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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)	
AMENDMENTS TO)	R18-20
35 ILL. ADM. CODE 225.233)	(Rulemaking – Air)
MULTI-POLLUTANT STANDARDS)	
(MPS))	

NOTICE OF FILING

PLEASE TAKE NOTICE that on this 10th day of December 2018, I have filed with the Clerk of the Illinois Pollution Control Board, the Pre-Filed Testimony of Andrew Armstrong on Behalf of the Illinois Attorney General’s Office in the above-referenced case, a copy of which is hereby served upon you.

Respectfully submitted,

PEOPLE OF THE STATE OF ILLINOIS
By LISA MADIGAN,
Attorney General of the State of Illinois

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Exhibit 4A
R18-20
1/29/2019
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CERTIFICATE OF SERVICE

I, STEPHEN J. SYLVESTER, an attorney, do certify that on December 10, 2018, I caused the Pre-Filed Testimony of Andrew Armstrong on Behalf of the Illinois Attorney General's Office and Notice of Filing to be served upon the persons listed in the attached Service List by email for those who have consented to email service and by U.S. Mail for all others.

/s/ Stephen J. Sylvester
STEPHEN J. SYLVESTER

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)
)
AMENDMENTS TO 35 ILL. ADM.) R18-20
) (Rulemaking-Air)
CODE 225.233, MULTI-POLLUTANT)
STANDARDS)

**PRE-FILED TESTIMONY OF ANDREW ARMSTRONG
ON BEHALF OF THE ILLINOIS ATTORNEY GENERAL'S OFFICE**

The Illinois Attorney General's Office, on behalf of the People of the State of Illinois ("People"), hereby files the pre-filed testimony of Assistant Attorney General Andrew Armstrong, as provided by the Hearing Office Order issued on November 15, 2018. We provide this pre-filed testimony to respond to requests for comment and questions raised in the October 4, 2018 Opinion and Order of the Board and Hearing Officer Order.

I. October 4, 2018 Opinion and Order of the Board

On page 55, the Board requests comment on its proposed mass-based limits. We previously have testified and been examined on the Illinois Attorney General's Office's views on appropriate mass-based limits. Our previous testimony stands and we provide no additional testimony on this point, though we do anticipate submitting additional post-hearing comments.

On page 60, the Board invites comment on reducing mass caps for retired and mothballed MPS units. As we have previously testified and commented, the Illinois Attorney General's Office supports reducing mass caps for retired and mothballed MPS units. By this testimony, we suggest some refinements of the Board's proposed approach, discussed below in response to the questions asked in the October 4, 2018 Hearing Officer Order.

II. October 4, 2018 Hearing Officer Order

The October 4, 2018 Hearing Officer Order included an Attachment A containing “a series of questions for participants to direct their attention to when filing pre-filing testimony.” Oct. 4, 2018 Hearing Officer Order at 1. The Illinois Attorney General’s Office responds to these questions as follows:

- 1. A rule adopted by the Board is effective upon filing with the Secretary of State unless a later date is required by statute or specified by the Board. 5 ILCS 100/5-40(d). At second first notice, the Board has proposed the compliance date for the proposed mass-based limits and for combining MPS Groups as the beginning of calendar year 2019. See proposed revised MPS rule provisions at Sections 225.233 (e)(1)(C), (D) and (E). Please comment on whether the proposed date is acceptable, or should the Board adopt a delayed effective date of January 1 of the year following the year of the rule adoption for the proposed mass-based limits and for combining MPS Groups? If so, please propose and support a specific delayed effective date.**

If the Board proceeds to final adoption of the proposed rules during calendar year 2019, we do not object to the rule taking effect for the two compliance periods during calendar year 2019 (the 2019 annual compliance period (i.e., beginning January 1, 2019) and 2019 ozone season (i.e., beginning May 1, 2019)).

- 2. Please comment on how IEPA would enforce the proposed revised MPS rule provisions at Sections 225.233(f), (g) and (h) that require adjustment of mass-based cap in case of:**
 - a. Transfer of the MPS EGUs?**
 - b. Permanent shutdown (retirement) of the MPS EGUs?**
 - c. Temporary shutdown (mothballing) of the MPS EGUs?**

We appreciate that the Board has proposed new recordkeeping and reporting provisions in subsections (j) and (k). Overall, the form of the reports required by subsections (k)(2)(A) and (B) seems appropriate to demonstrate compliance with annual and seasonal emission limits, based on the EGUs identified by the owner to be within an owner’s MPS Group. To provide additional necessary information to show compliance—including which EGUs actually should

be considered to be within the owner's MPS Group—and to facilitate enforcement of the revised provisions, though, we make three proposals.

