UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION

Meeting the Challenge of Resource Adequacy in Regional Transmission Organization and Independent System Operator Regions	)	Docket No. AD25-7-000

PRE TECHNICAL CONFERENCE COMMENTS OF THE INDEPENDENT MARKET MONITOR FOR PJM

Pursuant to the Commission's April 3, 2025 notice, Monitoring Analytics, LLC, acting in its capacity as the Independent Market Monitor ("Market Monitor") for PJM Interconnection, L.L.C. ("PJM") submits these comments addressing resource adequacy challenges in PJM in advance of the Commissioner led technical conference scheduled for June 4–5, 2025.[1] The Market Monitor appreciates the opportunity to participate in this technical conference and to submit these comments in advance.

I. SUMMARY

Reliability is a core goal of PJM. Maintaining and improving competitive markets should also be a core goal of PJM. The goal of competition in PJM is to provide customers with reliable wholesale power at the lowest possible price, but no lower. The PJM energy markets have done that. The PJM markets work, even if not perfectly. The results of PJM markets were reliable in the first three months of 2025 and have been reliable since their

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[1] *See* Notice of Commissioner-Led Technical Conference, Docket No. AD25-7-000 (February 20, 2025); Supplemental Notice of Commissioner-Led Technical Conference, Docket No. AD25-7-000 (April 3, 2025).

inception in 1999. The results of the energy market were competitive in the first three months of 2025 and have been since their inception in 1999. The results of the 2025/2026 capacity market were not competitive, although the results of prior capacity market auctions have generally been competitive, with some notable exceptions. The PJM markets bring customers the benefits of competition when the market rules allow competition to work and prevent the exercise of market power.

The PJM energy and capacity markets are components of the PJM market; both are essential to providing reliable energy to customers at the lowest possible price. The energy market results incorporate immediate short term conditions including weather, unit availability, actual load, and fuel availability and costs. The capacity market, as designed, addresses longer term supply and demand conditions. The energy market and the capacity market face interrelated challenges. There are interactive effects between the incentives in the energy market and the incentives in the capacity market.

The PJM market design, regardless of its issues, is strongly preferred to the alternatives whether those are required long term bilateral contracts, traditional cost of service regulation, or integrated resource planning. The Market Monitor's State of the Market Reports have documented the benefits of markets since 1999.[2]

II. CAPACITY MARKET

The capacity market is getting tighter. The cost of new generation is increasing significantly. The result will be higher capacity market prices than for prior delivery years. In a well designed market, capacity market prices reflect the underlying supply and demand fundamentals. The results of the last capacity market Base Residual Auction (the 2025/2026 BRA) illustrate the amplified impact of not getting the details of the market design right when

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[2] *See, e.g.*, Monitoring Analytics, LLC, *2025 Quarterly State of the Market Report for PJM: January through March* (May 8, 2025), historical state of the market reports for PJM are available at <https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2025.shtml.>

the market is tight. The Market Monitor analysis shows that while a significant increase in capacity market payments was based on the fundamentals, market design and market power issues resulted in actual capacity market payments that were approximately twice as high as needed in the 2025/2026 auction.[3]

The capacity market is already tight, meaning that supply is approximately equal to forecast demand plus the required reserve margin. Even if the capacity market issues, other than the fundamental Effective Load Carrying Capability ("ELCC") issues and capacity performance ("CP") issues, identified by the Market Monitor were resolved, the market would still be tight and prices correspondingly high.[4] The capacity market is tight primarily as a combined result of the recent addition of large data center loads and the expected addition of more large data center loads included in the PJM load forecast and incorporated in the capacity market demand. Almost all of these large data center load additions to date are connected to the grid as full transmission customers. Large data center load additions have already had a significant impact and will have additional significant impacts on other customers as a result of required transmission upgrades and higher capacity market prices, regardless of the details of interconnection. Although large data center loads are widely discussed, the extreme impacts that the addition of those loads has already had, and will have again in the next auction, on capacity market clearing prices does not seem to be generally appreciated in discussions of the capacity market.

