

UNITED STATES OF AMERICA  
BEFORE THE  
FEDERAL ENERGY REGULATORY COMMISSION

|                                    |   |                                 |
|------------------------------------|---|---------------------------------|
| <b>PJM Interconnection, L.L.C.</b> | ) |                                 |
|                                    | ) | <b>Docket No. ER08-1569-001</b> |
|                                    | ) |                                 |

**MOTION FOR LEAVE TO ANSWER AND ANSWER OF  
THE INDEPENDENT MARKET MONITOR FOR PJM**

Pursuant to Rules 212 and 213 of the Commission’s Rules and Regulations, 18 CFR § 385.212 & 385.213 (2008), Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor for PJM<sup>1</sup> (“Market Monitor”), moves for leave to answer and submits this answer to the responses filed by the PJM Power Providers Group (“Power Providers”), American Electric Power Service Corporation (“AEP”) and PJM Interconnection, L.L.C. (“PJM”) to the Market Monitor’s protest in the above-referenced proceeding. This answer is necessary to resolve confusion raised by the indicated pleadings regarding the Market Monitor’s position and to address new issues raised in those pleadings, such as who is the appropriate party to administer the rules at issue here as a consequence of PJM’s filing to comply with the Commission’s order issued November 26, 2008 (“November 26<sup>th</sup> Order”).<sup>2</sup>

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<sup>1</sup> Capitalized terms used herein and not otherwise defined shall have the meaning specified in the PJM Open Access Transmission Tariff (“OATT”) or the PJM Operating Agreement (“OA”).

<sup>2</sup> *PJM Interconnection, L.L.C.*, 125 FERC ¶61,244.

The confusion evidenced in these responses starts with their collective failure to recognize that rules for minimum generator operating parameters were the outcome of a lengthy and intensive stakeholder process prior to approval by the Members Committee on November 15, 2007 (“Approved Rules”). The Approved Rules constitute the consensus that was achieved.<sup>3</sup> There is no reason to debate the recollections of participants. The Approved Rules define an agreed upon means to limit the ability of market participants to exercise market power via the use of parameter limited schedules. It is presumptuous for any party to assert that any part of the rules can now be unilaterally changed on the grounds that some provisions of the rules are asserted to have not been “intentional.”

PJM’s compliance filing went beyond the Commission’s direction and proposed unilateral changes to the Approved Rules in ways that weaken the protection against the exercise of market power. The filings of Power Providers and AEP propose to further weaken the protections afforded by the rules against the exercise of market power. If the Commission does not reject the offending portions of the compliance filing as beyond the proper scope of a compliance filing, the Commission should reject the changes to Section 6.6(c) on the merits.

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<sup>3</sup> Motion to Intervene and Comments of Exelon Corporation, Docket No.ER08-1569-000 at 3–4 (October 16, 2008) (“The revisions in total were thoroughly vetted through a multi-year PJM stakeholder process and the package is a result of give and take by many parties”); Motion to Intervene and Comments of the Dayton Power and Light Company, Docket No. ER08-1569-000 at 2 (October 16, 2008) (“DP&L actively participated in the PJM lengthy stakeholder process and voted to approve all of the proposed modifications as a package”).

PJM questions (at 5–6) the authority of the Market Monitor to raise questions about PJM’s filing. Under the tariff, the Market Monitor has the lead role on this issue, as the Market Monitor is the only entity in the PJM Region that has a tariff-defined obligation to evaluate, comment on and make recommendations to improve the design of market rules that deter the exercise of market power and ensure competitive markets.<sup>4</sup> The tariff states that part of the Market Monitor’s responsibilities is to “make filings with the Commission on market design issues.”<sup>5</sup> It is the Market Monitor’s role to have a detailed understanding of the complex market rules and to make corresponding recommendations. The fact that stakeholders who may be harmed by the filing have not yet objected is not evidence that the harm does not occur, that stakeholders do not care about these issues or that no important public interests are at stake. Further, the tariff specifically requires the Market Monitor to monitor PJM’s implementation of the PJM Market Rules and operation of PJM Markets.<sup>6</sup>

The Market Monitor requests that the Commission require PJM to modify its compliance filing to incorporate the Commission identified individual Approved Rules, as approved by PJM members, in the PJM tariff.

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<sup>4</sup> PJM OATT, Attachment M § IV.C.

<sup>5</sup> *Id.*

<sup>6</sup> PJM OATT, Attachment M § IV.B.5.