First, we propose that the annual and ozone season compliance reports required by subsections (k)(2)(A) and (B) also include information regarding all MPS units transferred, retired, or mothballed by the owner during the relevant compliance period. Specifically, the information required in notices of transfer, permanent shutdown, and temporary shutdown in subsections (f)(3), (g)(3), and (h)(3) also should be included in reports required by subsections (k)(2)(A) and (B). So, too, should be all information reportable to the Agency (regarding deviations and inoperation of SCR control systems) under subsections (k)(3) and (k)(4) during the relevant compliance period.

Second, we propose that the Board require MPS owners to publicly maintain on their websites: (1) their most recently submitted compliance reports under subsections (k)(2)(A) and (B); and (2) any notices and reports under subsections (f)(3), (g)(3), (h)(3), (k)(3), and (k)(4) submitted to the Agency after the owner's submission of the most recent annual compliance report. Vistra's management has publicly stated that it intends to, in its words, "clean up" its portfolio of Illinois plants "immediately" after the Board proceeds to final adoption of MPS revisions.¹ (Vistra management refers to "cleaning up" here in the sense of corporate earnings,

¹ During Vistra's November 2, 2018 quarterly earnings call, Vistra's President and Chief Executive Officer Curt Morgan made the following comments in response to the question of financial analyst Shar Pourreza:

Shar Pourreza

Got it. And then just lastly on the MISO assets, when do you expect to sort of make a decision here? I mean, obviously given the cash flow profile, you can see an improvement in your conversion cycles I guess, Curt, what are you waiting for around MISO?

Curt Morgan

So, we unfortunately, we've got to wait to see what the multipollutant standard what the final outcome of that is unfortunately, it didn't happen in the fourth quarter of '18, but we did get what I think is a reasonable and fair outcome from the Illinois Pollution Control Board we will have to go through another hearing on that that's okay we're not uncomfortable with that but we're thinking April/May timeframe to get a final kind of outcome because

not air pollution.) It is clear that, once the Board moves forward to final adoption of MPS revisions, Vistra then will immediately announce shutdowns of MPS units. Given Vistra's plans, it may soon be complicated for the public to assess whether Vistra (or any new owner of MPS units that appears) is in compliance with the MPS, based only on the language of the revised MPS as adopted. It is important that complete and current compliance information for the MPS fleet or fleets be readily available, and it would be appropriate for the Board to require MPS owners to post that information on their websites.

Third, and related to the second proposal, we propose that, if the Board proceeds to final adoption, it include a Board note identifying all MPS units that are mothballed at that time. Currently, Baldwin 3 has been mothballed since October 2016.² The Board should note that Baldwin 3 is mothballed in subsection (h)(2), and similarly flag any other units mothballed prior to final adoption. Further, the Board should note in subsection (h)(2) what adjusted emission limits apply for the remaining MPS Group's initial annual and seasonal compliance periods, given any such temporary shutdowns at the time of final adoption. This will provide more clarity to the public regarding the applicable emission limits.

what happens, Shar, it goes from the Illinois Pollution Control Board, they recommended it to a committee of the legislature it's called JCAR. And then JCAR actually votes on it doesn't have to go to the full legislature; it just goes to JCAR and we believe that it will go through as it is today and if that happens, we should be prepared then to come to the market, but more importantly to begin to execute on what we are going to do and how we're going to create our final I shouldn't say final, but create the business that we believe will be profitable now, work is going on right now, and so I want to make sure that and everybody knows that we're going to be in a position to execute immediately so, we know if the deal goes through exactly the way it is now, we know what we would do and so, it's just a matter of timing but we also have been contingency planning so, if something else happened, then we would be prepared for that, as well and that would include engaging with MISO to make sure that they understand our plans, engaging with politicians, engaging with the Illinois Commerce Commission, to make sure that we have the pathway to shore this up and there is a reasonably significant we believe a reasonably significant improvement in EBITDA once we clean this portfolio up and that's what we're trying to get to unfortunately, we're going to have a little bit of a drag in 2019 to get to the point where we get a final multipollutant standard.

Vistra Earnings Call, Q3 2018 Earnings Call (Nov. 2, 2018), available at <https://seekingalpha.com/article/4217747-vistra-energy-vst-ceo-curt-morgan-q3-2018-results-earnings-call-transcript?part=single>.

