

less Projected PJM Market Revenues.⁵ Projected PJM Market Revenues are net revenues, the gross revenues from the energy and ancillary services markets less the incremental or marginal costs incurred to earn such revenues. The specific issue is the correct measure of marginal costs in the net revenue calculation when a unit submits a market-based energy offer which is less than its cost-based energy offer.

The existing tariff (Section 6.8(d)) requires (per the August 25th Order) the use of a unit's cost-based offer as the only measure of marginal costs in the calculation of net revenues.⁶ The existing tariff provisions are not just and reasonable and should be modified to permit the use of the best available information on marginal costs in defining net revenues.

The Market Monitor's position is that non-zero, market-based offers reveal a unit's actual marginal costs when lower than cost-based offers and for that reason should be used in the net revenue calculation rather than the higher cost-based offers. More specifically, the best way to determine marginal costs is to use the lower of a unit's cost-based offer or market-based offer, if the market-based offer exceeds marginal costs based on fuel and emissions costs, while providing the seller the opportunity to support the assertion that its lower market-based offer is less than its marginal costs. This approach would be reliable, transparent and accurate and entirely consistent with the defined roles of the Market Monitor, PJM and the Commission.

⁵ See August 25th Order at P 30. Section 6.8(a) of Attachment DD to the OATT defines Avoidable Cost Rates. Section 6.8(d) of Attachment DD provides, "Projected PJM Market Revenues for any Generation Capacity Resource to which the Avoidable Cost Rate is applied shall include all actual unit-specific revenues from PJM energy markets, ancillary services, and unit-specific bilateral contracts from such Generation Capacity Resource, net of marginal costs for providing such energy (i.e., costs allowed under cost-based offers pursuant to Section 6.4 of Schedule 1 of the Operating Agreement) and ancillary services from such resource."

⁶ See August 25th Order at P 30.

This approach is also fully consistent with the way in which offer capping is implemented in the energy market. The lower of the cost-based offer and the market-based offer is used to offer cap units in the energy market.

I. BACKGROUND

Structural market power is endemic to the PJM Capacity Market.⁷ The RPM rules employ the three pivotal supplier test to identify Capacity Market Sellers with market power and apply market power mitigation to the capacity market offers of sellers that fail the test. Effective market power mitigation is necessary to ensure competitive results. Capacity Market Sellers fail the market power test almost without exception and their offers are mitigated.⁸ When market power mitigation applies, Capacity Market Sellers are limited to Sell Offers at or below their Market Seller Offer Caps.

Market Seller Offer Caps are defined as avoidable costs plus ten percent less net revenue from the energy and ancillary services markets. The marginal cost of producing energy is part of the calculation of net revenue and thus directly affects offer caps in the capacity market. Market power mitigation requires Capacity Market Sellers to offer at no more than the competitive levels defined by Market Seller Offer Caps when the market lacks the competitive structural conditions that would otherwise result in competitive offers.

It is critical that Market Seller Offer Caps be as accurate as possible because they directly affect capacity market prices. Market power mitigation only works if the Market Seller Offer Caps are calculated accurately. If the market clears based on a Seller Offer that reflects an overstated Market Seller Offer Cap, then market power is exercised.

⁷ See, e.g., Monitoring Analytics, LLC, 2013 State of the Report for PJM: Volume .2 (March 13, 2014) at 157.

⁸ See, e.g., Monitoring Analytics, LLC, Analysis of the 2017/2018 RPM Base Residual Auction (October 6, 2014) at 18.

There are three types of costs identified under PJM rules: marginal costs (or incremental costs), short run costs incurred directly as a result of producing energy for an hour; avoidable costs, annual costs that would be avoided if energy were not produced over an annual period; and long term fixed costs, costs associated with an investment in a facility including the return on and of capital.

Market Seller Offer Caps for an existing resource equal the Avoidable Cost Rate plus ten percent (ACR) less net revenues (Projected PJM Market Revenues) from PJM energy and ancillary services markets.⁹ Projected PJM Market Revenues for a resource are the gross revenues from energy and ancillary services markets and bilateral contracts, net of the marginal costs of that resource to generate energy. This proceeding concerns the calculation of Projected PJM Market Revenues and specifically the definition of the marginal costs of providing energy.