## **I. ANSWER**

### **A. It Is Appropriate that the Approved Rules Objectively Identify the Supporting Data Needed to Justify a Request for an Exception; the Commission Should Reject Arguments Advocating a More Subjective Approach**

The Approved Rules include a parameter matrix that provides objective and agreed upon operating parameters by unit class with which generators must comply in submitting their parameter limited schedules, unless an exception is obtained.<sup>7</sup> The parameter matrix is designed to ensure that participants do not offer their units with arbitrarily inflexible operating parameters. The use of arbitrarily inflexible operating parameters can be a mechanism for the exercise of market power via physical withholding. Such parameters can serve to limit the availability of units to PJM dispatch and can ensure excess operating reserve payments when PJM does dispatch the units.

The parameter matrix reflects agreement on the limitations that are appropriate by unit class. In order to account for the case when individual units face operational issues that require exceptions, stakeholders also agreed to a process for obtaining prior agreement to exceptions that could be supported with appropriate historic operating data. Consistent with the Commission's policy favoring, to the extent possible, the

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<sup>7</sup> A copy of this matrix showing five operational parameters (Minimum Down Time, Minimum Run Time, Maximum Daily Starts, Maximum Weekly Starts and Turn Down Ratio) and the default values applicable to those types of units eligible to receive operating reserve payments is posted on the PJM Website at: <http://www.pjm.com/markets-and-operations/energy/~media/markets-ops/energy/op-reserves/20080916-parameter-limited-schedule-matrix.ashx>.

establishment of clear and objective rules,<sup>8</sup> the Approved Rules incorporate details about the nature of the data needed to support a unit owner's claim for an exception.<sup>9</sup>

Approved Rule 23 states clearly that all generation suppliers that wish to submit an exception for units "with physical operational limitations that prevent the units from meeting the minimum parameters," "must supply the required historical unit operating data in support of the exception."

The Market Monitor favors the use of operating data for review of operating parameters because these data demonstrate how unit owners have actually operated their units. Units must produce energy to receive revenues, so unit owners have a strong incentive to operate their units in a manner consistent with the true limitations of the units, absent a countervailing incentive for withholding. Unit owners also have the ability to exercise market power by submitting offers with parameters that do not reflect the actual operational limits of their units.

AEP claims (at 3) that reliance on historic operating data is misplaced because such data "could show isolated short term aberrations in the unit performance that a unit might demonstrate for certain short periods of time." AEP's argument is

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<sup>8</sup> See, e.g., *Wholesale Competition in Regions with Organized Electric Markets*, Order No. 719, 125 FERC ¶61,071 at P 379 (2008).

<sup>9</sup> PJM included the Approved Rules as Attachment C to its compliance filing that initiated this Subdocket No. ER08-1596-001 on December 24, 2008. They can also be found posted on PJM's Website at: [http://www.pjm.com/markets-and-operations/energy/~/\\_/media/markets-ops/energy/op-reserves/operating-reserve-revised-business-rules-v6.ashx](http://www.pjm.com/markets-and-operations/energy/~/_/media/markets-ops/energy/op-reserves/operating-reserve-revised-business-rules-v6.ashx).

reasonable; it was raised in the stakeholder process, and it was addressed. AEP forgets that the operating data are submitted only in seeking an exception to the parameter limits. The initiative is with the generation owner. The expectation is actually that a generation owner will request an exception to the defined parameter limits based on short term aberrations that a unit might demonstrate for a period of time. A review of actual operating data is the only way to get to the underlying truth. AEP has the argument exactly backwards. Operating data reflect the actual operation of the unit. If an owner can explain how operating data reflect the actual operational capability of the unit, then there is an acceptable basis for an exception. In its most recent pleading, AEP would have the Market Monitor rely on unit offers that have no necessary link to the actual operating capabilities of the unit. A unit owner would not submit its offers as evidence of the way in which a unit actually operates; it would submit the operating data directly.

The issue appropriately raised by AEP is what data are the best measure to ensure that market power is not exercised through physical withholding. The Market Monitor is not attempting to tell unit owners how to operate their facilities. The parameter rules are applied only if there is an identified market power issue or if there is a system emergency (Approved Rule 6). The purpose of the rules is to ensure that unit owners do not use restrictive parameters to force other Market Participants to pay them excess operating reserves credits.

Thus AEP's suggestion (at 2–3) that the Approved Rules do not permit the use of such historic operating data for certain types of units to obtain an exception is false. Approved Rule 23 not only permits but requires the use of historical operating data to support an exception.

AEP has apparently misunderstood the Market Monitor's position on the Approved Rules. Much of AEP's answer addresses (at 3–5) the question of whether historic offer data should be used to evaluate requested exceptions from any type of unit. Approved Rule 23 is the only rule that addresses the data requirement to support exceptions. Approved Rule 23 covers all units and requires the use of historical operating data.