² Dynegy, "Third Quarter 2016 Review" (Nov. 2, 2016), at 4, available at <http://phx.corporate-ir.net/phoenix.zhtml?c=147906&p=irol-presentations2016>.

3. **Please comment on whether the adjustment of the mass-based MPS caps should take effect in a manner other than proposed in Sections 225.233(f), (g) and (h) in case of:**
 - a. **Transfer of the MPS EGUs?**
 - b. **Permanent shutdown (retirement) of the MPS EGUs?**
 - c. **Temporary shutdown (mothballing) of the MPS EGUs?**
 - d. **Please also comment on whether NO_x ozone season mass caps should be adjusted in the year in which an EGU is mothballed if it is mothballed for the entire NO_x ozone season as required in Sections 225.233(e)(1)(d) and (h)(1)?**

4. **Please comment on whether mass-based MPS caps adjustments should be pro-rated in a calendar year in which the EGU unit stops operating within the same MPS Group in case of:**
 - a. **Permanent shutdown (retirement) of the MPS EGUs to comply with Section 225.233(g)(1)?**
 - b. **Temporary shutdown (mothballing) of the MPS EGUs to comply with Section 225.233(h)(1)?**

In the Board's October 4, 2018 Opinion and Order, the Board found—correctly, in our view—that “in addition to ownership transfer, the proposed mass caps for SO₂ and NO_x must decline with the retirement (permanent shut down) or mothballing (temporary shutdown) of MPS EGUs.” Oct. 4, 2018 Board Order at 58. The Board noted that, “under the current MPS, a retired or mothballed EGU does not factor into MPS compliance because, without heat input, no allowance is allocated for emissions from the EGU.” *Id.* at 59.

Despite their similar impact under the current MPS, transfer, retirement, and mothballing each receive slightly different treatment for purposes of MPS compliance in the Board's proposed rules. More specifically: while each of the three appropriately causes mass caps to decline over the long term, the proposed rules handle MPS compliance for the year (or year and ozone season) during which transfer, retirement, and mothballing occurs differently. We propose that all three be treated the same, and look to the Board's proposed rules on transfer as providing the model. Generally, we propose that an MPS unit's transfer, retirement, or

mothballing each should sever it from the remaining MPS Group, and that the MPS owner (or owners, in the case of transfers) be required to show compliance with allocated emission limits for both (i) the remaining MPS units and (ii) the transferred, retired, or mothballed unit. We further propose that the allocated emission limits for a retired or mothballed unit be adjusted downward, pro rata, based on the number of days it was out of service during a compliance period. We explain below.

Transfer: As we read proposed subsections (f)(1)(A), (B), and (C), if an owner transfers an MPS unit but owns any remaining units, then the adjusted emission limits for the remaining units take effect during the compliance period or periods in which the transfer occurred (i.e., the annual compliance period for the year of the transfer, and, if the transfer took place from May 1 through September 30, the ozone season compliance period, as well). The acquiring owner is then separately responsible for demonstrating compliance with the adjusted emission limits for the acquired unit during the compliance period or periods in which the transfer occurred (and each period thereafter).

To illustrate, we use a very simplified scenario in which there is an MPS Group consisting of only Hennepin 1 and 2, and examine only the SO₂ emission limit. If the MPS owner transferred Hennepin 2 to a new owner on July 1, 2020, then the original owner would be required to demonstrate that Hennepin 1 complied with the allocated emission limit of 1,180 tons of SO₂ for calendar year 2020. Additionally, the new owner would be required to demonstrate that Hennepin 2 complied with the allocated emission limit of 3,720 tons of SO₂ for calendar year 2020. We believe this is a reasonable approach.

“Permanent Shutdown” (Retirement): By contrast, as we read subsection (g)(1), retired units are treated differently, in that no showing of compliance need be made for a retired

unit for the compliance period or periods during which a “permanent shutdown” (as defined in subsection (g)(1)(B)) occurs. As with transfers under (f)(1), if an owner permanently shuts down an MPS unit but owns remaining MPS units, then the adjusted emission limits for the remaining MPS units would take effect during the compliance period or periods during which the permanent shutdown occurred. *See* proposed subsection (g)(1)(B). To return to the simplified “Hennepin-only” scenario, if the MPS owner permanently shut down Hennepin 2 on July 1, 2020, then, with respect to SO₂ emissions, the owner’s only obligation for the 2020 annual compliance period would be to demonstrate that Hennepin 1 did not emit more than 1,180 tons of SO₂ for the year. However, no showing would need to be made that Hennepin 2 complied with its allocated emission limit of 3,720 tons during the 2020 compliance period. Hennepin 2 could have emitted 10,000 tons of SO₂ during the six months prior to its shutdown, and the MPS owner nevertheless would have been in compliance with the MPS. Under subsection (g)(1), as proposed, then, it seems there are effectively no MPS requirements on a permanently shut down unit during its final compliance period (or periods) of operation.