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[3] *See* MMU reports analyzing the 2025/2026 RPM Base Residual Auction, "Analysis of the 2025/2026 RPM Base Residual Auction - Part A," (Sep. 20, 2024), "Analysis of the 2025/2026 RPM Base Residual Auction - Part B," (Oct. 15, 2024), "Analysis of the 2025/2026 RPM Base Residual Auction - Part C," (Nov. 6, 2024), "Analysis of the 2025/2026 RPM Base Residual Auction - Part D," (Dec. 6, 2024), "Analysis of the 2025/2026 RPM Base Residual Auction - Part E," (Jan. 31, 2025), Analysis of the 2025/2026 RPM Base Residual Auction - Part F," (Feb. 4, 2025). ("BRA Reports") These reports can be found at <*https://www.monitoringanalytics.com/reports/Reports/2024.shtml*>.

[4] BRA Reports.

The rapid addition of large data center loads has created unique issues in the PJM markets. The capacity market is tight, the interconnection queue does not have adequate dispatchable resources to meet the needs of large data center loads, and the asserted market solution is to let the market go short and have persistent pricing at the maximum price until enough dispatchable capacity is added to meet the large data center loads. Given the well documented time involved in building new dispatchable capacity combined with the apparently insatiable appetite for more large data centers, that process could go on for five to 10 years and cost other customers billions of dollars. A more likely outcome of that approach would be significant exit from the PJM markets and a return to cost of service average cost ratemaking.

Rather than directly addressing the impact of large data center load additions, PJM has implemented an extremely high maximum price on the demand curve (Variable Resource Requirement or VRR curve) in the capacity market and proposes an even higher maximum price.[5] The maximum price has a significant effect when the market is tight and therefore clears at or near the maximum price. The maximum price is an administrative price that has always been part of the capacity market demand curve. The use of gross CONE as the maximum price is an example of a PJM administrative parameter choice that was not well supported and that resulted in market outcomes not consistent with market fundamentals. The market is likely to clear in upcoming auctions at the maximum price as a direct result of the prior and planned addition of large data center loads in PJM. PJM's maximum price proposal was temporarily replaced by PJM's agreement with the Governor of Pennsylvania on the maximum and minimum price for the next two BRAs. The maximum price

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[5] *See* Brattle Group, PJM Markets Implementation Committee (MIC), Sixth Review of PJM's RPM VRR Curve Parameters: Final Recommendations (April 11, 2025), which can be accessed at: <*item-01-1-cone-and-vrr-curve-final-recommendations.pdf*>. PJM indicated its support for some of the Brattle Report recommendations at the next special MIC meeting, April 16, 2025.

(approximately 1.5 * Net CONE) in PJM's filing based on that agreement was fully consistent with the basic design and history of the PJM Capacity Market. The minimum price was not.

The assertion that we should let the market solve the current capacity market issues is equivalent to asserting that blackouts are a market solution in the energy market. Both assertions are correct. Neither is acceptable. Wholesale power markets in the U.S. are not operated as laissez faire constructs. Competition was introduced by the Commission as a more efficient and effective substitute for traditional cost of service regulation. Markets only work effectively within a framework of rules. FERC's rules about market design and rules governing demand and supply are essential to creating the conditions under which markets can work. These are public, regulatory decisions because they are about competitive outcomes that are in the interests of all market participants. The first responsibility of the Commission, including NERC, is to maintain reliability. Simply allowing increased demand for capacity from multiple large data centers to drive the capacity market into persistent shortage is not a plan.

Markets cannot solve all problems in a vacuum. However, there is a market based solution to the current issues that requires clear new rules. It is clear that continuing to simply accept the interconnection of large data center loads that cannot be served reliably is not a reasonable path forward. These loads cannot be served reliably because there is not adequate dispatchable capacity, and no timely ability to add new capacity that matches the 8,760 hour demands of large data center loads. That path leads to continued shortfalls, continued clearing prices equal to maximum prices, and continued calls to abandon markets and return to cost of service regulation. The calls to return to cost of service regulation include the current proposal by PJM's consultant for the potential accelerated use of PJM's euphemistically named reliability backstop option in the capacity market.[6] That backstop

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[6] *See* Brattle Group, PJM Markets Implementation Committee (MIC), Sixth Review of PJM's RPM VRR Curve Parameters: Final Recommendations (April 11, 2025), at 18 which can be accessed at: <*item-01-1-cone-and-vrr-curve-final-recommendations.pdf*>.

option could result in significantly undermining PJM markets in the near future. This illustrates the fact that a realistic market solution that can be implemented immediately is essential if PJM markets are to be preserved. The proposed co-location model is not a market solution and in its proposed form would create artificial shortages, significantly undermine markets and also result in proposals to replace markets.

