Exhibit No.:	5
Issue:	Flaws in CRA International RTO cost-benefit study and additional CRA simulations
Witness:	Johannes P. Pfeifenberger
Sponsoring Party:	Midwest Independent Transmission System Operator, Inc.
Case No.:	Case No. EO-2008-0046

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MIDWEST INDEPENDENT TRANSMISSION SYSTEM OPERATOR, INC.

REBUTTAL TESTIMONY

OF

JOHANNES P. PFEIFENBERGER

Cambridge, Massachusetts
November, 2007

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Aquila, Inc., d/b/a Aquila Networks – MPS and Aquila Networks – L&P for Authority to Transfer Operational Control of Certain Transmission Assets to the Midwest Independent Transmission System Operator, Inc.	))))))))	Case No. EO-2008-0046

AFFIDAVIT OF JOHANNES P. PFEIFENBERGER

COMMONWEALTH OF MASSACHUSETTS	)) ss.
COUNTY OF MIDDLESEX	)

Johannes P. Pfeifenberger, being first duly sworn on his oath, states:

1. My name is Johannes P. Pfeifenberger. I am presently a Principal for The Brattle Group, which serves as consultant for Midwest Independent Transmission System Operator, Inc.

2. Attached hereto and made a part hereof for all purposes is my rebuttal testimony.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct to the best of my personal knowledge, information and belief.

Johannes P. Pfeifenberger

Subscribed and sworn before me this 27th day of November, 2007.

Debra A. Paolo
Notary Public for Middlesex County, Massachusetts
My Commission expires: October 23, 2009

DEBRA A. PAOLO NOTARY PUBLIC

DEBRA A. PAOLO
Notary Public
Commonwealth of Massachusetts
My Commission Expires Oct 23, 2009

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ON BEHALF OF
MIDWEST INDEPENDENT TRANSMISSION SYSTEM OPERATOR, INC.
CASE NO. EO-2008-0046

I. INTRODUCTION AND SUMMARY

Q. Please state your name, employer, title and business address.

A. My name is Johannes P. Pfeifenberger. I am a Principal and Director of The Brattle Group, an economic consulting firm with offices in Cambridge, Massachusetts; Washington, D.C.; San Francisco; London; and Brussels. My business address is 44 Brattle Street, Cambridge, Massachusetts, 02138.

Q. On whose behalf are you testifying in this proceeding?

A. I am testifying on behalf of Midwest Independent Transmission System Operator, Inc. ("Midwest ISO").

Q. Please describe your background, including your educational and professional experience as it relates to this testimony.

A. I am an economist with a background in power engineering and 20 years of experience in the areas of regulated industries, energy policy, and finance. I received an M.A. in Economics and Finance from Brandeis University and an M.S. in Electrical Engineering with a specialization in Power Engineering and Energy Economics from the University of Technology, Vienna, Austria. I am the author and co-author of numerous articles, reports, and presentations on subject areas related to electric utility regulation and

restructuring, including Regional Transmission Organization ("RTO") matters, transmission access, and cost-benefit analyses.

I testified or submitted reports in cases before the Illinois Commerce Commission, the Public Service Commission of New York, the Public Service Commission of Colorado, the Arizona Power Plant and Transmission Line Siting Committee of the Arizona Corporation Commission, the Maine Public Utilities Commission, as well as the Missouri Public Service Commission (a Whitepaper on Incentive Regulation in Case No. EC-2002-1). I have also testified before the Federal Energy Regulatory Commission on a number of RTO operational and transmission matters, including on: (a) RTO seams on behalf of Wisconsin and Michigan utilities; (b) market power implications of the proposed Exelon-PSEG merger on behalf of Ameren; (c) the costs and benefits of a revised transmission access charge methodology on behalf of the California Independent System Operator Corporation; and (d) regarding RTO configuration and tariff design issues on behalf of the Midwest ISO. Finally, I have submitted testimony and expert reports on power contracts, industry restructuring, antitrust matters, and economic damages to the U.S. House of Representatives, the Federal Communications Commission, in U.S. District Court and in an arbitration case. I am also attaching as Schedule JPP-1 further details of my education and work experience.

Q. What is the purpose of your rebuttal testimony?

A. My testimony addresses certain flaws of the RTO cost-benefit study that was introduced and discussed in the direct testimony of Aquila witness Mr. Dennis Odell (the "Aquila Study"). The Aquila Study, prepared by CRA International, was filed as Schedule DO-3

(with additional clarifications provided in Schedule DO-4) in support of Aquila's request for Commission approval to allow its Aquila Missouri operations—Aquila Networks-MPS and Aquila Networks-L&P (herein "Aquila Missouri" or simply "Aquila")—to become a full member of the Midwest ISO.

Q. How are the Aquila Study and its results relevant to this case?

A. The Aquila Study quantified certain costs and benefits associated with Aquila moving from its current status as a vertically integrated utility that is not a member of an RTO to full membership in an RTO. The Aquila Study examined the costs and benefits associated with transferring functional control of its transmission assets to the Midwest ISO as one option and to the Southwest Power Pool ("SPP") as a second option. In both cases, the Aquila Study found that the benefits of joining an RTO exceeded the incremental cost of RTO membership. These estimates imply that transfer of functional control of Aquila's transmission system to an RTO is beneficial to Aquila's customers.