We believe this result is contrary to the MPS’s intent and instead that an MPS owner should be required to demonstrate compliance for a permanently shut down unit during the final compliance period(s) of operation. To this end, proposed subsection (g)(1)(A) could be amended as follows:

For the compliance period or periods during which a permanent shutdown occurs, a permanently shut down EGU is not part of an MPS Group, but the owner or operator of the permanently shut down EGU must not cause or allow to be discharged into the atmosphere emissions from the EGU in excess of the allocation amounts attributable to the permanently shut down EGU set forth in Columns A, B, and C in subsection (g)(2). For all compliance periods thereafter, such EGU is no longer part of an MPS Group and no longer subject to the requirements of this Section.

“Temporary Shutdown” (Mothballing): As we read subsection (h)(1), mothballed units are treated differently from both transferred and retired units. A mothballed unit lowers MPS Group emission limits only if the unit is mothballed for the entire compliance period. Returning again to the “Hennepin-only” example, suppose the owner of the hypothetical MPS Group consisting entirely of Hennepin temporarily shut down Hennepin 2 from July 1, 2020 on, while continuing to operate Hennepin 1 for the entire year. With respect to SO₂, the owner’s only compliance obligation under proposed subsection (h)(1) for the calendar year 2020 would be to demonstrate that Hennepin 1 and 2 did not emit more than the combined annual emission limit of 4,900 tons—even though Hennepin 2 only operated six months of the year.³ Under this scenario, the MPS owner effectively is permitted to use emissions allocated to mothballed units to increase emissions of remaining units—unlike the case of either transferred or retired units. The earlier in the year a mothballing occurred, the more disparate the treatment. For example, if Hennepin 2 were mothballed from January 2, 2020 through December 31, 2020, then Hennepin 1 would effectively be allocated nearly 4,900 tons of emissions for the year, instead of 1,180 tons.

Again, we believe this is not consistent with the MPS’s intent. We propose that mothballing be treated the same as the Board proposes for transfers, and as we propose for permanent shutdowns, above: the MPS owner should demonstrate compliance with adjusted emission limits for its remaining units, and with adjusted emission limits for the mothballed unit, for the compliance period or periods during which the mothballing occurred (and for subsequent compliance periods during which it continues). In this way, an owner would be prevented from utilizing emissions allocated to mothballed units to increase emissions of remaining units.

³ Neither would the mothballing have any impact on the ozone season emission limit for the MPS Group, as the unit would not have been mothballed for the entire compliance period of May 1 through September 30.

We do recognize that “temporary shutdowns” may occur for relatively short periods for reasons other than longer-term mothballing, and that the Board may also have proposed its treatment of mothballed plants to avoid having to distinguish between transitory shutdowns—for maintenance, for example—and longer-term mothballings. If the Board has any such concern that the term “temporarily shut down” is too broad if the shutdown is not required to continue for an entire compliance period, the Board could consider that the owners of units within Midcontinent Independent System Operator, Inc. (“MISO”) are required to submit to MISO notification of “suspensions,” providing a clear indication of longer-term mothballings. The MISO Tariff defines “Suspend” as follows:

The cessation of operation of a Generation Resource or an SCU for more than two (2) months commencing on a specified date that is provided to the Transmission Provider, that includes the right to rescind or modify the Attachment Y Notice for a period ending no later than thirty-six (36) months after the start date specified in an original (i.e. initial, first) Attachment Y Notice, consistent with the requirements in Section 38.2.7 and Attachment X.

See MISO, FERC Electric Tariff, Module A, § 1.S (Definitions) (33.0.0). The Board accordingly could qualify the term “temporarily shut down” in subsections (h)(1) and (h)(3) as follows: “If one or more EGUs in an MPS Group are temporarily shut down **in accordance with the owner’s notice to a Regional Transmission Organization that service will be suspended for more than two months: . . .**”

Therefore, to ensure similar treatment of mothballing to retirement and transfer, subsection (h)(1) could be amended as follows:

- (1) If one or more EGUs in an MPS Group are temporarily shut down **in accordance with the owner’s notice to a Regional Transmission Organization that service will be suspended for more than two months** ~~over an entire compliance period or periods:~~
 - (A) **For any compliance period or periods during which such temporary shutdown occurs or continues, a temporarily shut**

down EGU is not part of an MPS Group, but the owner or operator of a temporarily shut down EGU must not cause or allow to be discharged into the atmosphere emissions from the EGU in excess of the allocation amounts attributable to the temporarily shut down EGU set forth in Columns A, B, and C in subsection (h)(2).