The Market Monitor does not determine the level of Market Seller Offer Caps. The Market Monitor reviews the Capacity Market Sellers' proposed caps and discusses the caps with Capacity Market Sellers. The Market Monitor provides the Market Monitor's view of whether the components of the proposed Market Seller Offer Caps are consistent with competitive offers but has no authority to compel a participant to change its offer or to make an offer at any specific level. Capacity Market Sellers and the Market Monitor reach agreement on the level of Market Seller Offer Caps in almost every case. But in every case, Capacity Market Sellers have full and sole responsibility for their offers and their impact on the markets. Market Sellers provide their offer caps. PJM may reject offers that do not

⁹ See OATT Attachment DD § 6.8(d) ("Projected PJM Market Revenues for any Generation Capacity Resource to which the Avoidable Cost Rate is applied shall include all actual unit-specific revenues from PJM energy markets, ancillary services, and unit-specific bilateral contracts from such Generation Capacity Resource, net of marginal costs for providing such energy (i.e., costs allowed under cost-based offers pursuant to Section 6.4 of Schedule 1 of the Operating Agreement) and ancillary services from such resource. ... [T]he calculation of Projected PJM Market Revenues shall be equal to the rolling simple average of such net revenues as described above from the three most recent whole calendar years prior to the year in which the BRA is conducted.").

comply with its interpretation of the applicable rules, but PJM does not make determinations about market power.¹⁰

For every RPM Auction held since the first Base Residual Auction (“BRA”) for the 2007/2008 Delivery Year beginning on April 2, 2007, through the most recent BRA for the 2017/2018 Delivery Year beginning on May 12, 2014, Projected PJM Market Revenues have been calculated by starting with gross energy and ancillary services revenues and subtracting the marginal costs of producing that energy. The lower of the non-zero market-based energy offer and the cost-based energy offer has been used to calculate the actual marginal cost of producing energy. In the RPM Auctions for a period covering ten Delivery Years, Capacity Market Sellers did not disagree with this approach, with the exception of FirstEnergy’s petition for declaratory order filed April 7, 2014.

The August 25th Order agreed with FirstEnergy that a correct interpretation of the current tariff requires the use of a cost-based energy offer regardless of whether such offer is the marginal cost of producing energy. If the rule is applied in that manner for the 2015/2016 Third Incremental Auction on February 23, 2015, this would be the first time that this approach is applied.

II. ARGUMENT

A. Non-Zero Market-Based Offers Below Cost-Based Offers Are Evidence of a Resource’s Actual Marginal Costs.

Schedule 2 to the Operating Agreement broadly defines incremental or marginal costs while more detailed definitions are in Manual 15. Cost-based offers are offer caps. Cost-based offers and offer caps in the energy market are defined to be a unit’s marginal costs plus ten percent. By definition, cost-based offers are set a level ten percent greater

¹⁰ See OATT § 12A.

than marginal costs. The rationale for this rule was to reflect uncertainty resulting from the impact of ambient conditions on the costs of operating combustion turbines.¹¹

The assumption that cost-based offers (offer caps), as defined in OATT Section 6.4.2, always reflect marginal costs is not consistent with the observed behavior of generation owners.

A significant number of units in PJM submit cost-based offers in the energy market equal to the highest allowed offer price cap and, at the same time, submit a lower market-based energy offer equal to actual marginal costs. This is competitive behavior by units that want to run whenever market prices exceed the units' actual marginal costs. Competition creates a strong incentive to offer actual marginal cost. Accordingly, when a market participant submits non-zero market-based energy offers for a unit at levels below the unit's offer price cap, it is strong evidence that the unit's market-based offer equals its actual marginal costs.

For example, participants offering coal units in PJM typically have market-based offers at levels below the maximum offer price cap because they do not include the ten percent adder and reduce or eliminate Variable Operations and Maintenance Costs (VOM) in order to calculate actual marginal costs and to calculate a competitive offer.¹²

The Market Monitor's recommended approach to calculating offer caps in the capacity market is fully consistent with the way in which offer caps are calculated in the

¹¹ The inclusion of a ten percent adder in the PJM's cost calculation rules predates the establishment of PJM's competitive markets in the late 1990s. It was a policy of PJM's predecessor PJM Power Pool. PJM Power Pool records indicate that a ten percent adder was included to reflect uncertainty resulting from the impact of ambient conditions on the costs of operating Combustion Turbines (CTs). The original rationale for setting the adder at ten percent is unclear. The rationale for applying the adder to generating unit types other than CTs in the PJM market rules that applied after the introduction of the market on April 1, 1999 is also unclear,

¹² See Monitoring Analytics, LLC, 2013 State of the Market Report for PJM: Volume 2 (March 13, 2014) at 94-95.