Q. Did the overall finding that the benefits from RTO participation exceeded the incremental RTO-related costs surprise you?

A. No. This finding is consistent with the findings of similar RTO cost-benefit studies.

Q. Were there aspects of the Aquila Study and its results that you found surprising?

A. Yes, there were three aspects that I found very surprising. First, the Aquila Study estimated significantly greater benefits for Aquila joining SPP than were estimated for Aquila joining the Midwest ISO (Aquila Study, Table 1 on p. 4). The magnitude of this difference was very surprising and contrary to my experience with this type of studies.

Second, I was surprised by the Aquila Study's suggestion that participating in SPP would reduce Aquila Missouri generation by between 15% and 23%, whereas participation in the Midwest ISO would reduce it only by between 1% and 3% (Aquila Study, Table 2 on p. 6). The 15% to 23% displacement of Aquila Missouri generation in the SPP case, as compared to only 1% to 3% in the Midwest ISO case, again, was contrary to my experience with the extent to which RTO participation may affect generation dispatch.

Finally, upon further inspection, I was very surprised to find that the larger SPP benefits as well as the large displacement of Aquila Missouri generation in the SPP case are driven almost entirely by the Aquila Study's assumptions and results for the commitment and dispatch of a single merchant power plant, the Aries plant,[1] in Aquila's control area.

Q. Why was the study's finding of significantly greater benefits from Aquila's participation in SPP surprising?

A. The benefits quantified in the Aquila Study are derived primarily from two sources: (1) reduced transmission rate "pancaking" and (2) moving from optimizing the unit commitment and dispatch of Aquila's own resources in the "Aquila Stand Alone" case to optimizing the unit commitment and dispatch of all of the generating resources in an entire RTO region. In general, the ability to optimize unit commitment and dispatch across a larger pool of resources will result in benefits in the form of lower fuel, operation and maintenance ("O&M") and purchased power costs ("production costs"). As such, one would expect production cost savings to result from Aquila's participation in either RTO. That proved to be the case in both RTO scenarios analyzed in Aquila's

study. However, the disproportionately higher benefits in the SPP case are suspect for two reasons. First, it is unclear why centralized unit commitment and dispatch of Aquila's resources by SPP would offer larger benefits than through the Midwest ISO. Moreover, while the Midwest ISO's market design features centralized unit commitment and dispatch of all the generating resources in its region, the SPP market design at this time does not.[2] Second, based on the total Aquila third-party import volume estimated in the Aquila Study, it was also clear that the elimination of rate pancaking in the SPP and MISO cases is unlikely to account for the disproportionately large difference in SPP and Midwest ISO benefits.[3]

Q. Why was the finding that 15% to 23% of Aquila's generation would be displaced by imported power in the "Aquila in SPP" scenario surprising?

A. Simply put, this level of displacement of utility-owned generation by purchases of power from utility-owned and/or merchant power plants in the SPP region is highly unlikely and may not even be feasible. This finding is a red flag that the production cost simulation results for the "Aquila Stand Alone" scenario, the "Aquila in SPP" scenario, or both scenarios are unreliable as a basis for measuring the benefits associated with SPP participation.

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[1] The Aries plant is the name in the Aquila Study for an approximately 600 MW gas-fired combined-cycle merchant plant that is now called the Dogwood plant. The name of the power plant changed when the facility was sold by Calpine to Kelson Energy in January 2007.

[2] The Midwest ISO market, featuring a day-ahead and real-time energy market with centralized unit commitment and dispatch, is sometimes referred to as a "Day-2" market. By contrast, the current SPP market is sometimes referred to as a "Day-1" market. The Midwest ISO evolved from a Day-1 market to a Day-2 market on April 1, 2005.

[3] Aquila's 2008 imports from third-party resources outside its control area are estimated to range from approximately 400,000 MWh to 1,500,000 MWh per year. Even if SPP participation were to eliminate rate pancaking on 50% more of these imports compared to Midwest ISO participation, the $2/MWh wheeling rate applied to imports from SPP would translate into differential savings of only $400,000 to $1,500,000 per year. This is much smaller than the almost $8 million dollar difference in SPP and Midwest ISO benefits for 2008 shown in Tables 15 and 16 of the Aquila Study (p. 39).

Q. Did you further investigate why RTO savings were disproportionately higher in the "Aquila in SPP" case?

A. Yes, I did.

Q. What did you find?

A. I found that the higher estimated benefits associated with SPP participation depended almost entirely on the Aquila Study's treatment of the Aries merchant generating unit. This was perhaps the most significant red flag raised in my review of the Aquila Study. It simply does not make sense that (1) changes in the MWh output of a single merchant plant in Aquila's control area would create such a large benefit in terms of a reduction in Aquila's production costs; and (2) that this large benefit, if it existed, could be realized by Aquila only if it joined SPP.

Q. Have you determined why the treatment of the Aries plant in the Aquila Study results in much greater estimated benefits from participation in SPP as compared to participation in the Midwest ISO?

