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May 3, 2016

Honorable Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20246

Re: Informational Filing of Midwest Independent Transmission System Operator, Inc.'s Independent Market Monitor

Dear Secretary Bose:

Pursuant to the Commission's order in *Midwest Transmission System Operator, Inc.*, 118 FERC ¶61,020 at P 12 (2007)[1] the Independent Market Monitor ("IMM") hereby submits this informational report on the effectiveness and need for changes in the Narrow Constrained Area ("NCA") designation approved on January 19, 2007.

This report contains an updated evaluation of the tariff criteria used to designate the existing NCAs and evaluate the applicable NCA thresholds. The report also includes a summary of the mitigation that was implemented in the NCAs for the Midwest Independent System Operator (MISO) administered energy markets and an assessment of the effectiveness of the NCAs.

I. Background

Market power mitigation measures contained in the MISO Tariff are designed to mitigate market power that arises when transmission constraints that limit competition in certain areas of the market bind. Such constraints create locational market power. Two types of constrained areas are defined: Narrow Constrained Areas and Broad Constrained Areas ("BCAs"). NCAs are explicitly designated because they are chronically constrained and raise more severe locational market power concerns. BCAs are not explicitly designated and include all other constrained areas.

The purpose of designating an area as an NCA is to utilize tighter thresholds in identifying participant conduct and measuring its impact on the market to determine when the imposition of mitigation is warranted. These tighter thresholds reflect a reduced tolerance for potential market power abuses, which is appropriate in light of the higher frequency with which the constraints are binding and, hence, the increased severity of the locational market power.

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[1] 118 FERC ¶ 61,020 at P 12 (2007) ("the Commission will require . . . an informational report summarizing the effectiveness or changes required to the NCA (for example, re-defining the NCA with a updated GSF or updating the NCA threshold value to incorporate new net annual fixed costs data)".

A. Definition of NCAs

A constrained area warrants designation as a NCA if it satisfies two tests under the FERC-approved market power mitigation measures contained in the MISO Tariff. First, the transmission constraint must have bound for more than 500 hours over the prior 12 months. These hours include those in which MISO made commitments or took other actions to manage the congestion. Second, one or more suppliers must frequently be pivotal – i.e., its resources are needed to meet the load and manage the congestion into the constrained area. An area that satisfies these two tests is particularly vulnerable to market power abuse. The NCA designation is necessary to assure that wholesale electricity prices will remain just and reasonable.

B. Conduct-Impact Mitigation Process for NCAs

When a flowgate within an NCA experiences a Binding Transmission Constraint, the NCA is considered to be binding. In such instances, only generators which have GSFs that exceed the Constraint GSF Cutoff are evaluated under the conduct and impact test. The test first evaluates whether the Market Participant's behavior exceeds the conduct thresholds and, if so, the price impact of the conduct is evaluated. Therefore, before mitigation is applied in an NCA, four conditions must be met: (1) there must be a Binding Transmission Constraint within the NCA; (2) the generator's GSF on the given constraint must exceed the Constraint GSF Cutoff; (3) the generator's energy offer must exceed the conduct threshold; and (4) the conduct must cause a significant price impact.

NCA Mitigation is performed in concert with the RT-UDS for realtime in an automated process involving a conduct and impact test. Since September 30, 2007, the DA RSC has been used to evaluate day-ahead mitigation. As noted, mitigation only occurs when a unit or units have failed both an automated conduct test and an automated impact test. Conduct tests are preformed every hour and impact tests (if required) are performed every five minutes for the real-time market and once a day for all 24 hours for the day-ahead market. It is important to note that these NCA conduct and impact tests procedures are automated and involve no discretion whatsoever on the part of the IMM.

II. Existing NCAs

A. Definition of NCA in Southeast Minnesota, Northern Iowa, and Southwest Wisconsin

The area approved for the NCA in the Commission's Order January 2007 order includes portions of Minnesota, Iowa, and Wisconsin (i.e., the "Minnesota NCA"). The area is defined by a set of constraints that limit imports from south to north into Minnesota. There are two dominant parallel electrical paths that limit power imported into Minnesota from the south.

The first is a series of 345 KV transmission facilities in a path from Raun in western Iowa to Lakefield, to Wilmarth, and to Blue Lake in southern Minnesota. The second path is also a

series of 345 KV transmission facilities in a path from Tiffin in eastern Iowa to Arnold, to Hazleton, to Adams, to Pleasant Valley, and to Prairie Island in southern Minnesota.

Many distinct constraints are associated with these paths and each constraint includes a limiting transmission element and potentially a contingent element so one limiting element can be associated with many constraints. A list of the transmission constraints that define the WUMS and SE Minnesota NCA constraints are periodically updated on the MISO web page.