AEP disagrees (at 2) with the Market Monitor's position that historic offer data should not be used as a basis for determining whether units should be allowed to receive an exemption from defined parameter limits. AEP claims instead (at 3), that "the use of historical offer data ... provides *additional* information on which PJM can rely in order to make reasonable exemption decisions" (emphasis in original). This is inconsistent with AEP's prior position on objectivity. The concern raised in AEP's protest of PJM's initial filing was that the data used were too subjective.<sup>10</sup> In this answer, AEP now argues for considerable discretion regarding the units and the types

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<sup>10</sup> See Motion to Intervene and Protest of American Electric Power Service Corporation, Docket No. ER08-1569-000 at 5 (October 16, 2008) ("we have no assurances that PJM or Monitoring Analytics will accept our rationale for needing exemptions because the criteria are undefined").

of data that may be used for different types of units. AEP's approach would accord significant discretion to the party evaluating the requested exceptions.

At the time that AEP argued for a more objective approach, the assumption was that the Market Monitor would be involved in the evaluation process, as indicated by Approved Rules Nos. 23, 26, 32 and 35. In this answer, AEP instead requests (at 5–6) that the Commission modify the rules to ensure that "PJM is responsible for granting exceptions." AEP's new position, which would accord much greater discretion to the party granting the requested exception, should be evaluated in conjunction with this request.

PJM's claim (at 5) that the Power Point presentation made on November 16, 2005 by the Market Monitor supports their view on the use of offer data is incorrect. The repeatedly stated principle of the Market Monitor, throughout the process, was and continues to be that unit operating parameters should be consistent with physical unit capabilities in order to prevent the exercise of market power. As one example, the October 20, 2005 Power Point presentation by the Market Monitor stated as a goal to "Maintain unit parameters at levels based on physical characteristics."<sup>11</sup> The proposal was to: "Limit operating reserve payments to units with operating parameters based on the physical characteristics of the units."<sup>12</sup> The Market Monitor has also recognized that

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<sup>11</sup> Attachment to Protest of the Independent Market Monitor for PJM at 14, filed December 12, 2008.

<sup>12</sup> *Id.* at 35.



offer data can serve as the basis for parameter limits when relevant, i.e., when offer data reflect the physical characteristics of units.

**B. The Commission Should Not Modify the Approved Rules to Allow the Use of Post Calendar Year 2006 Offer Data to Define Parameter Limits**

The Market Monitor has stated that it does not support the use of historical offer data for defining the baseline parameter limits for any unit types. It has made it equally clear that it can accept the use of such data under the terms agreed to in the Approved Rules. The Approved Rules do not permit the use of offer data to support exceptions under Approved Rule 23. The Approved Rules explicitly limit the use of historical offer data to offer data from 2006. Data from after 2006 were excluded in the Approved Rules because stakeholders were involved in defining the rules in 2007. It was a reasonable assumption that, in the defined cases, offer data prior to and including 2006 reflected the actual operating limits of units rather than a withholding strategy. If the pre 2006 offer data become stale, the solution is not to use more recent offer data but to use current actual unit operating data. The touchstone, in every case, is the actual operating data. The purpose of the parameter rules is to prevent gaming. Unit offers are the form that gaming, when attempted, takes. It is naïve to ignore this fact. AEP does not deny (at 2) that offers are the vehicle used to game the rules and fails to make a case that that offers have any information content independent of the actual operating history and capabilities of the units.

Approved Rules 29 and 31 include a restriction on the use of offer data after 2006 because these rules define the baseline parameters to be used by units. Approved Rules 29 and 31 do not cover exceptions, they define instead the limits to which exceptions may be requested. The fact that Rules 29 and 31 define the baseline parameters makes it even more critical that the rules not be overturned outside of the stakeholder process. Approved Rule 23 covers exceptions and unambiguously requires the use of operating data. If any party believes that it requires an exception to the baseline parameters, the exception process is available.

The Power Providers, AEP and PJM never address the reasons that this limitation was included in the Approved Rules. Although its significance may have been forgotten by some, the limitation appears three times in paragraphs 29 and 31 of the Approved Rules, qualifying every place where the ability to rely upon historic offer data is discussed. Thus, the Approved Rules indicate explicitly that the prohibition on post Calendar Year 2006 data was an important element of consensus achieved after years of discussion to include Approved Rules 29 and 31 in this process for establishing minimum generator operating parameters.

PJM asserts (at 4) that “PJM personnel do not recall any discussion during the PJM stakeholder process in which there was a decision to explicitly and intentionally differentiate steam units from other types of generating units with respect to allowing the use of historical offer data to determine the parameter limits of a unit.”

Presentations to the RMWG by the Market Monitor on January 11, 2007 and April 24, 2007 may serve to refresh PJM's recollection.<sup>13</sup> Both presentations make it explicit that steam units are treated differently and explain exactly why. The same is true for combined cycle units. The language and concepts in this presentation were incorporated into the final Approved Rules.