PJM energy market when market power mitigation is applied. In the PJM energy market, when a unit has structural market power and its offer is mitigated, the unit's offer is set to the lower of its cost-based or market-based offer. The OATT rule for the capacity market is inconsistent with the way in which market power mitigation works in the energy market. Under the OATT, a unit's energy offer could be capped at its lower market-based offer yet have its net revenues for market power mitigation in the capacity market calculated based on its higher cost-based offer, artificially reducing its net revenues for purposes of calculating the Market Seller Offer Caps in the capacity market.

Units that can use multiple fuels provide another actual example of how the OATT would lead to unjust and unreasonable results. Such units can and do base their much higher cost-based offers on oil, the secondary fuel, and their lower market based offers on natural gas, the primary fuel. The OATT would require the use of the higher cost-based offer in the calculation of net revenue despite the fact that the unit actually burns natural gas. The Market Monitor's proposed approach would use the market based offer, consistent with the actual fuel burned and the actual marginal fuel costs.

When a market participant submits a non-zero market-based offer below the highest offer price cap that it could justify under the rules, it is evidence of the participant's actual marginal costs. Participants in PJM calculate their own offers in PJM markets and participants have exclusive responsibility to submit offers that are not intended to exercise market power, that are not part of a manipulative scheme, and that do not otherwise violate the PJM market rules.

In the competitive PJM energy market, sellers have an incentive to offer their actual marginal costs. That is the profit maximizing strategy and there is strong evidence that sellers offer their actual marginal costs in their market-based offers. Sellers want their unit dispatched when the market price is greater than marginal cost.

B. The Definition of Marginal Cost in the Cost Development Guidelines

OATT Section 6.4.2 was included in the PJM Market Rules in order to establish offer caps that are imposed when units have local market power in the energy market. There are several adders to marginal costs that are included in the offer caps defined in Section 6.4.2 that are not part of marginal costs.

The definition of an Offer Price Cap in Section 6.4.2(a)(ii) of Schedule 1 to the OA includes a ten percent adder to incremental, or marginal, cost. A ten percent adder is not part of marginal costs.

Frequently Mitigated Units/Associated Units (“FMUs”) may apply adders to marginal costs ranging from \$10 to \$40/MWh.¹³ The FMU adders are not part of marginal costs.¹⁴ The FMU adder should not be included in marginal costs for any definition of costs applied when calculating net revenues. The FMU adder was designed to address the net revenue shortfall (missing money) for frequently mitigated units prior to and as a substitute for capacity market revenues. It is therefore appropriate to include FMU adders as part of net revenues and not as part of marginal costs in calculating net revenue. Including FMU adders as part of net revenue reduces the amount of revenue a unit must recover from the capacity market. To instead include FMU adders as part of marginal costs would result in double recovery in the capacity market of any missing money in the energy and ancillary services markets, once through the FMU adder and once through the capacity market price.

There are also elements of the definition of variable operation and maintenance expense in Manual 15 that exceed marginal cost.

¹³ See OA Schedule 1 § 6.4.2(a)(iii).

¹⁴ See *PJM Interconnection, L.L.C.*, 149 FERC ¶ 61,091 at P 32 (2014) (“The intention of the PJM 2005 Order was to allow units to recover their going-forward costs through Offer Price Adders”), citing *PJM Interconnection, L.L.C.*, 110 FERC ¶ 61,053 at P 25 (2005).

The result is that marginal costs for individual units can be and frequently are less than the cost-based offer caps defined in OATT Section 6.4.2. Units make competitive, market-based offers in the energy market that are less than the cost-based offer caps when the marginal cost for an individual unit is less than the cost defined in Manual 15.