A. Yes. I found that the production cost savings estimated in the Aquila Study (1) are driven by entirely unrealistic simulation of unit commitment in the Aquila control area; and (2) are further exacerbated by the erroneous treatment of Aries-related "uplift" costs in the "Aquila in Midwest ISO" case.[4] If these items are corrected, the available evidence

[4] As used in this context, "uplift" costs are start up and operating costs incurred by a generator that are greater than the price of power during the time the unit is committed and operated. In the Midwest ISO, these "uplift" costs are allocated to and paid by all load serving entities and other market participants in order to generate sufficient revenue to compensate the generator for providing power. In the Aquila Study the "uplift" costs for the Aries plant were assigned solely to Aquila in all scenarios. Start up and operating costs that exceed market prices are routinely incurred by vertically integrated utilities and paid for by their ratepayers. These costs are simply part of the overall operating costs incurred by the vertically integrated utility as part of its unit commitment and dispatch process. In this sense, these costs are not new or unique to RTOs. They are simply made transparent under the RTO's market design.

shows that the study's estimated RTO-related benefits are essentially the same for Aquila's participation in either the Midwest ISO or SPP.

Q. Are there other aspects of the Aquila Study that would need to be corrected or addressed?

A. Yes. As noted earlier, the Aquila Study assumed a Day-2 market for SPP in all years of the study. This assumption may overstate the level of production cost savings obtainable from Aquila's participation in SPP until such time as SPP evolves into a Day-2 market. I am also concerned that the simulations performed for the Aquila Study apply transmission charges to physical power flows rather than to contact path schedules. This may serve to underestimate de-pancaking-related benefits for the "Aquila in Midwest ISO" case while it may overstate these benefits in the "Aquila in SPP" scenario.

Q. How have you organized the remainder of your testimony?

A. Section II discusses the implications of unrealistically modeled generation commitment in the Aquila control area. Section III focuses on the erroneous treatment of uplift costs in the "Aquila in Midwest ISO" case, and Section IV briefly discusses RTO-related benefits not considered in the Aquila Study.

II. UNREALISTIC SIMULATION OF AQUILA GENERATION COMMITMENT

Q. How does the Aquila Study estimate the cost savings for Aquila joining the Midwest ISO or SPP?

A. The study calculated RTO-related cost savings by estimating production and administrative costs for three cases: (1) an "Aquila Stand Alone" case; (2) an "Aquila in Midwest ISO" case; and (3) an "Aquila in SPP" case. The benefits of joining the

Midwest ISO and SPP are estimated as the difference in costs between the "Aquila in Midwest ISO" and the "Aquila in SPP" cases as compared to the "Aquila Stand Alone" case.

Production costs are estimated as the sum of purchased power costs and the fuel and operating and maintenance costs of Aquila's physically or contractually owned generating plants, net of Aquila's off-system sales and wheeling revenues. These costs are estimated using a generation dispatch model that simulates the entire regional power market. The Aquila Study refers to the estimated net reduction in production costs due to RTO participation as "Trade Benefits."

Changes in administrative costs are then estimated separately. The administrative costs—which include costs related to Aquila's transmission and reliability functions, RTO administrative charges, and additional FERC charges—are estimated to be identical for both the "Aquila in Midwest ISO" case and the "Aquila in SPP" case. As a result, the higher estimated benefits associated with the "Aquila in SPP" case are solely a function of the differential in production costs (i.e., "Trade Benefits"), which are almost entirely the result of highly unrealistic simulation of unit commitment and generation dispatch within the Aquila control area.

Q. How does unrealistic simulation of unit commitment and generation dispatch in the Aquila control area affect the results of the Aquila Study?

A. Due to unique interactions of the simulation model's commitment algorithm and the modeled generation and load serving requirements within the Aquila control area, the

model greatly over-commits the Aries merchant plant in the "Aquila Stand Alone" and the "Aquila in Midwest ISO" cases, but not in the "Aquila in SPP" case. The commitment of the Aries unit in both of these cases is uneconomic thereby causing Aquila to incur greater costs in these cases than in the "Aquila in SPP" case. As such, the disproportionately larger benefit of participation in SPP is due to the fact that the uneconomic costs associated with over commitment of the Aries unit are not present in the "Aquila in SPP" case.

Q. In your opinion, is the commitment of the Aries unit in the model for the "Aquila Stand Alone" case and the "Aquila in Midwest ISO" case reasonable?

A. No, it is not. In the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases, the Aries plant is committed and dispatched (mostly only at minimum load) routinely even when the price for power is less than the cost of operating the Aries plant. As such, the model results are unrealistic.

Q. How does the over commitment of the Aries unit affect Aquila's costs as estimated in the Aquila Study?

A. Facing the out-of-market conditions caused by over commitment,[5] the Aquila Study assumes that Aquila (and only Aquila) would make the Aries plant whole financially by paying an "uplift" charge to cover the difference between the cost to operate the unit and the price for power in the simulation. However, because the model algorithm does not result in similar out-of-market commitment costs for the Aries plant in the "Aquila in SPP" case, the Aquila Study erroneously imputes higher RTO-related "cost savings" to the "Aquila in SPP" case. In fact, however, the higher commitment-related costs for the

Aries generating plant in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases are an entirely unrealistic result that is driven solely by limitations of the performed market simulations.