- (AB) The combined emissions limitations for the MPS Group set forth in this Section, as applicable must be adjusted by subtracting from those limitations the applicable allocation amounts set forth in Columns A, B, and C in subsection (h)(2) that are attributable to the temporary shutdown EGU or EGUs.
- (BC) The owner and operator of the MPS Group must comply with the adjusted emissions limitations, beginning with the compliance period or periods during which the temporary shutdown occurs. **An** adjusted emissions limitations will no longer apply, if the EGU or EGUs resume **service for an entire compliance period associated with that limitation.**
- (CD) Nothing in this subsection (h) shall be construed to relieve owners and operators of EGUs in an MPS Group from any of the other requirements set forth in this Section, including the mercury standards under subsection (d).

Proration for Shut Down Units: In its October 4, 2018 Order, the Board expressed concern that adjusting mass caps in the case of temporarily shut down units could require proration of emission allocations. *See* Oct. 4, 2018 Board Order at 59. That is not necessarily the case, though. Under the Board's proposed rules for transfer, for example, no proration is needed. The owner of an MPS unit at the end of the compliance period(s) of transfer demonstrates compliance with the adjusted emission limits for that unit. Under the Board's proposed rules for permanent shut down, again, no proration is needed. If a unit is permanently shut down on July 1 in any particular calendar year, for example, then the MPS owner simply must demonstrate compliance with the adjusted emission limits for the remaining MPS units during that calendar year's annual and ozone season compliance periods (and, we suggest, additionally should be required to show compliance with adjusted emission limits for the

permanently shut down unit). Temporary shut downs conceivably could be handled the same way.

To be clear, though: it also certainly is possible—and preferable, from an environmental standpoint—to prorate the emissions allocated to a shut down unit for the compliance period(s) during which the shutdown occurred and, in the case of mothballing, during which the shutdown continues. Prorating would ensure a consistent level of emissions control for shut down units during their final compliance period(s) of operation. Therefore, if the Board concurs with our proposed revisions to subsection (g)(1)(A), above, subsection (g)(2) could be amended to include the following sentence:

The allocation amounts for a permanently shut down unit for purposes of subsection (g)(1)(A) are equal to the allocation amounts set forth in Columns A, B, and C, respectively, multiplied by the number of days in the relevant compliance period that the unit was in service prior to permanent shut down, divided by the total number of days in the relevant compliance period, and rounded to the nearest ton.

Subsection (h)(2) further could be amended to include the following sentence:

The allocation amounts for a temporarily shut down unit for purposes of subsection (h)(1)(A) are equal to the allocation amounts set forth in Columns A, B, and C, respectively, multiplied by the number of days in the relevant compliance period that the unit was in service prior to and/or following temporary shut down, divided by the total number of days in the relevant compliance period, and rounded to the nearest ton.

In sum, proration is not absolutely necessary to adjust mass caps following a shutdown, either permanent or temporary. To the contrary, remaining MPS units simply can be severed from the shut down unit beginning with the compliance period(s) during which the shutdown occurs, and their emission limits adjusted accordingly, just as the Board proposes for transfers. The shut down unit further can be required to comply with its own adjusted emission limits, preferably prorated.

5. **Please comment on which date the IEPA should consider a date of transfer and a date of permanent and temporary shutdown of an MPS EGU? Would the dates the owner/operator indicate in their written notifications required under Section 225.233(f)(3), (g)(3) and (h)(3) be proper dates? Please also comment on the following:**
- a. **In case of discrepancy between the notification provided under Section 225.233(f)(3)(A) and (B), which date should control?**
 - b. **Is there a conflict between Section 225.233(g)(1)(B) and (3)(D)? In case of discrepancy between dates provided under Section 225.233(g)(1)(B) and (3)(D), which date will control?**

With respect to the date of a transfer, the Board proposes in subsections (f)(3)(A) and (B) that both the transferring and acquiring owners report the date of the transfer of an MPS unit to the Agency. We believe this reporting requirement is appropriate but, as the Board's question implies, reliance upon the owners' reporting, alone, does create the possibility of a discrepancy between the dates provided by the two owners. One alternative approach could be to follow subsection (g)(1)(B)'s focus on the unit's operating permit, and to provide that the date of transfer is the date for which an acquiring owner or operator seeks transfer of the unit's operating permit, in a written request to the Agency. This would put the responsibility of MPS compliance on the transferring owner until such time as an acquiring owner officially notifies the Agency of its intention to assume responsibility for the MPS unit.