**C. The Commission Should Direct the Market Monitor to Review and Provide Decisions on Requested Exceptions**

AEP makes an additional request that the Commission modify the Approved Rules outside the stakeholder process. AEP requests, without explanation, that the Commission provide PJM with exclusive authority to review and approve requested exceptions, which would remove the Market Monitor from the role.

Order 719 explicitly states that a role for an external, independent market monitor is the provision of inputs to prospective mitigation. Parameter limited schedules are such inputs. The review of requested exceptions to parameter limited schedules is an appropriate role for the Market Monitor because it is the Market Monitor's role to identify and prevent the exercise of market power. Parameter limited schedules are a vehicle for the exercise of market power.

To put the parameter limited schedule issue in historical context, the Market Monitor identified this issue in State of the Market Reports over several years, the

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<sup>13</sup> The indicated presentations are included as Attachment A below.

Market Monitor raised this issue in the stakeholder process and the Market Monitor took the lead on this issue with market participants. The outcome was a consensus supporting these rules, after a multi-year process.

It was understood, in that stakeholder process, that the MMU would review requests for exceptions to the parameter matrix. During the controversy over the MMU's independence in 2007, PJM drafted business rules, despite the explicit disagreement of the Market Monitor, to provide for the shared authority that is now reflected in the Approved Rules. More recently, PJM proposed revised business rules at the Market Implementation Committee ("MIC") that would have entirely excluded the Market Monitor from evaluating requests, but objections were raised in the stakeholder process and the changes were never voted on at the MIC or considered by the Members Committee.<sup>14</sup>

Contrary to AEP's request, if any party should have exclusive authority to administer the tariff provisions, it should be the Market Monitor. These exceptions are clearly pre-determined inputs to Sell Offers as described in Order No. 719.<sup>15</sup> Market Participants use these inputs to develop the offers that they submit to PJM. However, neither the tariff nor the rules require that a market participant use the exception

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<sup>14</sup> A copy of this draft can be found on the PJM Website at <http://www.pjm.com/Media/committees-groups/committees/mic/20081029-item-10b-operating-reserve-revised-business-rules.pdf>.

<sup>15</sup> *Wholesale Competition in Regions with Organized Markets*, Order No. 719, 125 FERC ¶ 61,071 at P 375 (2008) ("Order No. 719").

approved by the Market Monitor. Market participants retain full discretion to submit any offer they choose. Moreover, PJM can accept or reject an offer in accordance with its responsibilities under the tariff. The Market Monitor does not presume to tell either Market Participants or PJM what to do. The Market Monitor's role has no impact on the actual operation of any unit or on PJM's ability to operate the system. The Market Monitor does, however, have a responsibility to deter the exercise of market power and physical withholding, such as that addressed by these rules. With Market Monitor review, Market Participants have an opportunity to receive an advance determination from the Market Monitor on the basis of objectively established criteria, and can go forward confident that the Market Monitor has evaluated and approved a parameter limit exception or with notice that the Market Monitor does not approve it, in which case the Market Participant is at risk that the matter will be brought to the Commission. The Market Monitor follows the Approved Rules, in detail, and has no discretion to deviate from those rules. The Market Monitor has a detailed approach for the administration of these rules in an objective manner, which is provided as Attachment B below. This document was previously provided to PJM.

Essentially the same process has worked well since 1999 as it pertains to cost data provided in support of Seller Offer Caps and more recently as it pertains to avoided

cost rates for the PJM Capacity Market. The Market Monitor has had successful interactions with market participants, including the parties submitting answers here.<sup>16</sup>

PJM is independent from its particular Members, but it must be understood that it is not guided, as an institution, by a comparable, singular commitment to the mitigation of market power for reasons that the Commission has identified in Order No. 719.<sup>17</sup> Order No. 719 identifies monitoring the conduct of market participants (and the RTO) as a core function of the market monitoring function, and the Commission has recognized that the market monitor's role in developing mitigation inputs is central to its ability to carry out that function.<sup>18</sup> Indeed, this is the most critical stage of the process

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<sup>16</sup> PJM's argument (at 7) that the Market Monitor's general authority under Attachment M to investigate and refer matters to the Commission is an adequate substitute for clear tariff rules is not supportable and not consistent with Commission directives. Clear rules minimize ex post filings to correct behavior that has damaged the market and make all market participants better off.