Q. Please explain in more detail the limitations in the market simulations and how they have affected the estimated RTO benefits in the Aquila Study.

A. For the purpose of the Aquila Study, the market simulation software was configured such that only "pool-internal" resources are considered in the generation-commitment stage of the simulation. This configuration simplifies the simulations and decreases the computer time needed to run the simulation software. However, this simplification ignores the fact that a particular "pool"—such as the Midwest ISO, SPP, or the Aquila control area in the "Aquila Stand Alone" case—may plan to be a net importer of power during certain time periods. When such imports are scheduled by a utility in advance so that they are already known during the generation commitment phase of control area operations—as is certainly the case for imports from Aquila's jointly-owned generation and contracted-for resources that are located outside of its control area—these imports would be considered in the commitment process. Failure to consider these scheduled imports will result in over commitment of more expensive generating resources within the control area.[6]

This is particularly relevant in the Aquila Study because a very significant portion of Aquila's resources—about 470 MW of jointly owned units and long-term purchases—are

[5] As used in this context out-of-market conditions means the market price of power is less than the cost to start up and operate a generating unit. This condition is also often referred to as out-of-merit dispatch. The costs associated with such out-of-merit dispatch are referred to in the Aquila Study as "uplift costs."

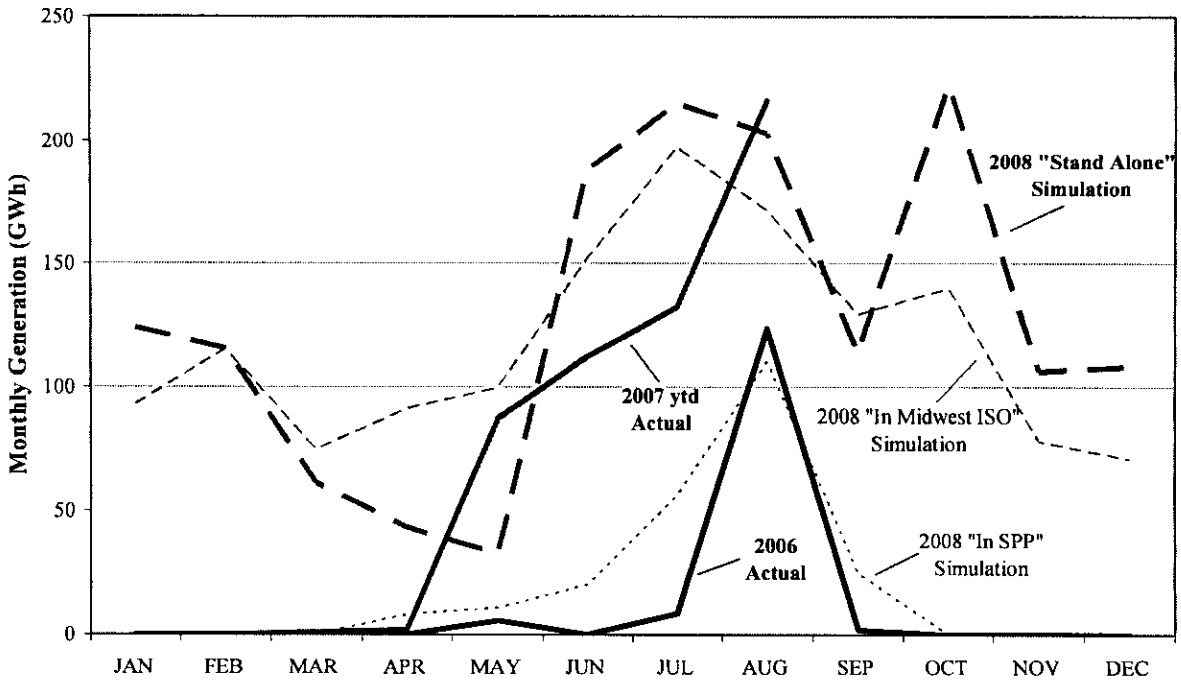
[6] As used in this context the term imports or imported power applies to both the generation provided by units owned by Aquila but located outside of its control area as well as power purchased by Aquila from other utilities and/or merchant generators located outside its control area.

located outside Aquila's Missouri control area (see Aquila Study, p. 38). The simplified modeling of "pool-based" unit commitment does not recognize the availability of these external resources in the Stand Alone and Midwest ISO cases. However, in the simulations for the "Aquila in SPP" case, Aquila's external resources are located within the boundary of the same "pool" (i.e., within SPP). As a consequence, the simulation model overcommitted the Aries merchant generating plant in the "Aquila Stand Alone" and the "Aquila in Midwest ISO" cases but not the "Aquila in SPP" case. Because the dispatch of the Aries plant caused substantial uplift costs that were allocated solely to Aquila, this resulted in artificially and unrealistically inflated costs to Aquila in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases as compared to the "Aquila in SPP" case. The bottom line is that the Aquila Study incorrectly overstates the estimated benefits of Aquila being in SPP relative to the benefit of Aquila joining the Midwest ISO.

Q. Did you review any corroborating evidence showing that the simulated commitment of the Aries plant is unrealistic in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases?