The prices in capacity market auctions are a result of both demand and supply conditions. There are current issues with the addition of both demand and supply that must be addressed in a comprehensive, transparent and stable manner in order to help ensure that the market can manage to balance demand and supply. It is not enough to simply assert that the market will solve all these problems. Markets need rules. Markets need exogenous parameters. Markets need to provide reliability. Some of the current issues result from rules that create unnecessary administrative barriers to entry of new supply or create uncertainty about the addition of new large data center loads. PJM needs a process for expediting and streamlining the entry of new generation that is ready for commercial operation without distorting the related PJM market principles. PJM needs a process for managing the addition of large data center loads to the system without distorting the capacity market design.

As has been pointed out by those on both sides of the co-location debate, the addition of large data center loads will have a significant impact on PJM markets and customers whether co-located or not.[7] The expected impact is less immediately transparent with the co-located approach because the co-located load is not included in PJM load or the capacity market demand curve, the generation is not included in the capacity and energy markets, and the transmission costs avoided by the co-located loads are never calculated. The expected

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[7] *See* Market Monitor, Comments to the Maryland PSC Senate Bill 1 Co-location Study Administrative Docket PC 61 (September 24, 2024) <*https://www.monitoringanalytics.com/filings/2024/IMM_Comments_MDPSC_PC61_20240924.pdf*>; Market Monitor, Supplemental Comments to the Maryland PSC Senate Bill 1 Co-location Study Administrative Docket PC 61 (December 13, 2024) <*https://www.monitoringanalytics.com/filings/2024/IMM_Supplemental_Comments_re_MDPSC_PC61_Co_Located_Load_20241213.pdf*>.

impact is more transparent if large data center loads are accurately forecasted and pay for energy, capacity and transmission as has been the case for almost all large data center load additions in PJM to date.

The addition of large data center loads ultimately has similar impacts on capacity and energy market dynamics regardless of whether the loads are added as full transmission customers or as co-located customers. However, the co-located option would happen much faster and bring the negative consequences for markets much faster because the co-located option is implemented via confidential, private, out of market agreements that can be implemented relatively quickly. Co-located loads would remove existing capacity resources from the market. Co-located loads would lean on the grid for backup without paying for backup. The large data center loads would pay a full share of transmission costs if added as full transmission customers and would not pay a full share if co-located. Under both approaches, large data center loads are added even when there is no matching supply and no prospect of matching supply.

The problem for other customers taking wholesale power service from PJM is that the addition of large data center loads without adequate planning imposes very significant capacity market costs on everyone else. The result has been and, without adequate planning, will continue to be shortage conditions in the capacity market and calls for dramatic price increases for other customers based on market dynamics. The immediate problem facing the PJM system is how to serve these very large increases in load in a way that does not threaten reliability or the ability of PJM markets to reliably serve all load at the lowest possible cost. The discussion to date has largely ignored the fact that the addition and expected addition of large data center loads has already had a very large impact on PJM markets and on the costs of transmission and capacity to other PJM customers. The broader question is whether it is reasonable to impose billions of dollars of additional costs on other customers in order to serve large data center loads.

There are basic, straightforward principles that the process for the addition of large data center loads should follow. The Market Monitor's recommendations about how to

address the issues that result from the addition of large data center loads are based on these principles.

All loads should be served. All loads should be served reliably. The process for adding large data center loads should be transparent. All loads should benefit from competitive markets. All loads should have equal access to the transmission system. All loads should be treated as full transmission customers. All loads and generation are on the grid and the grid is highly interconnected and the treatment of all loads and generation should reflect that fact.