With respect to the date of a permanent shutdown, we do not see a conflict between subsections (g)(1)(B) and (3)(D), and agree that the date of "permanent shutdown" can be appropriately defined as the date on which the MPS owner or operator submits a written request to modify or withdraw the relevant operating permit to reflect the shutdown.

With respect to the date of a temporary shutdown, we note that the operator of any unit within a Regional Transmission Operator ("RTO") must give advance notice of shutdowns to the RTO. We therefore propose that subsection (f)(3) be amended to also require the MPS owner to

include a copy of the notice sent to the RTO, to evidence the start date of the temporary shutdown.

6. Please comment if there are limitations on how often and for how long an MPS EGU may be mothballed for.

We do not offer any testimony on this point beyond noting that the MISO Tariff provides that a suspension may last no longer than thirty-six months. *See* MISO, FERC Electric Tariff, Module A, § 1.S (Definitions) (33.0.0).

7. Please comment on whether and how mass caps should be adjusted for units retired and mothballed before the effective date of MPS revisions adopted in this rulemaking.

In its October 4, 2018 Order, the Board stated: “If Vistra transfers or retires any MPS plants or EGUs before the Board adopts final rule amendments, the Board will adjust the mass caps to reflect the transfers or retirements, using the proposed allocation amounts.” Oct. 4, 2018 Board Order at 60. We agree with this approach. If any current MPS units are retired before a rule in this rulemaking is finally adopted, then all references to those units and their allocated emissions for transfer and shutdown should be removed from the regulation, and the emissions caps in subsections (e)(1)(C), (e)(1)(D), (e)(2)(C), and, if applicable, (e)(2)(D), should be adjusted downward accordingly.

Assuming both that (i) the Board’s adoption of any final rule amendments takes place in 2019, and (ii) the effective date for any MPS revisions adopted in this rulemaking also is in 2019, then subsection (g) could be used to address any MPS units that are retired after the Board’s final adoption but prior to the effective date. For clarity, subsection (g)(1) could be amended to read: “If one or more EGUs in an MPS Group are permanently shut down **during the 2019 annual compliance period or thereafter**:”. This would make clear that the retirement provisions apply to all retirements occurring during calendar year 2019, even if they

occur prior to the effective date of the rule. If the Board concurs with our proposal regarding mothballed plants, above, then similar language could be added to our proposed revised subsection (h)(1). As discussed in response to Question 2, above, we also propose that the Board include a note in subsection (h)(2) that identifies units that are temporarily shut down as of the date of final adoption, and sets out the applicable adjusted emission limits.

We appreciate the opportunity to testify on these issues.

Dated: December 10, 2018

Respectfully submitted,

PEOPLE OF THE STATE OF ILLINOIS,
by LISA MADIGAN,

Attorney General of the State of Illinois,
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MULTI-POLLUTANT STANDARDS (MPS))	

NOTICE

TO: Don Brown
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SEE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that I have today electronically filed with the Office of the Clerk of the Illinois Pollution Control Board the ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S RESPONSES TO BOARD QUESTIONS SET FORTH IN HEARING OFFICER ORDER DATED OCTOBER 4, 2018, a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL
 PROTECTION AGENCY

By: /s/ Gina Roccaforte
 Gina Roccaforte
 Assistant Counsel
 Division of Legal Counsel

DATED: December 10, 2018

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*Exhibit 49
 R18-20
 1/29/2019
 MTK*

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IN THE MATTER OF:)
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AMENDMENTS TO) R18-20
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MULTI-POLLUTANT STANDARDS (MPS))

**ILLINOIS ENVIRONMENTAL PROTECTION AGENCY'S
RESPONSES TO BOARD QUESTIONS SET FORTH IN HEARING OFFICER ORDER
DATED OCTOBER 4, 2018**

NOW COMES the Illinois Environmental Protection Agency ("Illinois EPA" or "Agency"), by one of its attorneys, and submits the following in response to the series of questions for participants developed by the Illinois Pollution Control Board ("Board") as set forth in the Hearing Officer Order dated October 4, 2018. Additionally, the Agency does not object to either the Board's Second First Notice proposal or the findings in the Board's October 4, 2018, Second First Notice Order.