A. Yes, there are several pieces of clear and corroborating evidence. First, I compared the simulated commitment and dispatch of the Aries generating unit in 2008 for the three cases presented in the study—the "Aquila Stand Alone" case, the "Aquila in Midwest ISO" case and the "Aquila in SPP" case—with the actual historic generation of the Aries plant. This comparison is shown in Figure 1 below.

Figure 1: Aries Monthly Generation
2006-07 Actual vs. 2008 Simulations



Sources: CRA Workpapers (simulations), EIA / Energy Velocity (actuals)

Figure 1 shows that the market simulation for the "Aquila Stand Alone" case (dashed red line) resulted in substantially greater dispatch of the Aries plant than the dispatch levels the plant has actually experienced in 2006 and 2007 (solid black and purple lines). The same is true for the "Aquila in Midwest ISO" case (dashed thin green line). In comparison, the "Aquila in SPP" case resulted in a simulated Aries dispatch that is close to the plant's actual operations during 2006.

Importantly, Figure 1 reveals that under actual market conditions the Aries plant generally is not dispatched during the fall, winter and early spring. This makes intuitive sense because during these relatively lower-load periods the regional power market is dominated by coal-fired power plants, which generally makes it uneconomic to operate

natural-gas fired power plants, such as Aries. It is thus not surprising that the forced, unrealistic dispatch of the Aries plants in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases erroneously adds significant uplift costs to these two scenarios.

Q. What is the magnitude of these erroneously added uplift costs in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases?

A. Based on the Aquila Study's workpapers for the 2008 simulations, the out-of-market dispatch of the Aries plant adds over $15 million in unrealistic uplift costs to the "Aquila Stand Alone" case and approximately $13 million of erroneous uplift costs in the "Aquila in Midwest ISO" case. By comparison, the more realistic simulation results for the "Aquila in SPP" case resulted in negligible uplift cost of only approximately $0.1 million. As shown in Tables 15 and 16 of the Aquila Study, this difference in annual uplift costs between the Midwest ISO and SPP cases of almost $13 million is significantly larger than the almost $8 million annual difference in estimated cost savings for Midwest ISO and SPP participation by Aquila.[7] The large uplift costs imposed on Aquila in the "Aquila in Midwest ISO" case strongly supports a conclusion that the Aquila Study's estimated greater benefit of Aquila joining SPP is fictitious.

Q. Does the magnitude of the Aries uplift costs also mean that if one were to exclude these uplift charges in the determination of Aquila costs, the benefits of Aquila joining the Midwest ISO may even exceed the benefits of joining SPP?

A. Yes, that is correct. Table 1 below illustrates the effect of excluding the unrealistic Aries uplift costs incurred in 2008 that were assigned solely to Aquila. The first column summarizes the Study results for 2008 prior to adjusting for the unrealistic Aries uplift

costs. This column shows that the Aquila Study's estimated 2008 annual benefits of Aquila joining SPP exceed the benefit of joining the Midwest ISO by $7.4 million. However, if the unrealistic Aries uplift charges shown in the second column are excluded from the determination of Aquila costs, the revised results indicate the estimated annual benefits of Aquila joining SPP would be $5.5 million *less* than the benefits of joining the Midwest ISO.

It is important to note, however, that the substantial variance in Aries commitment across the three scenarios also distorts market prices and the dispatch of other generation in the regional market. As such, the adjusted results in Table 1 below are only indicative of the relative direction to which RTO savings for the Midwest ISO and SPP cases are affected by the unrealistic commitment of the Aries plant.

Table 1: 2008 Aquila Net Generation Costs Without Aries Uplift Costs[8]

	Total Aquila Costs Original 2008 case	Aries Uplift	Total Aquila Costs Without Aries Uplift
Aquila Stand Alone	$231.8 million	$15.3 million	$216.4 million
Aquila in Midwest ISO	$225.4 million	$13.0 million	$212.4 million
Aquila in SPP	$218.0 million	$0.1 million	$217.9 million
SPP cost reduction	$13.8 million		($1.5) million
Midwest ISO cost reduction	$6.4 million		$4.0 million
Apparent SPP Advantage over Midwest ISO	$7.4 million		($5.5) million

[7] In 2008, Table 16 of the Aquila Study shows that the estimated total cost savings are $13.4 million for the "Aquila in SPP" case, while Table 15 shows that the estimated total cost savings are $5.5 million in the "Aquila in Midwest ISO" case. The difference in annual costs savings is almost $8 million ($13.4 m - $5.5 m = $7.9 m).

[8] The costs and cost differentials in this table are stated in 2005 dollars. The 2008 cost differentials in Tables 15 and 16 of the Aquila Study (p. 39) are stated in nominal (i.e., actual 2008) dollars. As stated in footnotes 7 and 13 of the Aquila Study, an inflation rate of 2.5% was applied to convert the simulation results (in year-end 2005 dollars) to the trade benefits (in mid-year 2008 dollars) shown in Tables 15 and 16.

Q. What other evidence supports your conclusion that the commitment of the Aries unit in the Aquila Study is unrealistic?

A. As noted earlier, the simulations for the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases commit the Aries generating plant at above-market costs during much of the year. The Study then implicitly assumes that Aquila would be contractually obligated to make such above-market purchases. However, a contract that would obligate Aquila to make such above-market payments to the owner of the Aries plant does not exist. Without such a contract, Aquila would not be obligated to make above-market payments to Aries—and without these payments, the owner of the Aries plant would not incur the significant costs associated with the extensive out-of-market commitment.