There are three broad currently proposed options for addressing the addition of large data center loads in PJM. The first option would allow electric distribution companies ("EDCs") and transmission owners ("TOs") to sign up new large data center loads, subject these additions only to a PJM transmission planning analysis (necessary study) and permit interconnection of the loads without consideration of the reliability impacts, including the impacts on the energy and capacity markets. The second option, co-location, would rely on private bilateral transactions to remove capacity from the PJM markets with de minimis planning requirements and dedicate it to specific large data center loads without consideration of the reliability impacts, including the impacts on the energy and capacity markets.[8] The third option would rely on PJM to more comprehensively and transparently plan for the addition of large data center loads by ensuring that large data center loads are not added unless these loads bring their own new generation to match them. The third option is the pragmatic, practical choice given the realities of the PJM markets, including the current lags in the generation interconnection queue and the increase in large data center load additions. The third option is market based and recognizes that the addition of data center loads is a unique phenomenon and that the alternatives could lead to an end of the PJM market design.

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[8] *See* Comments of the Independent Market Monitor for PJM, Docket No. EL25-49-000 (April 23, 2025).

The broader goal is to address the underlying issues and causes of tight supply-demand conditions in the capacity market. The current conditions are not the result of organic load growth. The current conditions in the capacity market are almost entirely the result of large data center load additions from data centers, both actual historical and forecast. This is not a reason to introduce cost of service regulation through an accelerated and distorted version of the reliability backstop. This is not a reason to transform the TOs or EDCs back into vertically integrated utilities building generation subject to cost of service regulation.

The solution to the issues created by the addition of large data center loads is for the large data center loads to bring their own new generation. That can take a variety of forms but would entail the large data center loads taking responsibility for adding new generation to the grid that has locational and temporal characteristics reasonably matched to their load profile. The new capacity would be offered into the capacity market, the energy would be offered into the energy market and the customers would be full market customers in the PJM markets. There could be bilateral contracts between the large data center loads and the generation developers. This option should include an expedited interconnection process for large data center loads and their matching new generation that is consistent with the PJM queue processes but that ensures rapid interconnection of the matched pair. This option would balance the desire of large data center loads to interconnect quickly with the need to maintain reliability for all customers in the existing market design. This option would also directly address the current extreme uncertainty embedded in PJM load forecasts. PJM does not have and is not likely to ever have adequate insight into the level of large data center loads that will actually occur. The result is to impose unreasonable risks and costs on all other customers both for transmission costs and capacity market costs. This third option would ensure that only actual new large data center loads with actual matching new generation are added to the system and that PJM has studied the additions for both transmission and generation reliability. It is not reasonable to force all other customers to absorb these risks and costs while admonishing those customers to do better hedging. Most customers and LSEs

do not have the ability to do long term hedging or to benefit from long term hedging. In addition, if it is widely understood that capacity market prices will increase, any hedging positions will reflect those prices rather than providing nonmarket low prices. Hedging does not create a way to avoid market prices. Hedging through bilateral contracts for all other customers as a solution to large data center load additions is a mirage. The suggestion that loads should enter or should have entered into bilateral contracts is a form of blaming customers for high prices.

Regardless, the costs of building new dispatchable, 8,760 hour capacity in the form of combustion turbines or combined cycles has recently increased significantly.[9] To the extent that the organic demand growth from all non data center customers requires the addition of new capacity, the prices in the capacity market will increase but not by as much as would result from a failure to address the large data center load additions. It is imperative that the market design be improved and made as rational and transparent as possible so that all other customers can be confident that price increases are based on truly competitive markets with reasonable administrative parameters. There is no reason for the maximum price on the VRR curve to be greater than the higher of 1.5 times net CONE or gross CONE.