C. The Market Monitor's Proposed Approach is Just and Reasonable

The Market Monitor proposes that the language of Section 6.8(d) of Attachment DD to the OATT be revised to apply the lower of the seller's (i) cost-based offer, or (ii) non-zero market-based offer, if the non-zero offer is greater than or equal to the marginal cost of fuel and emissions, unless the seller asserts and can support the assertion that its lower market-based offer is less than short run marginal costs.

It is very unlikely that a unit's market-based offer would be less than its actual marginal costs in order to increase its chance of dispatch because unit owners have other alternatives including self scheduling or starting the unit at their discretion. FirstEnergy, for example, did not assert that its market-based offers were less than marginal cost.¹⁵ Nonetheless, in order to address the possibility that a seller could make an offer in the energy market at less than its marginal cost, the Market Monitor's proposed approach would base the calculation of net revenues on the lower of cost-based or market-based offers only if the non-zero offer is greater than or equal to the marginal cost of fuel and emissions, unless the seller asserts and can support the assertion that its lower market-based offer is less than marginal cost. More specifically, the seller would have to demonstrate that its energy offer is less than the marginal cost of fuel plus the marginal cost of any emissions allowances. If the seller can support that assertion, the Market Monitor's proposed approach would use the cost-based offer.¹⁶

¹⁵ See Petition for Declaratory Order of FirstEnergy Solutions Corporation and Request for Expedited Action, Docket No. EL14-36-000 (April 7, 2014).

¹⁶ See OATT § 12A, Attachment DD § 6.7(d), Attachment M-Appendix § II.H.

D. Marginal Cost Can Be Reliably Determined Based on Unit Offers and Without Reliance on the Market Monitor’s Discretion.

PJM’s argues (at 8) that the existing tariff provision, as its meaning has been clarified by the Commission, is necessary in order to avoid the Market Monitor’s exercise of discretion. PJM argues (at 8) that use of a value other than cost-based offers “places the IMM and PJM in the tenuous position of determining what costs may be more reflective of marginal costs than the cost-based offer.” While the Market Monitor agrees with the concern, the Market Monitor does not propose to exercise discretion. The Market Monitor did not exercise discretion in the seven years it has applied this method and the market participant always has the final decision about what offer to enter in the PJM market.

The Market Monitor proposes to continue to apply the current process for review of offers and to continue to reserve the current defined roles for the Market Monitor, PJM and the Commission.¹⁷

The Market Monitor does not set any seller’s Market Seller Offer Caps. Under the PJM market rules, Capacity Market Sellers have exclusive responsibility to calculate Market Seller Offer Caps consistent with the rules.¹⁸ The tariff also establishes a review process by the Market Monitor concerning market power issues and by PJM concerning tariff compliance.¹⁹ Capacity Market Sellers have the exclusive responsibility to defend their calculations in Commission proceedings.²⁰ The Market Monitor has the responsibility to bring market power issues to the Commission’s attention and to take a position on the proper interpretation and implementation of the rules, particularly regarding mitigation.²¹

¹⁷ See OATT § 12A.

¹⁸ See OATT § 12A; OATT Attachment DD § 6.4; OATT Attachment M–Appendix § II.E.

¹⁹ *Id.*

²⁰ *Id.*

²¹ See OATT Attachment M § IV.

The Market Monitor does not determine the level of Market Seller Offer Caps. The Market Monitor reviews the Capacity Market Sellers' proposed caps and discusses the caps with Market Sellers.²² The Market Monitor provides the Market Monitor's view of whether the components of the proposed Market Seller Offer Caps are consistent with competitive offers but has no authority to compel a participant to change its offer or to make an offer at any specific level. Capacity Market Sellers and the Market Monitor reach agreement on the level of Market Seller Offer Caps in almost every case. But in every case, Capacity Market

²² See OATT § 12A. Section 12A provides:

The Office of the Interconnection determines whether an offer, bid, components of an offer or bid, or decision not to offer a committed resource complies with the PJM Market Rules. The Office of the Interconnection has the final authority to determine whether an offer, bid or decision not to offer a committed resource complies with the PJM Market Rules. The Office of the Interconnection may accept an offer, bid or decision not to offer a committed resource regardless of whether the Market Monitoring Unit has made a finding that such conduct raises market power concerns, unless the Commission issues an order determining that the offer or bid must be rejected prior to the clearing of the relevant RPM Auction.