B. Definition of NCA in Wisconsin and Upper Michigan (WUMS) and Northern Wisconsin and Upper Michigan (NWUMS)

Two additional NCAs were approved by the Commission at the start of the MISO energy market. The first is the Wisconsin Upper Michigan System ("WUMS") area, which includes eastern Wisconsin (east of the Arpin bus) and the Upper Peninsula of Michigan. The second is North WUMS, which includes only the Upper Peninsula of Michigan. North WUMS is a sub-region within WUMS. The transmission constraints that define these NCAs are posted on the MISO website.

C. Definition of AMITE South and WOTAB NCA in MISO South

Prior to the integration of the MISO South Region, the Commission approved two additional NCAs. The first, was the West Of The Atchafalaya Basin ("WOTAB") which includes southwest Louisiana and all of the control area in eastern Texas. The second was the Amite South NCA which encompasses most of southeast Louisiana. The Amite South NCA includes all of the ELL-South and ENOI service territories. The transmission constraints that define these NCAs are posted on the MISO website.

D. NCA Constraint Definition

The initial list of the transmission constraints that defined the NCA constraints for these areas are supplemented over time using the same analytical procedures used to define the original list. Each of these constraints can limit power flows from outside to inside the NCA.

E. NCA Units

A table showing the list of generators that are included in the NCA is posted on the MISO website. The list may be modified based on transmission system topology changes.

III. Updated NCA Definition Criteria

The first analysis needed to determine whether an area should be designated as an NCA identifies the frequency with which the relevant constraints were binding. Table 1 shows the number of binding constraint hours during 2012 in the Minnesota, WUMS, and North WUMS NCAs. The "Constraint" columns in Table 1 show hours when a binding constraint resulted in changes in dispatch or commitment of generation. The "Total" columns include these hours, as

well as hours in which supplemental generator commitments were made in anticipation of congestion into the NCA.

Table 1: Binding Constraints in 12 Month Period, 2015- 2016

Month	Minnesota NCA Total	North WUMS Total	WUMS NCA Total	AMITE South NCA Total	WOTAB NCA Total
April	147	57	57	98	36
May	152	157	129	120	413
June	125	158	138	18	163
July	88	179	118	20	192
August	201	64	57	45	256
September	370	213	175	22	45
October	113	510	271	39	142
November	118	158	144	14	106
December	40	81	81	31	39
January	32	227	227	28	69
February	26	214	165	79	161
March	120	243	226	41	217
Annual Total	1532	2000	1788	555	1839

The constraint totals in Table 1 are for the period from April 1, 2016 through March 31, 2016. In this period there were 1532 hours when the NCA constraints were binding in the real-time market into the Minnesota NCA. In WUMS, there were 1788 hours with binding constraints in the real-time market and North WUMS had over 2000 binding hours (the maximum for use in the threshold formula). In Amite South there were 555 hours when constraints were binding and in WOTAB there 1839 hours. Hence, the 500-hour NCA criterion is satisfied in all the existing NCAs.

Though congestion declined, continued high levels of wind generation and related transmission outages related to planned transmission upgrades in MISO's North region contributed to the continued Minnesota NCA congestion in the period. Accordingly, we expect that the constraints that define the Minnesota NCA will continue to significantly surpass the 500-hour criteria during the next 12 months.

Congestion into WUMS has declined in recent years, due in part key transmission enhancements as well as new generation additions. The congestion is now often from north to south from WUMS to Com Ed. However, congestion in the period continued to significantly exceed the annual 500 hours threshold for defining an NCA. Although there have been a number of transmission projects in WUMS, we still expect that the constraints that define the WUMS NCA to surpass the 500-hour criteria during the next 12 months.

North WUMS congestion exceeded 2000 hours and we expect the area to continue to significantly surpass the 500-hour criteria.

Congestion into the Amite South NCA during the 12 month period of post-market integration result was less than experienced during the pre-market integration time period studied and less than 2015 but slightly above the 500-hour criteria and we expect the NCA criteria may be satisfied during the next 12 months.

Congestion into the WOTAB NCA continued to be significant during the period. With improvements in OP Guides and transmission utilization we expect congestion to potentially decrease but that it will continue to significantly exceed the 500-hour criteria in the next 12 months.

The second criterion for defining an NCA is that one or more suppliers are typically pivotal when the NCA constraints are binding. A supplier is pivotal when a Binding Transmission Constraint cannot be managed with other suppliers' generation resources, i.e., the resources of the pivotal supplier are needed to manage the constraint. To determine whether a supplier is pivotal, we evaluate the GSFs for generators owned by the various suppliers that affect the constraint. The GSFs indicate what portion of a unit's incremental output flows over the constraint. Once these are determined for all generating units, the total impact that an individual supplier has on a constraint can be calculated.