<sup>17</sup> Order No. 719 at P 372 ("Many commenters, however, raise substantial concerns over removing MMUs from mitigation, including the following: (1) there is a greater conflict of interest for the RTO or ISO to administer mitigation, as it has a vested interest in keeping its market participants happy, especially the larger players who can threaten to leave the RTO or ISO if they choose; (2) the MMU serves as a useful buffer between the RTO or ISO and the market participants, performing what is often viewed as a hostile act; (3) there is an inherent tension between mitigation and the RTO or ISO goal of promoting new markets; (4) the MMU is better equipped by training and market access to detect the need for mitigation; (5) removing the MMU from mitigation would distance it from the market insights it needs to perform its monitoring functions; (6) if removed from tariff administration, the MMU would not have access to the mitigation settlement process and thus could not adequately monitor the RTO's or ISO's mitigation performance; (7) there would be much duplication of costs, since the MMU would have to retain most of its mitigation capabilities in order to monitor the RTO's or ISO's conduct of mitigation; (8) there would be extensive transition costs and software licensing concerns; and (9) there is no empirical evidence of an existing problem with the MMUs performing mitigation. We find many of the objections raised by commenters meritorious.").

<sup>18</sup> See 18 CFR § 35.28 (g)(3)(ii)(C) & (g)(3)(iii); Order No. 719 at 354 ("[W]e have previously acknowledged ... MMUs perform an important role in assisting the Commission in enhancing the competitiveness of ISO/RTO markets. Competitive markets benefit customers by assuring that prices properly reflect supply and demand conditions. MMUs monitor organized wholesale markets to

in that it allows the Market Monitor to discuss conduct issues with market participants before the submission of offers into the markets, after which it is too late to prevent irremediable impacts on market outcomes. This core market monitoring function cannot be carried out effectively without preserving these critical tools.

It should be recognized that the involvement of the Market Monitor in PJM's mitigation program, in this case and in general, is more limited than what the Commission allows and is more limited than the mitigation-related tasks that other RTOs' market monitoring units perform, which includes actually providing the inputs (e.g., reference prices) directly to the RTO. In PJM, the Market Monitor's role is (i) to provide agreed upon default inputs that the RTO files or posts and (ii) to evaluate and agree to a market participant's unit or transaction specific requests. However, only Market Participants provide the inputs (default or unit specific) to PJM and Market Participants are solely responsible for their accuracy and conformity with the PJM Market Rules.<sup>19</sup> Consequently, the function exercised by the Independent Market

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identify ineffective market rules and tariff provisions, identify potential anticompetitive behavior by market participants, and provide the comprehensive market analysis critical for informed policy decision making." Citing *Market Monitoring Units in Regional Transmission Organizations and Independent System Operators*, 111 FERC ¶61,267 (2005), Appendix A); Order No. 719 at P 311 ("The Final Rule also imposes obligations on the RTOs and ISOs to provide the MMU with adequate tools with which to carry out its duties"). Order No. 917 ("We also determine that the MMU may provide the inputs required by the RTO or ISO to conduct prospective mitigation, including determining reference levels, identifying system constraints, cost calculations and the like. This will enable the RTO or ISO to utilize the considerable expertise and software capabilities developed by their MMUs, and reduce wasteful duplication.").

<sup>19</sup> PJM OA Schedule 1 § 6.4.2(f).

Monitor for PJM falls within the core function of monitoring a Market Participant's conduct and does not implicate any of the concerns identified by the Commission (i.e., conflicts of interest, subordination to the RTOs) that only have relevance after a Market Participant has submitted its offer.

A critical feature of the recent settlement of market monitoring issues left these tools undisturbed, and the Commission specifically sanctions the "structure and tools" of PJM's market monitoring program in Order No. 719.<sup>20</sup> PJM's compliance filing and AEP's response require the Market Monitor to put these matters before the Commission at this time. The Market Monitor is hopeful that clear direction from the Commission will clarify PJM's and the Market Monitor's respective roles in a manner that will ensure an effective program for the benefit of all involved.

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<sup>20</sup> Order No. 719 at P 330.



## II. MOTION FOR LEAVE TO ANSWER

This answer is necessary to resolve confusion raised by the indicated pleadings regarding the Market Monitor's position, and to address new issues raised in those pleadings, such as which party or parties the Commission should entrust to administer the rules at issue here. The Commission has found good cause exists to accept an answer when the answer leads to a more accurate and complete record, helps the Commission understand the issues, clarifies certain errors and misstatements, responds to new issues raised, or provides useful and relevant information that will assist the Commission in its decision-making process.<sup>21</sup>

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<sup>21</sup> See *Renewable Energy Systems Americas Inc. and PEAK Wind Development, LLC v. Otter Tail Power Company and Minnkota Power Cooperative, Inc.*, 125 FERC ¶61,336 (2008) at P 45 ("We will accept all of the answers and replies because they have provided information that assisted us in our decision-making process"); *Pinnacle West Energy Corp. v. Nevada Power Co., et al.*, 105 FERC ¶61,053 at P 34 (2003) (acceptance "because they have provided information that assisted us in our decision-making process").