The Office of the Interconnection does not make determinations about market power, including, but not limited to, whether the level or value of inputs or a decision not to offer a committed resource involves the potential exercise of market power. Acceptance or rejection of an offer or bid by the Office of the Interconnection does not include an evaluation of whether such offer or bid represents a potential exercise of market power.

A market participant may submit any offer or bid that it chooses or make a decision not to offer a committed resource, provided that the Office of the Interconnection determines that: (i) the market participant has participated in the review process conducted by the Market Monitoring Unit (without regard to whether an agreement is obtained) if required by the Tariff; (ii) offer is no higher, in the case of seller market power, or lower, in the case of buyer side market power, than the level to which the market participant has committed or agreed in the course of its participation in such review process; and (iii) the offer is compliant with the Tariff and PJM Manuals. The market participant assumes exclusive responsibility for any adverse findings at the Commission related to its offer.

See also, Jeffrey Mayes, Howard Haas and Joseph Bowring, "Effective Monitoring and Mitigation in the Organized Wholesale Electric Power Markets," J. REGUL. ECON., v 41 (July 21, 2012).

Sellers have full and sole responsibility for their offers and their impact on the markets.²³ Capacity Market Sellers provide their offer caps. PJM may reject offers that do not comply with its interpretation of the applicable rules, but PJM does not make determinations about market power.²⁴

E. Section 6.8(d) of Attachment DD to the OATT Should Be Revised to Require an Accurate Calculation of Projected PJM Market Revenues.

To prevent the exercise of market power in RPM Auctions and to ensure just and reasonable pricing in RPM Auctions, the tariff should be revised in order to provide that the best information about marginal costs is used in the calculation of Projected PJM Market Revenues.

Section 6.8(d) of Attachment DD to the OATT provides that Projected PJM Market Revenues be calculated as follows:

Projected PJM Market Revenues for any Generation Capacity Resource to which the Avoidable Cost Rate is applied shall include all actual unit-specific revenues from PJM energy markets, ancillary services, and unit-specific bilateral contracts from such Generation Capacity Resource, net of marginal costs for providing such energy (i.e., costs allowed under cost-based offers pursuant to Section 6.4 of Schedule 1 of the Operating Agreement) and ancillary services from such resource. ... [T]he calculation of Projected PJM Market Revenues shall be equal to the rolling simple average of such net revenues as described above from the three most recent whole calendar years prior to the year in which the BRA is conducted.

Section 6.8(d) of Attachment DD to the OATT should be revised to state the following:

Projected PJM Market Revenues for any Generation Capacity Resource to which the Avoidable Cost Rate is applied shall

²³ *Id.*

²⁴ *Id.*

include all actual unit-specific revenues from PJM energy markets, ancillary services, and unit-specific bilateral contracts from such Generation Capacity Resource, net of marginal costs for providing such energy (~~i.e., costs allowed under cost-based offers pursuant to Section 6.4 of Schedule 1 of the Operating Agreement~~) and ancillary services from such resource. Marginal costs shall be calculated as equal to the lower of (i) market offers for the sale of energy or ancillary services from such resource or (ii) cost-based offers as defined in Schedule 2 to the Operating Agreement and in PJM Manual 15 (Cost Development Guidelines) or successor rules. However, marginal costs shall be calculated to be equal to the lower market offer only if the market offer is greater or equal to the marginal cost of fuel plus emissions. However, marginal costs for a unit shall be calculated as the cost-based offer when the Capacity Market Seller can demonstrate that the market offer is less than the marginal cost of fuel and emissions allowances for the unit.... [T]he calculation of Projected PJM Market Revenues shall be equal to the rolling simple average of such net revenues as described above from the three most recent whole calendar years prior to the year in which the BRA is conducted.

F. The Rules Should Include Actual Marginal Costs in the Calculation of Projected PJM Market Revenues.

Marginal costs are included in the calculation of Projected PJM Market Revenues in order to appropriately calculate actual net revenues, to appropriately set the level of Market Seller Offer Caps and to protect RPM Auctions from the exercise of market power.

The rules should not allow a Capacity Market Seller to use cost-based offers as marginal costs in the calculation of net revenues when it knows, and reveals through its market behavior, that its actual marginal costs are lower than its cost-based offers. Allowing a Capacity Market Seller to artificially reduce its Projected PJM Market Revenues means allowing such seller to submit an artificially inflated Market Seller Offer Cap in an RPM Auction. This means allowing a potential exercise of market power in such auction.