A goal of market design should be to be consistent, predictable and transparent. A consistent, predictable and transparent design would provide a stable investment environment for generators and a stable price environment for customers who both consume and invest. New supply requires competitive incentives and a stable investment environment. The objective of the market design should be markets that work, markets that work for generators and markets that work for customers. The objective of the market design should also be markets that are transparent and understandable to market participants and

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[9] See Monitoring Analytics, LLC, presentation the MIC Quadrennial Review, Quadrennial Review Issues (May 19, 2025) which can be accessed at. <*https://www.pjm.com/-/media/DotCom/committees-groups/committees/mic/2025/20250519-special/item-01c---imm-mic-quadrennial-review-perspective.pdf*>

to regulators. The capacity market design should be as simple as possible to meet its objectives. The current capacity market design does not meet these standards.

The level of uncertainty created by PJM's ELCC design combined with the extreme performance assessment interval ("PAI") penalties has a negative impact on the risk and economic viability of units considering retirement and weakens the incentives to invest in PJM generation. Despite assertions about the efficacy of PAI penalties, there are effectively zero performance incentives when PJM addresses high load days through conservative operations, as PJM has appropriately done since Winter Storm Elliott, because the probability of a PAI event is extremely low. The ELCC should be unit specific. The ELCC should be based on unit specific hourly supply and demand matching. Capacity resources should be paid only when available to perform. Capacity resources should be paid based on actual hourly performance during the delivery year.

The current PJM interconnection queue does not include adequate dispatchable thermal capacity to replace the potentially retiring thermal capacity. The apparent level of MW in the interconnection queues substantially overstates the level of capacity MW that is likely to actually go into service in PJM markets for all resource types. While there are legitimate differences of opinion about the exact level and timing of the need, PJM needs additional capacity resources and PJM needs to remove inefficient barriers to entry based on interconnection queue rules in order to facilitate that entry. PJM has taken essential steps to do exactly that, including the Interconnection Process Reform changes to the queue management process and the recent filing and approval of the Reliability Resource Initiative ("RRI") and Surplus Interconnection Service ("SIS") rules. More needs to be done. The reformed queue process is having an impact on reducing the presence of speculative projects in the queue.

While the short term RRI process is a clear improvement, PJM should request the ongoing authority with clear rules to advance projects at any time that can more effectively address immediate reliability issues including the issues that result from requests to retire existing resources regardless of whether they qualify for RMR status. While it is important to

respect the existing, improved PJM queue process, it is essential to provide strong and clear incentives for projects to actually resolve reliability issues and to actually guarantee timely in service dates in order to help ensure that the queue is not a mirage as it has been in significant part for its recent history. Recognizing that improved queue rules are being implemented, the history of queue projects and whether they become actual in service capacity resources suggests strongly that such incentives have not been provided by the queue process. Creating an expedited track with clear rules for large data center loads that bring their own new generation should be part of the short term queue reforms.

III. ENERGY MARKET

The primary challenge currently facing the energy market is ensuring that load can be met in extreme weather conditions, primarily winter weather to date but likely to include both winter and summer weather. The contrast between PJM's approach to Winter Storm Elliott in December 2022 and to Polar Vortex 2025 illustrates the issues and demonstrates a productive path forward.

PJM chose to prepare for the weather related risks of Polar Vortex 2025 (January 19 through 23, 2025) in very different ways than for Winter Storm Elliott. The results of Winter Storm Elliott demonstrated that capacity market PAI incentives were not effective. During Winter Storm Elliott, PJM's approach assumed that generators would be ready for extreme weather and that generators would behave exactly as their parameters described, all as a result of the incentives associated with extreme PAI penalties. The interactions between PJM commitment and dispatch instructions and generators did not work well because the market design failed to recognize the basic physical realities of the generators and the realities of gas procurement and transportation. In preparing for Polar Vortex 2025, rather than rely on PAI incentives to provide assurance that generators would be ready for cold weather, PJM took direct steps to ensure a reliable outcome. The results of Polar Vortex 2025 vindicated PJM's strategy. PJM took conservative measures to ensure reliability by scheduling resources well in advance of the day-ahead energy market. PJM took additional advance actions to ensure