### III. CONCLUSION

The Market Monitor respectfully requests that the Commission accept this answer and afford it consideration as it resolves the issues raised in this proceeding.

Respectfully submitted,



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Independent Market Monitor for PJM

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Dated: February 17, 2009

## CERTIFICATE OF SERVICE

I hereby certify that I have this day served the foregoing document upon each person designated on the official service list compiled by the Secretary in this proceeding.

Dated at Eagleville, Pennsylvania,  
this 17<sup>th</sup> day of February, 2009.



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## **Attachment A**



# Updated Operating Parameter Matrix

RMWG

January 11, 2007

Joe Bowring

Market Monitor

- Detailed discussions with unit owners
  - Steam units generally have well established historical operating practices based on physical units
  - Different approaches to CC units
- Detailed review of 2006 data for every PJM unit
- Key changes:
  - Use of historical data based parameters for steam units of all types
  - Use of historical data based parameters for CC units
- Exception process still in place

| Parameter   | Minimum Down Time (Hrs) | 2006 System Mean | Observations (Unit-Day) |
|---|-------------------------|------------------|-------------------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 2 or Less               | 1                | 49,677                  |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 2 or Less               | 1                | 59,332                  |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 3 or Less               | 2                | 33,115                  |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 4 or Less               | 3                | 24,734                  |
| Combined Cycle Units                                    | 4 or Less               | 4                | 17,540                  |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 7 or Less               | 7                | 9,902                   |
| Petroleum and Natural Gas Steam Units - Post-1985       | 4 or Less               | 4                | 13,885                  |
| Sub-Critical Coal Units                                 | 9 or Less               | 8                | 15,660                  |
| Super-Critical Coal Units                               | 84 or Less              | 53               | 20,748                  |

| Parameter   | Minimum Run Time (Hrs) | 2006 System Mean | Observations (Unit-Day) |
|---|------------------------|------------------|-------------------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 2 or Less              | 2                | 49,677                  |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 3 or Less              | 2                | 59,332                  |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 5 or Less              | 3                | 33,115                  |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 5 or Less              | 3                | 24,734                  |
| Combined Cycle Units                                    | 6 or Less              | 5                | 16,178                  |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 8 or Less              | 9                | 9,909                   |
| Petroleum and Natural Gas Steam Units - Post-1985       | 6 or Less              | 5                | 13,017                  |
| Sub-Critical Coal Units                                 | 15 or Less             | 10               | 18,257                  |
| Super-Critical Coal Units                               | 24 or Less             | 24               | 20,748                  |





## Maximum Daily Starts

| Parameter   | Maximum Daily Starts | 2006 System Mean | Observations (Unit-Day) |
|---|----------------------|------------------|-------------------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 2 or More            | 3                | 42,547                  |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 2 or More            | 4                | 56,056                  |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 2 or More            | 2                | 25,471                  |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 2 or More            | 2                | 24,318                  |
| Combined Cycle Units                                    | 2 or More            | 1                | 20,677                  |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 1 or More            | 1                | 13,468                  |
| Petroleum and Natural Gas Steam Units - Post-1985       | 2 or More            | 2                | 14,833                  |
| Sub-Critical Coal Units                                 | 1 or More            | 1                | 56,780                  |
| Super-Critical Coal Units                               | 1 or More            | 1                | 16,744                  |

| Parameter   | Maximum Weekly Starts | 2006 System Mean | Observations (Unit-Day) |
|---|-----------------------|------------------|-------------------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 14 or More            | 20               | 42,547                  |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 14 or More            | 22               | 56,056                  |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 14 or More            | 13               | 25,471                  |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 14 or More            | 16               | 24,318                  |
| Combined Cycle Units                                    | 11 or More            | 9                | 20,677                  |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 7 or More             | 5                | 13,468                  |
| Petroleum and Natural Gas Steam Units - Post-1985       | 11 or More            | 7                | 14,833                  |
| Sub-Critical Coal Units                                 | 5 or More             | 4                | 57,507                  |
| Super-Critical Coal Units                               | 2 or More             | 2                | 16,744                  |



## Minimum Turn Down Ratio

| Parameter   | Turn Down Ratio | 2006 System Mean | Observations (Unit-Hour) |
|---|-----------------|------------------|--------------------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 1.0 or More     | 1.1              | 1,187,875                |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 1.0 or More     | 1.4              | 1,418,660                |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 1.0 or More     | 1.2              | 791,939                  |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 1.0 or More     | 1.0              | 591,508                  |
| Combined Cycle Units                                    | 1.5 or More     | 2.9              | 504,925                  |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 3.0 or More     | 4.0              | 330,790                  |
| Petroleum and Natural Gas Steam Units - Post-1985       | 2.0 or More     | 2.1              | 546,223                  |
| Sub-Critical Coal Units                                 | 2.0 or More     | 2.0              | 1,593,001                |
| Super-Critical Coal Units                               | 1.5 or More     | 1.6              | 496,185                  |