Further, even if the Aries plant was physically owned or contractually obligated to provide power to Aquila, which it is not, it would still not make sense for Aquila to commit the plant to generate, as modeled, under out-of-market conditions. Aquila simply does not need to rely on out-of-market (i.e., uneconomic) generation from the Aries plant. As shown in Table 14 of the Aquila Study (p. 38), Aquila physically or contractually owns over 1,900 MW of generation resources—which compares to a modeled 2008 peak load of 1,942 MW. In fact, Aquila's modeled 2008 load exceeds 1,700 MW during only approximately 200 hours a year. Thus, Aquila rarely needs to rely on non-Aquila generating resources from a reliability perspective. In addition, based on the Aquila Study's workpapers, most of Aquila's resources have materially lower dispatch costs than the Aries plant. This includes over 1,200 MW of generation from the Iatan, Jeffrey, Lake Road, Sibley, Cooper and Gentleman power plants that are listed as Aquila resources in

Table 14 (p. 38) of the Aquila Study. Aquila's projected 2008 load exceeds 1,200 MW during fewer than 1,500 hours a year, or only approximately 17 percent of the time. It would not make economic sense to commit the Aries plant during much of the remaining 83 percent of the year when market prices are below Aries costs and the company has available lower-cost resources to supply its load.

Taken together, these facts further demonstrate that the commitment and dispatch of the Aries plant in the "Aquila Stand Alone" and "Aquila in Midwest ISO" case is unrealistic—simply an artifact of the simulations performed. The much larger benefit attributed to participation in SPP consequently is not supported by the available evidence.

Q. These facts document that the simulation model unnecessarily commits and dispatches the Aries merchant generating plant on behalf of Aquila in two of the three scenarios. Do you have any estimates of the impact on RTO benefits quantified in the study if the Aries plant were excluded from the simulations?

A. Yes. As it became clear that the commitment and dispatch of the Aries generating unit in the two of the three simulations had a disproportionate impact on the difference in estimated RTO-related benefits, the Midwest ISO sought and obtained permission from Aquila to engage the consultants who performed the Aquila Study (CRA International) to perform additional simulations. As an initial sensitivity, the Midwest ISO and I asked CRA to re-simulate the three 2008 cases by excluding the Aries generating plant from the simulations.

Q. Mr. Pfeifenberger, before you discuss the results of these additional simulations, would you please describe CRA and the services it supplies generally.

A. CRA International is an economic consulting firm that provides services to a variety of industries, including the utility industry. In connection with preparation and development of my rebuttal testimony I relied on the results of the simulations CRA performed for the Aquila Study as well as the additional "No Aries" simulation CRA performed for the Midwest ISO.

Q. In your field of expertise, Mr. Pfeifenberger, do you frequently rely on the results of such simulations in developing your professional opinions and conclusions?

A. Yes, I do.

Q. Have you prepared such simulations in your own firm?

A. Yes, I have.

Q. Why did you not undertake your own simulations for the purpose of your rebuttal testimony?

A. CRA had already created an extensive data foundation with which to do this work and, given the available time and the need to understand how more reasonable unit commitment in CRA's simulations would impact the results of the Aquila Study, the Midwest ISO and I considered it most effective to ask CRA to adjust its analysis as I describe in this testimony.

Q. With respect to CRA and the computer models used by CRA, do you consider them to be a reasonable source for the additional analyses and simulations you requested?

A. Yes. Based on my review of CRA's workpapers, I believe that the results supplied by CRA pursuant to my request were reasonable and adequate for purposes of my opinions and conclusions.

Q. Did CRA provide detailed results of the simulations it performed for the Aquila Study and the additional simulations you requested in electronic form?

A. Yes, they did.

Q. Have you attached the CRA simulations to your testimony?

A. No, I have not. I have only included the summaries of the simulation results as discussed in my testimony. The detailed simulation results are highly voluminous and would have been difficult to attach to this testimony. However, detailed results for each of the discussed simulations and the analyses I generated from them have been provided as workpapers and served on the parties. Additionally, I will have them available in an electronic form at the hearing should there be a need for referring to them at that time. Copies of any of those simulation results can be generated as needed.

Q. What do the results of the "No Aries" simulations you requested from CRA show with respect to the estimated benefits of Aquila joining SPP or the Midwest ISO?

A, The results of the "No Aries" simulations are summarized in Table 2 below. This sensitivity analysis shows that, if the Aries generating plant is removed from the simulations, the large difference in estimated RTO-related benefits of Aquila joining the Midwest ISO versus SPP disappears. As Table 2 summarizes, the simulations without the Aries plant show a difference in 2008 cost savings realized from participation in the Midwest ISO as compared to participation in SPP of only $0.3 million a year. This difference in estimated RTO-related savings is only 0.14%, or less than two tenths of one percent, of the estimated $220 million in annual Aquila generation and net purchase costs.