Attached as Exhibits are the Agency's responses to the questions posed by the Board to participants in Attachment A to the October 4, 2018, Order (Exhibit 1), and the Agency's suggested amendments to the Board's proposal (Exhibit 2).

Respectfully submitted,

ILLINOIS ENVIRONMENTAL
PROTECTION AGENCY

By: /s/ Gina Roccaforte
Gina Roccaforte
Assistant Counsel
Division of Legal Counsel

DATED: December 10, 2018

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EXHIBIT 1

ILLINOIS EPA'S RESPONSES TO BOARD QUESTIONS

A. Compliance Date for Proposed Mass Limits

1. A rule adopted by the Board is effective upon filing with the Secretary of State unless a later date is required by statute or specified by the Board. 5 ILCS 100/5-40(d). At second first notice, the Board has proposed the compliance date for the proposed mass-based limits and for combining MPS Groups as the beginning of calendar year 2019. *See* proposed revised MPS rule provisions at Sections 225.233 (e)(1)(C), (D) and (E). Please comment on whether the proposed date is acceptable, or should the Board adopt a delayed effective date of January 1 of the year following the year of the rule adoption for the proposed mass-based limits and for combining MPS Groups? If so, please propose and support a specific delayed effective date.

The Board should maintain the January 1, 2019, compliance date, as there is no compelling reason to delay. The purpose of the rule is to provide operational flexibility to Vistra by combining the MPS Groups and providing mass-based standards for compliance. This rulemaking began with an initial filing on October 2, 2017, and the final hearing is scheduled for late January. Therefore, it would be preferable for the effective date of the rule to be January 1, 2019, in order to effectuate the purpose of the rulemaking. As the SO₂ and NO_x standards are annual, and the NO_x seasonal standard does not apply until May 1, Vistra will have adequate time to ensure compliance, even though the rule will be adopted by the Board after January 1, 2019.

B. Adjustment of Proposed Mass-Based Caps

2. Please comment on how IEPA would enforce the proposed revised MPS rule provisions at Sections 225.233(f), (g) and (h) that require adjustment of mass-based cap in case of:
 - a. Transfer of the MPS EGUs?
 - b. Permanent shutdown (retirement) of the MPS EGUs?
 - c. Temporary shutdown (mothballing) of the MPS EGUs?

The Agency will track the transfer, permanent shutdown, and temporary shutdown of any EGUs and adjust the caps accordingly upon receiving the required notifications or otherwise determining that such actions have occurred if the notifications are not properly made.

3. Please comment on whether the adjustment of the mass-based MPS caps should take effect in a manner other than proposed in Sections 225.233(f), (g) and (h) in case of:

a. Transfer of the MPS EGUs?

The Agency does not object to the adjustment of the caps in the event of a transfer in the manner proposed by the Board in Section 225.233(f). However, the Agency proposes a change to Section 225.233(f)(1)(A), as delineated in Exhibit 2. The Agency suggests removing the phrase “beginning with the year in which the transfer occurs” from the last sentence of this subsection, as this phrase does not take the NO_x seasonal limitation into consideration. Furthermore, subparagraph (C) addresses compliance by the transferor and transferee in more detail, specifying that the owner/operator as of the last day of the pertinent compliance period (annual or seasonal) is responsible for compliance for the entire compliance period, making the above phrase unnecessary and potentially confusing.

The cap will be adjusted for the compliance period in which the transfer occurs. As similarly provided for in the Agency’s Statement of Reasons, if the proposed combined MPS Group is subject to an annual tonnage cap for NO_x emissions of 22,469 tons per year, and in March 2020, the owner of the MPS Group transfers Baldwin, which has a NO_x allocation amount of 5,400 tons per year, to a new owner, the MPS Group’s annual NO_x cap of 22,469 tons per year would be reduced to 17,069 tons per year. The owner and operator of the original MPS Group would be required to comply with this adjusted limit in 2020 and would not include NO_x emissions from Baldwin EGUs (even those that occurred in January and February) in calculations determining compliance with that limit. The owner of the new MPS Group consisting of the acquired Baldwin EGUs would be subject to an annual tonnage cap for NO_x emissions of 5,400 tons per year beginning in 2020 and would be required to include Baldwin EGUs’ NO_x emissions for the entire 2020 calendar year in its calculations determining compliance. The same is true as it applies to the other caps.

b. Permanent shutdown (retirement) of the MPS EGUs?