- For all steam units
  - Units have some unique characteristics
    - Typically relatively old
  - Units must use most flexible actual historical values
    - Offered at least 10 percent of the time
  - For each parameter
  - Calculated for calendar year 2006
  - Parameters from market-based offers
  - Parameters from cost-based offers if no market-based offers

- For all combined cycle units
  - Units must use most flexible actual historical values within defined limits
    - Offered at least 10 percent of the time
  - For each parameter
  - Calculated for calendar year 2006
  - Parameters from market-based offers
  - Parameters from cost-based offers if no market-based offers

- For all combined cycle units
  - Maximum daily starts
    - 1 or 2
  - Maximum weekly starts
    - 7 or 14
  - Minimum down time
    - 4 or 6
  - Minimum run time
    - 4; 6; or 8
  - Minimum Turn down ratio
    - 1.5



# Operating Parameter Matrix

RMWG  
April 24, 2007

Joe Bowring  
Market Monitoring Unit



## PJM Unit Parameter Matrix Summary

Turn Down Ratio = Economic Maximum MW / Economic Minimum MW

| Parameter   | Minimum Down Time (Hrs) | Minimum Run Time (Hrs) | Maximum Daily Starts | Maximum Weekly Starts | Turn Down Ratio |
|---|-------------------------|------------------------|----------------------|-----------------------|-----------------|
| Small Frame CT and Aero CT Units - Up to 29 MW ICAP     | 2.0 or Less             | 2.0 or Less            | 2 or More            | 14 or More            | 1.0 or More     |
| Medium Frame CT and Aero CT Units - 30 MW to 65 MW ICAP | 2.0 or Less             | 3.0 or Less            | 2 or More            | 14 or More            | 1.0 or More     |
| Medium-Large Frame CT Units - 65 MW to 125 MW ICAP      | 3.0 or Less             | 5.0 or Less            | 2 or More            | 14 or More            | 1.0 or More     |
| Large Frame CT Units - 135 MW to 180 MW ICAP            | 4.0 or Less             | 5.0 or Less            | 2 or More            | 14 or More            | 1.0 or More     |
| Combined Cycle Units                                    | 4.0 or Less             | 6.0 or Less            | 2 or More            | 11 or More            | 1.5 or More     |
| Petroleum and Natural Gas Steam Units - Pre-1985        | 7.0 or Less             | 8.0 or Less            | 1 or More            | 7 or More             | 3.0 or More     |
| Petroleum and Natural Gas Steam Units - Post-1985       | 3.5 or Less             | 5.5 or Less            | 2 or More            | 11 or More            | 2.0 or More     |
| Sub-Critical Coal Units                                 | 9.0 or Less             | 15.0 or Less           | 1 or More            | 5 or More             | 2.0 or More     |
| Super-Critical Coal Units                               | 84.0                    | 24.0 or Less           | 1 or More            | 2 or More             | 1.5 or More     |



- For steam plants, regardless of fuel type:
  - The average historical values for any of these parameters as offered by the owners for the calendar year 2006 may be used in place of the values in the matrix
  - The historical average is calculated from the market based offers for market based units and from cost based offers for units which made only cost based offers.

- For Combined Cycle plants:
  - A) If the 2006 average historical market based offer parameters are within the limits in the matrix, the unit will be limited to that 2006 historical average. If not, then B) applies.
  - B) If the unit was offered with market based offer parameters for 10% or more of the days (36 days minimum) at a level at or more flexible than the parameters in the matrix, the unit will be limited to that level. If not then C) applies.
  - C) If the 2006 average historical market based offer parameters exceed the limits in the matrix (less flexible than the parameters in the matrix) then the unit will be limited to the level at which the market based parameter was bid to the most flexible level for 10% or more of the days (36 days minimum) at that level.

## **Attachment B**

## MMU Method for Review of Parameter Limited Schedules

### Introduction

The MMU method for reviewing exceptions to the parameter limited schedule (PLS) matrix consists of three steps, defined by the Business Rules in the PJM Operating Reserve Construct, Version 06 (Approved by Members Committee on Nov. 15, 2007), in the section Minimum Generator Operating Parameters – Parameter Limited Schedules.

The MMU calculated the parameters for each step and used the *least flexible* value from the three steps as the agreed parameter for a unit's PLS schedule. The least flexible value is the least flexible calculated parameter limit (Minimum Run Time, Minimum Down Time, Maximum Daily Starts, Maximum Weekly Starts, Turn Down Ratio) resulting from the three steps. Units were denied exceptions only if the *least flexible* value from Step 01, Step 02, and Step 03 were as or more flexible than the PJM Unit Parameter Matrix defined value.