Table 2: 2008 Aquila Net Generation Costs Without Aries[9]

	Total Aquila Costs Original 2008 case	Total Aquila Costs "No-Aries" Sensitivity
Aquila Stand Alone	$231.8 million	$224.6 million
Aquila in Midwest ISO	$225.4 million	$220.9 million
Aquila in SPP	$218.0 million	$220.6 million
SPP cost reduction	$13.8 million	$3.95 million
Midwest ISO cost reduction	$6.4 million	$3.65 million
Apparent SPP Advantage over Midwest ISO	$7.4 million	$0.31 million

Q. Do these estimates indicate whether the "No Aries" simulation results are any more realistic than the original results?

A. Yes, I believe these estimates show that the "No Aries" simulations are more realistic than the original results of the Aquila Study. The comparison of these simulations show that, in the Stand Alone basis and the Midwest ISO case, Aquila would incur lower overall production costs if the Aries generating plant did not even exist. However, considering that Aquila purchases significantly more power than it sells, it makes little sense that Aquila would be better off if the Aries merchant plant were removed from its service area. I believe this counter-intuitive result clearly indicates that the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases of the Aquila Study are flawed and that the "No Aries" simulations produce more realistic estimates of the relative magnitude of RTO-related cost savings—savings that are very similar for Aquila's participation in the Midwest ISO or SPP.

[9] The costs and cost differentials in this table are stated in 2005 dollars. The 2008 cost differentials in Tables 15 and 16 of the Aquila Study (p. 39) are stated in nominal (i.e., actual 2008) dollars. As stated in footnotes 7 and 13 of the Aquila Study, an inflation rate of 2.5% was applied to convert the simulation results (in year-end 2005 dollars) to the trade benefits (in mid-year 2008 dollars) shown in Tables 15 and 16.

Q. To summarize, what do the "No Aries" simulations results show with respect to the relative magnitude of estimated RTO-related benefits to Aquila if it joined the Midwest ISO or SPP?

A. These revised simulation results, again, show that the greater benefits from Aquila's participation in SPP in the Aquila Study are solely a function of how the simulation model treated the Aries merchant generating plant. The original simulations undertaken resulted in the erroneous and unnecessary imposition of uplift costs in the "Aquila Stand Alone" and "Aquila in Midwest ISO" cases. This is entirely unrealistic because (1) the Aries unit is neither owned by nor under contract to Aquila; and (2) the difference in Aquila's RTO-related cost savings cannot reasonably be expected to be driven entirely by the existence (or absence) of a single merchant generating plant. Once the Aries-related distortions are removed in the simulations, which was achieved in the "No Aries" simulations by removing the Aries plant, the estimate of RTO-related benefits of Aquila joining the Midwest ISO are virtually the same as those of Aquila joining SPP.

Q. Do you have any simulations that correct the Aries commitment and dispatch distortions without removing the Aries plant from the model?

A. No, not at this point. The economic modeling process is complicated and time consuming. In order to meet the filing deadline for this testimony, I was only able, with the assistance of CRA, to have the "No Aries" additional simulations completed. Although I am confident in the conclusions presented in this testimony, it is possible that additional simulations that correct the Aries commitment and dispatch distortions (which could not be completed by this filing deadline) may bring to light important issues that are not presently addressed. Therefore, I may need to supplement my testimony.

III. ERRONEOUS AQUILA "UPLIFT" CHARGES IN THE MIDWEST ISO CASE

Q. Please review how the Aquila Study's treatment of "uplift" charges affects the estimated cost savings.

A. As discussed earlier, the combination of the simulation model's generation commitment algorithm and the significant amount of Aquila generation that is located outside its control area results in highly unrealistic commitment of the Aries merchant generating units in the "Aquila Stand Alone" and the "Aquila in Midwest ISO" cases. The out-of-market costs associated with this unrealistic commitment of the Aries unit amount to $15.3 million in the "Aquila Stand Alone" case, $13.0 million in the "Aquila in Midwest ISO" case, but only $0.1 million in the "Aquila in SPP" case.

Q. Let's assume for a moment that these "uplift" costs associated with the Aries plant were appropriate and realistic. Would Aquila be responsible for 100% of these uplift costs if it joined the Midwest ISO?

A. No. Even if we were to assume these commitment-related uplift costs were realistic, the Aquila Study incorrectly assumes that Aquila would be responsible for 100 percent of these costs as a transmission-owning member of the Midwest ISO. If Aquila joined the Midwest ISO, generation commitment and dispatch would be arranged by the Midwest ISO, not Aquila. Importantly, assuming that the Midwest ISO would have to commit and dispatch the Aries plant at costs above market clearing prices for the benefit of the region, the uplift costs would not be incurred solely by Aquila but by all load serving entities and other market participants in the Midwest ISO.

Q. Under the Midwest ISO tariff, how would the Aries owner be compensated for out-of-market commitment and dispatch costs and how would Aquila be affected by that?

A. Under the Midwest ISO tariff, the Aries plant would be reimbursed for its out-of-market costs through what are known as revenue sufficiency guarantee ("RSG") payments, which would be collected from all Midwest ISO load serving entities and other market participants that contributed to the need to commit the Aries plant. Under no circumstance would one hundred percent of incremental RSG charges be assigned to a single load-serving entity such as Aquila. Rather, the Midwest ISO's RSG payments are recovered from all load-serving entities and other market participants in part based on an entity's load as a share of total Midwest ISO load and in part based on the extent their real-time schedules deviated from their day-ahead schedules. Considering that Aquila would constitute less than 2% of total Midwest ISO load,[10] Aquila's share of Aries-related uplift costs would likely be minimal in the "Aquila in Midwest ISO" case.