The basic approach is to change a supplier's output in a manner that maximizes congestion on a transmission constraint. The impact of this additional flow on the constraint is then compared to the impact that all other suppliers' generation has on the constraint if this generation is re-dispatched to relieve congestion on the constraint. If the impact of the individual supplier is sufficient to cause the limit for the constraint to be exceeded even when the other suppliers are re-dispatched to minimize the flows over the constrained facility, the supplier is pivotal.

This analysis is based on interval level results of the real-time energy market. As in past years, these results show that during congested intervals (instances when an NCA constraint is binding in the energy market), the vast majority had at least one pivotal supplier in the Minnesota, WUMS, and North WUMS, WOTAB, and Amite South NCAs. During the twelve months of 2015 analyzed in the IMM State of The Market Report, typically all the NCAs had pivotal suppliers in nearly all the congested intervals.

IV. NCA Threshold

On May 1, 2016, the NCA thresholds were updated for the Minnesota NCA, North WUMS, WUMS, WOTAB, and Amite South NCAs. The locational threshold for an NCA is defined in the tariff to be equal to:

$$\text{Narrow Constrained Area Threshold} = \frac{\text{Net Annual Fixed Cost}}{\text{Constrained Hours}}$$

The Net Annual Fixed Cost is equal to the revenue per megawatt that would need to be earned by a new peaking generator in excess of the net revenue it can expect to receive from the MISO electricity markets to cover its fixed costs, including return on equity. The net revenue from the MISO electricity markets would equal the market revenue that could be expected from the unit minus its variable production costs. In other words, the threshold would allow price increases in the Narrow Constrained Areas to the extent that additional profits derived from energy sales in these areas would be sufficient for a new peaking unit to profitably enter the market.

Constrained Hours are defined as the total number of hours during the 12-month period when there is a binding transmission constraint. This number cannot exceed a maximum of 2,000 hours. As shown above, the Binding Transmission Constraint hours for the 12-month period analyzed in the Minnesota NCA equaled 1532. In the WUMS, NCA the total was 1788. In North WUMS the total exceeded 2000 and was capped per Module D. In the MISO South Region, the Amite South NCA the total number of congested hours was 555 and the WOTAB NCA was 1839.

The Net Annual Fixed Costs were determined by obtaining an estimate of the overnight capital cost of an advanced combustion turbine made by the Energy Information Administration and deriving gross annualized fixed costs of $92.75 per KW-year and subtracting the Net Revenues for the prior 12-month period. The Net Revenues were calculated using the following assumed generating characteristics and costs:

- an assumed heat rate of 9,750 mmBTU/KWh and variable O&M of $10.19 per MWh;
- daily gas prices based on the Chicago Citygate price plus a combined basis differential and distribution charge of $0.61/mmBTU for the WUMS and North WUMS areas and of $0.38/mmBTU for the Iowa/Minnesota area and $0.38/mmBTU from the Henry Hub to the WOTAB and Amite South areas;
- capacity revenues equal to clearing prices from the 2016-2017 PRA
- a forced outage rate of 5 percent; and
- a minimum run-time of 1 hour.

These assumed costs and physical characteristics are used to estimate the net revenues of the new unit from MISO's energy, ancillary services and capacity markets. Based on these assumptions, the net revenue estimated for the NCAs over the past 12 months were: $46.75 for

WUMS, $48.14 per KW-year for North WUMS, and $25.60 per KW- year for SE Minnesota, $30.22 per KW-year for Amite South, and $34.16 per KW-year for WOTAB.

Based on these values, the NCA threshold for the energy component of suppliers' offers are $25.73 per MWh for WUMS, $22.31 for North WUMS, and $43.83 per MWH for SE Minnesota, $100.00 per MWh for Amite South, and $31.86 per MWH for WOTAB per the formula specified in Section 64.1.2(d) of the MISO Tariff. These values are posted on the web site and were made effective in the MISO production systems on May 1, 2016.

V. NOTICE AND SERVICE

A. NOTICE

Please place the following persons on the official service list in this proceeding:

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* Persons designated to receive official service.

B. SERVICE

The IMM has served all parties provided in the Commission's eService list for the above-referenced dockets. In addition, the IMM notes that the MISO has served a copy of this filing electronically, including attachments, upon all Tariff Customers, MISO Members, Member representatives of Transmission Owners and Non-Transmission Owners, the MISO Advisory Committee participants, as well as all state commissions within the Region. In addition, the filing has been posted electronically on the MISO's website at:

https://www.midwestiso.org/Library/FERCFilingsOrders/Pages/FERCFilings.aspx

VI. CONCLUSION

The IMM for the Midwest ISO respectfully requests the Commission to accept this informational report submitted in compliance with the directives set forth in the January 19, 2007 Order.

Respectfully submitted,

/s/ David B. Patton

Dr. David B. Patton
Potomac Economics, Ltd.