### Step 01

The first step (Step 01) is defined by Business Rules 10-20.

Rules 10, 11, 12, and 13 define the Turn Down Ratio (TDR) parameter. The defined TDR is the greater of the TDR calculated using the “the minimum of the economic minima and the maximum of the economic maxima submitted over the prior 24 months” (Rule 11a) or “90 percent of the PJM-defined unit class Turn Down Ratio” (Rule 11b). In the case of CT units, Rule 13 defines the TDR. Rule 13 states: “For CTs, the Turn Down Ratio will assumed to be 1.0.”

Rule 14 defines the Minimum Run Time (MRT) parameter. Rule 14 is: “The submitted Minimum Run Time may not exceed the defined Minimum Run Time for the PJM-defined unit class.” As a result, there are no exceptions to the Parameter Matrix in Step 01 for MRT.

Rules 15 and 16 define the Minimum Down Time (MDT) parameter. The defined MDT is the “minimum of the Minimum Down Times submitted over the prior 24 months.”

Rules 17 and 18 define the Maximum Weekly Starts (MWS) parameter. Rules 17 and 18 are: “If the Maximum Starts Per Week submitted for a unit is less than the PJM-defined unit class maximum starts per week, then the unit's Maximum Starts per Week will be set equal to the PJM-defined unit class posted Maximum Starts per Week.” As a result, there are no exceptions to the Parameter Matrix in Step 01 for MWS.

Rules 19 and 20 define the Maximum Daily Starts (MDS) parameter. Rules 19 and 20 are: “If the number of Maximum Daily Starts submitted by a unit is less than the PJM-defined unit class Starts per Day for a non-CT unit, or less than 2 for a CT, then the unit's Maximum Starts per Day will be set equal to the PJM-defined unit class Maximum Starts per Day for a non-CT unit and 2 for a CT.” As a result, there are no exceptions to the Parameter Matrix in Step 01 for MDS.

# Monitoring Analytics

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## Step 02

The second step (Step 02) is defined by Business Rules 29, 30 and 31, which apply only to steam and combined cycle units.

Under Rule 30, the acceptable parameter levels for steam units are “calculated from the market based offers for market based units and from cost-based offers for units which made only cost-based offers” (Rule 30) using the 2006 historical average. A “market based offer” is defined as a price-based offer.

The MMU calculated defined levels for all parameters for steam units using the 2006 historical average offer data.

Rule 31 defines the acceptable parameter levels for combined cycle units. Rule 31i states: “If the 2006 average historical market-based offer parameters are within the limits in the parameter matrix, the unit will be limited to that 2006 historical average. If not, then ii) applies.” Rule 31ii states: “If the unit was offered with market-based offer parameters for 10% or more of the days (36 days minimum) at a level at or more flexible than parameters in matrix, the unit will be limited at that level.” If the unit does not meet the conditions in 31ii, then 31iii applies. Rule 31iii states: “If the 2006 average historical market based offer parameters exceed the limits in the matrix (less flexible than the parameters in the matrix) then the unit will be limited to the level at which the market-based parameter was bid to the most flexible level for 10% or more of the days (36 days minimum) at that level.”

While Rule 31i states that “the unit will be limited to that 2006 historical average” even if that is more flexible than the matrix parameter, the MMU, for purposes of this review, limited such units to the parameter values rather than the more flexible values based on actual 2006 operations.

## Step 03

The third step (Step 03) is defined by Business Rule 23.

Under Rule 23, “all generation suppliers that wish to submit a Parameter-Limited Schedule for units with physical operational limitations that prevent the units from meeting the minimum parameters may submit a request for a new exception.” Although Rule 23 states “Each generation supplier must supply the required historical unit operating data in support of the exception,” to our knowledge no unit submitted such data. Some unit owners provided other documentation supporting requested exceptions. The MMU analyzed the operating history of each unit requesting an exception, and agreed to exceptions based on the historical operating data of the unit.

Under Rule 23, the MMU analyzed exception requests based on actual unit operating data using all available DMT log data (typically from 2003-2004 to date). The operating data were filtered to remove trips and false starts.

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Under Rule 23, if a unit was able to meet the PJM Unit Parameter matrix defined standard 10% or more of the time, the matrix value is the acceptable value.

If the unit's operating history showed that the unit operated at the parameter level defined in the matrix 10% of the time or less, the exception is accepted if based on actual operating history. If the unit's operating history showed that the unit operated at the parameter level defined in the matrix 10% of the time or less, but the operating history showed that the unit was capable of more flexibility than the requested exception, then the MMU recommends a partial exception. The partial exception includes a recommended parameter level equal to the most flexible parameter level at which a unit has operated for *at least* 10% of the time.