A just and reasonable approach to calculating marginal cost is one that is reliable and accurate. Exclusive reliance on cost-based offer caps even when they are higher than actual marginal costs is not the way to achieve this objective. Nevertheless, PJM argues in defense of this approach:

Marginal cost is defined axiomatically; it is the incremental cost of producing one more MW of energy, inclusive of the 10% adder to account for difficult to quantify costs permitted under section 6.4.2 of Schedule 1 of the Operating Agreement and Section 6.4.2 of Attachment K-Appendix of the Tariff, as has been noted by the Commission previously. [footnote omitted] By design, cost based offers reflect the short run marginal cost of a generation unit.

PJM is correct in asserting that marginal cost is the incremental cost of producing one more MWh of energy. PJM is incorrect in asserting that marginal cost is defined axiomatically as a unit's cost-based offer.

The relevant part of Section 6.4.2 (a)(ii) states:

The incremental operating cost of the generation resource as determined in accordance with Schedule 2 of the Operating Agreement and the PJM Manuals ("incremental cost"), plus 10% of such costs;

It is not self evident that marginal costs are identical to cost-based offers as defined in the Cost Development Guidelines, PJM Manual 15 ("Manual 15"). If it were obvious, the Commission would not have established paper hearing procedures to investigate this question. If, as PJM asserts correctly, marginal cost is the incremental cost of producing one more MWh of energy, it does not follow that a ten percent adder is part of marginal cost and it does not follow that cost based offers as defined by Manual 15 are marginal costs.

The Market Monitor uses the term marginal cost, more specifically short run marginal cost, to mean the incremental cost of producing one more MWh of energy.

G. The Existing Tariff Provisions are Unjust and Unreasonable Because They Do Not Ensure Actual Marginal Costs Are Used in the Calculation of Projected PJM Market Revenues.

The existing tariff provision, as its meaning has been clarified by the Commission, is unjust and unreasonable because it would, in some cases, result in the use of marginal costs greater than actual marginal costs and therefore offer caps set above the competitive level and therefore permit the exercise of market power.

An accurate calculation of the short run marginal costs of energy is fundamental to obtaining an accurate calculation of Projected PJM Market Revenues. An accurate calculation of Projected PJM Market Revenues is fundamental to obtaining an accurate calculation of Market Seller Offer Caps. If the marginal costs of energy are overstated, Projected PJM Market Revenues are understated. If Projected PJM Market Revenues are understated, the Market Seller Offer Cap is overstated. If the Market Seller Offer Cap is overstated, and a Sell Offer based on that cap clears the market or influences the offer that clears, RPM market clearing prices will exceed competitive levels. If the current unjust and unreasonable tariff language is retained, there will be a significant impact on all subsequent RPM Auctions.

H. The Potential Harmful Impact of a Faulty and Inaccurate Definition of Marginal Cost on RPM Prices Is Significant.

Whether or not the tariff's faulty definition of marginal cost will persist long enough to impact an RPM auction is a serious issue. The next RPM Auction is a Third Incremental Auction scheduled to start on February 23, 2015. The Base Residual Auction for the 2018/2019 Delivery Year is scheduled to begin on May 11, 2015. The tariff approach to calculating Projected PJM Market Revenues could have a significant and detrimental impact on the results.

III. CONCLUSION

The Market Monitor respectfully requests that the Commission afford due consideration to these comments as the Commission resolves the issues raised in this proceeding.

Respectfully submitted,



Jeffrey W. Mayes

Joseph E. Bowring
Independent Market Monitor for PJM
President
Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8051
joseph.bowring@monitoringanalytics.com

General Counsel
Monitoring Analytics, LLC
2621 Van Buren Avenue, Suite 160
Valley Forge Corporate Center
Eagleville, Pennsylvania 19403
(610) 271-8053
jeffrey.mayes@monitoringanalytics.com

Dated: December 3, 2014

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 3rd day of December, 2014.



Jeffrey W. Mayes

General Counsel

Monitoring Analytics, LLC

2621 Van Buren Avenue, Suite 160

Valley Forge Corporate Center

Eagleville, Pennsylvania 19403

(610) 271-8053

jeffrey.mayes@monitoringanalytics.com