17.7
251905	08TRICO2	208	0	20	17.7		17.7
255239	17WCE-ST	217	50	213	177.1		26.81533701

255473	17HOOSIER_WF	217	0	20	16.6		16.6
255476	17ORION_BCWF	217	0	26.1	21.7		21.7
256329	18KARN3	218	50	639	639		172.9144372
256343	18CMPBL3	218	350	830.3	0		166.1984
256346	18ZELND1	218	90	165	0		140.25
256347	18ZELND2	218	90	158	0		29.11697522
256388	18MCVG3	218	49	88	79.6		88
256389	18MCVG4	218	49	88	79.6		8.822888393
264859	19SC4	219	30	151	151		25.06951872
318007	5MOROW161	349	100	400	290		3.033609646
334030	1FRNTR 1	351	0	165	126.6		76.36647962
334298	1CYPR U1	351	0	85	65.2		85
334299	1CYPR U2	351	0	85	65.2		85
334345	1CYPR U3!	351	0	73.1	56.1		73.1
334346	1CYPR U4!	351	0	73.1	56.1		33.62636816
334431	1G1SABIN	351	60	212	162.7		176.3441289
334440	1G4SABIN	351	180	529	450		529
334441	1G5SABIN	351	80	470	400		470
335370	1ACADIA_S26!	351	80	240.5	184.5		184.5
335371	1G2-1ACAD	351	60	179.7	137.9		137.9
335372	1G2-2ACAD	351	60	179.7	137.9		137.9
335611	1G1WGLEN	351	40	150	122.8		10.87456731
336571	1ISLVCRK1	326	0	75	57.5		38.13158606
336801	1B.WLSN U1	326	165	506.3	388.5		34.40413291
337041	1ANDRUS U1	326	235	740	583.9		94.12397688
337098	3CLARKMUN	326	0	45	34.5		22.17500525
337102	1IMEPCLG1	326	0	75	57.5		54.36414218
337124	1SLSBAU3	326	10	98.8	75.8		98.8
337125	1CLSBAU3	326	10	182.2	139.8		182.2
337631	1SKY U1	327	0	18.8	14.4		18.8

337632	1SKY U2	327	0	5.2	4		5.2
337652	1BLUF U1	327	160	815	700		815
337653	1BLUF U2	327	160	844	797.8		137.9033271
337688	1CATH U2	327	10	50.3	38.6		50.3
337689	1CATH U3	327	20	98.5	75.6		98.5
337691	1CATH U1	327	10	51.2	39.3		51.2
337692	1CATH U4	327	120	539	413.5		413.5
337694	1REML UA	327	5	11	8.4		8.4
337711	1BLAK U1	327	10	43	33		43
337712	1BLAK U2	327	10	43	33		43
337719	1CARP U1	327	5	29.5	22.6		29.5
337720	1CARP U2	327	5	29.5	22.6		29.5
337953	1LYNC U2	327	20	68	61.4		61.4
337954	1LYNC U3	327	20	130	99.7		36.0539886
338143	1ISES U1	327	160	836	700		219.7456493
338401	1LSPWRU1	331	0	88.5	14		88.5
338402	1LSPWRU3	331	0	157.8	0		134.13
338403	1LSPWRU2	331	0	88.5	0		37.21019992
338482	1MURY U1	339	15	40.1	33.7		33.7
338501	1L&D2U1	327	5	34	26.1		26.1
338502	1L&D2U2	327	5	34	26.1		26.1
338503	1L&D2U3	327	5	34	26.1		26.1
338504	1L&D9U1	327	2	10.8	8.3		8.3
338505	1L&D9U2	327	2	10.8	8.3		8.3
338506	1L&D9U3	327	2	10.8	8.3		8.3
338507	1C1KNWRI	327	0	95	72.9		95
338508	1C3KNWRI	327	0	95	72.9		95
338509	1C5KNWRI	327	0	95	72.9		95
338510	1S1KNWRI	327	0	95	72.9		95
338511	1C7KNWRI	327	0	73	56		73

338512	1S2KNWRI	327	0	95	72.9		95
338513	1BAILEY U1	327	35	122	93.6		93.6
348193	1STTLR G1	357	0	15	14.6		14.6
348194	1STTLR G2	357	0	15	14.6		14.6
348978	1BISHOP HG1	357	0	20.1	19.6		20.1
348979	1BISHOP HG2	357	0	20.1	19.6		20.1
350234	1MRNGEN4	361	100	180	105.2		180
350235	1MRNGEN5	361	42	88	32		88
350236	1MRNGEN6	361	42	88	32		88
501811	G1NESBIT	502	43	440	415.6		126.3587701
501821	G1TECHE	502	5	23	13.8		13.8
501823	G3TECHE	502	25	349	325		325
501824	G4TECHE	502	10	41.4	30		30
502436	HARGIS2	503	10	50	38.4		38.4
502437	BONIN3	503	80	146	96.2		146
502438	BONIN2	503	30	70	57.5		70
502439	BONIN1	503	20	40	30.7		40
600011	BLK D75G	600	40	161	136.2		149.2135794
600039	FEN 84G	600	9	61	51.6		61
600055	KEYCT34G	600	6	26	22		19.40058205
600129	HOLCOMB G	600	0	35.3	29.9		35.3
603154	CORNELL7	600	0	33.2	28.1		28.1
605024	BIGFALL8	600	0	7.5	6.3		6.3
605317	FRENCH G	600	0	18	15.2		18
608702	LASKIN 7	608	10	118	101.2		101.2
608774	BOSWE43G	608	170	390.9	336.2		351.6127733
608800	TACRIDG9	608	0	5	4.3		4.3
608891	BISON 1G	608	0	75	64		74.05620318
608892	BISON 2G	608	0	95	81.5		8.567165972
615001	GRE-COAL 41G	615	100	633.4	558		95.08276534

629072	LANS5 4G	627	85	277	203		14.74905642
629073	LANS5 3G	627	10	44	32.2		44
629991	G870_WF9	627	0	40.2	29.5		29.5
630038	BRLGTN28	627	20	76	55.7		45.10638298
630385	SLAKES 8	627	15	79	57.9		24.029287
630735	G746_WF9	627	0	200	146.6		61.9306712
631036	NIW 5	627	0	38	27.8		27.8
680334	FLAMBEAU	680	0	23.9	18.8		23.9
680379	MCNEIL_W	680	0	17.5	13.8		13.8
698798	WPINE M	295	18	54.6	18.2		26.03382237
699515	UNIV ST	295	60	98	96.4		1.549531158
699678	WES G3	696	135	321.6	278.8		63.63087028