Q. What would the Aquila Study's RTO benefits be if Aries-related uplift charges were assumed to be paid by all load serving entities and market participants, rather than being fully allocated to Aquila?

A. If the Aquila Study's Aries-related uplift costs were assumed to be realistic (which they are not), the cost savings in the "Aquila in Midwest ISO" case would be substantially larger than the Aquila Study estimated. In fact, given that most of the estimated $13 million in Aries uplift costs in the 2008 "Aquila in Midwest ISO" case would be paid by other Midwest ISO participants and would not be assigned solely to Aquila, the estimated

[10] For example, Aquila's projected 2008 peak load of 1,942 MW (as used in the Aquila Study) compares to a 2006 Midwest ISO peak load of approximately 109,000 MW.

benefits of Aquila joining the Midwest ISO would exceed the estimated benefits of joining SPP.

This is shown in Table 3 for the 2008 simulations. The table illustrates how Aquila's costs would change if all Aries uplift charges incurred in the simulations were allocated to entities other than Aquila. While Aquila would likely pay a small share of Aries-related uplift charges, that would not affect the relative magnitude of the benefits illustrated in Table 3. Based on these revised 2008 results and assuming the Aries uplift charges determined by the simulations were realistic, the estimated annual benefits of Aquila joining the Midwest ISO would exceed those of joining SPP by approximately $5.5 million annually.

Table 3: 2008 Aquila Net Generation Costs With RTO Payment of Uplift Costs[11]

	Total Aquila Costs Original 2008 case	RTO Uplift Payment	Total Aquila Costs w/ RTO Uplift Payment
Aquila Stand Alone	$231.8 million	--	$231.8 million
Aquila in Midwest ISO	$225.4 million	$13.0 million	$212.4 million
Aquila in SPP	$218.0 million	$0.1 million	$217.9 million
SPP cost reduction	$13.8 million		$13.9 million
Midwest ISO cost reduction	$6.4 million		$19.4 million
Apparent SPP Advantage over Midwest ISO	$7.4 million		($5.5) million

[11] The costs and cost differentials in this table are stated in 2005 dollars. The 2008 cost differentials in Tables 15 and 16 of the Aquila Study (at 39) are stated in nominal (i.e., actual 2008) dollars. As stated in footnotes 7 and 13 of the Aquila Study, an inflation rate of 2.5% was applied to convert the simulation results (in year-end 2005 dollars) to the trade benefits (in mid-year 2008 dollars) shown in Tables 15 and 16.

IV. DAY-2 MARKET DESIGN AND OTHER RTO BENEFITS

Q. You noted that the Aquila Study assumed SPP would already be operating under a Day-2 RTO market design as of 2008. Is that realistic?

A. No, it is not. Even if SPP decided to implement a Midwest ISO Day-2 market design—which includes centralized generation commitment and dispatch, day-ahead energy markets, market-based congestion management, financial transmission rights, as well as (in 2008) ancillary services markets—one would need to assume that the current Day-1 market structure of SPP would continue to exist for at least several more years. Until SPP implements a Day-2 market design, however, certain inefficiencies in unit commitment, generation dispatch, and congestion management would continue to exist within the SPP footprint. These inefficiencies—which include suboptimal utilization of the transmission system in the absence of market-based congestion management—would mean higher total generation costs compared to a Day-2 market design.

Q. What does this mean in terms of RTO-related benefits of Aquila joining SPP versus the Midwest ISO?

A. Until SPP implements a Day-2 market design, participation in SPP would mean that Aquila would be part of an RTO that operates less efficiently than is assumed in the market simulations of the Aquila Study. This means that even if one corrects the Aquila Study's estimated RTO savings for the unrealistic commitment and dispatch of the Aries merchant generating plant, SPP-related cost savings may still be overstated because SPP will not be able to offer for some time the efficiencies associated with the Midwest ISO's Day-2 market design.

Q. Are there any other RTO-related benefits of joining the Midwest ISO?

A. Yes, there are other benefits, not reflected in the Aquila Study, that Aquila would realize if it joined the Midwest ISO. These additional benefits are discussed in the rebuttal testimony of Mr. Richard Doying, Vice President of Market Operations for the Midwest ISO.

Q. Does this complete your rebuttal testimony?

A. Yes, it does.

Schedule JPP-1
Qualifications of Johannes P. Pfeifenberger

Johannes Pfeifenberger is a Principal of *The Brattle Group* where he co-manages the firm's utility practice area. He received a M.A. in Economics and Finance from Brandeis University and holds a M.S. ("*Diplom Ingenieur*") in Electrical Engineering, with a specialization in Power Engineering and Energy Economics from the University of Technology in Vienna, Austria. Before joining *The Brattle Group* in 1991, Mr. Pfeifenberger was a consultant with Cambridge Energy Research Associates of Cambridge, Massachusetts, and a research assistant at the Institute of Energy Economics in Vienna, Austria.

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