transmission reliability by scheduling specific resources to address specific issues. As there is no multiday market, actions taken before the day-ahead market starts generally result in some uplift to the extent that the units do not clear in the day-ahead market. Based on this experience, the rules governing PJM's actions in such events should be more transparent, clearly documented, and include defined criteria for taking such actions. In addition, there should be rules about the energy offers used for these advance commitments, and uplift rules should be revised to account for the multiday nature of these commitments. The lessons learned include that conservative operations are preferred to the Winter Storm Elliott approach of simply assuming that generators would respond, that increased uplift is the expected result and that the process of conservative operations and advance commitments needs to be improved, formalized and made as market oriented as possible in order to minimize uplift and make uplift as predictable as possible. This is a pragmatic, practical, targeted approach to managing system risk during extreme weather events. This is a clear, tested alternative to reliance on PAI incentives. Reliance on an expanded demand curve for reserves (ORDC) that is limited to the day-ahead and real-time markets is not a viable alternative to conservative operations for managing this risk. An ORDC cannot address all identifiable and specific sources of risk on any particular day and cannot produce advance commitments.

Uplift during Polar Vortex 2025 was a result of out of market commitments made by PJM in anticipation of the cold weather. PJM committed units on Friday, January 17, for the January 19, 20 and 21 operating days. These commitments were made in advance of the day-ahead energy market, before offers were due. Some of the units cleared the day-ahead energy market economically and did not require uplift payments because their offers were covered by the day-ahead LMP. The rest of the units committed in advance that did not clear the day-ahead market received balancing operating reserves credits because their offers were not covered by the real-time LMP. PJM made these commitments to mitigate generator performance risks based on available information about startup and operating uncertainty due to expected cold temperatures and gas supply illiquidity. PJM also committed specific

units in advance to ensure transmission system reliability. These units received day-ahead uplift.

The commitments made prior to the day-ahead market resulted primarily from conservative operations, which PJM declared from January 20 through January 23, 2025, but also included unit commitments for transmission constraints. The commitments for conservative operations were made to ensure that generators that in previous events had performed poorly due to cold temperatures and gas supply issues, had the ability to respond. These commitments were not made to meet reserve requirements.

Balancing operating reserve credits (uplift) were the result of multiday commitments to minimize generation performance risk under conservative operations (about two thirds of the total). Those units, mostly gas-fired combined cycle units, were committed ahead of time but did not clear the day-ahead market. The day-ahead operating reserve credits (uplift) (about one third of the total uplift) were the result of units committed for transmission reliability in the day-ahead market (rather than conservative operations), these payments were made to a very small number of units that were specifically required to resolve identified risks on the transmission grid. This targeted uplift was much more efficient than attempting to administratively raise energy market prices to make these units economic.

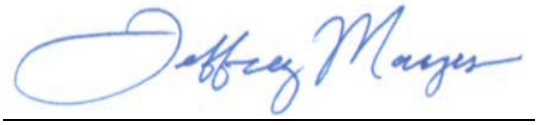
The basic lesson learned is that conservative operations is an effective way to ensure reliability during extreme weather. The broader lessons relate to the capacity market design. The PAI incentives did not work during Winter Storm Elliott. After Winter Storm Elliott, the impacts of PAIs were appropriately attenuated by changes to the definition of a PAI and by limits on the maximum annual penalty to 1.5 times the relevant capacity market clearing price. ELCC values, particularly for thermal resources, are understated because they rely heavily on the performance of thermal resources during Winter Storm Elliott and the original Polar Vortex in 2014 and therefore on PJM's approach to commitment and dispatch during those events. PJM did not engage in the same comprehensive approach to conservative operations in either event. Thermal resources' response in Polar Vortex 2025 was much better than in Winter Storm Elliott as a direct result of PJM's approach to the impending weather.

Assuming that PJM will continue to use a similar approach to future weather events, ELCC values must be modified to reflect that fact.

IV. CONCLUSION

The Market Monitor appreciates the opportunity to submit comments in advance of the June 4-5 technical conference. The Market Monitor continues its support for competitive PJM markets. There is a market solution to the issues created by the addition of unprecedented amounts of large data center loads that does not require a massive wealth transfer. It is essential to have a pragmatic market solution rather than to create the conditions for a return to cost of service regulation. The Market Monitor looks forward to continued discussion with the Commission and market participants on how to address this unique challenge.

Respectfully submitted,



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Dated: May 20, 2025

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 20th day of May, 2025.

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