The Agency does not object to the adjustment of the caps in the event of permanent shutdown in the manner proposed by the Board in Section 225.233(g). For example, if a permanent shutdown occurs on February 1, 2020, the cap is adjusted according to the allocations in Section 225.233(g)(2) for the entire compliance period, *i.e.*, all of calendar year 2020 for the NO_x and SO₂ annual caps and ozone season 2020 for the NO_x seasonal cap.

Utilizing the date that an owner/operator submits a request to modify its operating permit to reflect the shutdown of a unit, or to withdraw the permit for the source, as the date of permanent shutdown is logical and provides sources and the Agency with a clear-cut, objective way to determine “permanence” for purposes of this rule.

c. Temporary shutdown (mothballing) of the MPS EGUs?

The Agency does not object to the adjustment of the caps in the manner proposed by the Board in Section 225.233(h) in the event of a temporary shutdown, but suggests changes to the language of this section, as set forth in Exhibit 2.

While the Board indicated in its Second First Notice Order that it considers “temporary shutdown” to occur when a unit does not generate electricity or emissions for an entire compliance period, the rule language does not reflect that, and in fact the rule does not define “temporary shutdown” at all. The Agency therefore proposes changes to Section 225.233(h)(1) and (h)(3) to reflect the Board’s stated intent and specify that emission caps are only adjusted if a unit “does not operate during an entire compliance period.” For example, if an EGU does not operate from February 1 to October 31, the EGU will have had a temporary shutdown for the entire NO_x seasonal compliance period, but not the entire annual compliance period. The EGU must still comply with unadjusted annual SO₂ and NO_x caps in this example. The NO_x seasonal cap must be adjusted to account for the temporary shutdown over the ozone season, and the owner must report and demonstrate compliance accordingly.

The Agency also proposes changes to Section 225.233(h)(3)(D) to alter the timing of reporting and the information reported. First, sources cannot notify the Agency “within seven days after the *start date* of [temporary] shutdown,” as a temporary shutdown will not even be deemed to have occurred until a unit has been shut down for an entire compliance period. The Agency therefore suggests requiring notification within seven days after the *end* of each such compliance period. If a unit does not operate, for example, from March 2018 until January 2020, the source would submit a “temporary shutdown” notification to the Agency within seven days after the end of the 2018 ozone season, again within seven days after the end of the 2019 ozone season, and finally, within seven days after the end of the 2019 annual compliance period. Second, sources may not know the “duration” of the temporary shutdown at the time of reporting, as the unit may still be temporarily shut down at that point. The Agency does not need such information to determine compliance, and thus suggests eliminating that reporting requirement.

Similarly, the Agency further proposes revising the language in Section 225.233(h)(1)(B) that indicates that the MPS Group must comply with the adjusted emissions limitations “beginning with the compliance period or periods during which the temporary shutdown occurs” and that the adjusted limits “no longer apply, if the [EGUs] resume operation.” This language conflicts with the concept that a unit must be shut down for an entire compliance period to be considered temporarily shut down for that compliance period. The Agency suggests amending the language to indicate that the MPS Group must comply with the adjusted limit for the pertinent compliance period (i.e., the compliance period during which the unit did not operate). Whenever the unit resumes operation, it will simply no longer

provide "temporary shutdown" notifications to the Agency, and the original emissions limitations will again apply.

d. Please also comment on whether NOx ozone season mass caps should be adjusted in the year in which an EGU is mothballed if it is mothballed for the entire NOx ozone season as required in Sections 225.233(e)(1)(d) and (h)(1)?

Yes, the NOx seasonal caps should be adjusted if an EGU is temporarily shut down for an entire NOx ozone season, for consistency with the Board's approach to temporary shutdowns. In the example provided above in the answer to Question 3.c., the owner of the EGU would have to notify the Agency in accordance with the Agency's suggested changes to Section 225.233(h)(3) that the EGU was temporarily shut down for the entire ozone season and would have to demonstrate compliance with the adjusted NOx seasonal cap.

4. Please comment on whether mass-based MPS caps adjustments should be pro-rated in a calendar year in which the EGU unit stops operating within the same MPS Group in case of:
- Permanent shutdown (retirement) of the MPS EGUs to comply with Section 225.233(g)(1)?
 - Temporary shutdown (mothballing) of the MPS EGUs to comply with Section 225.233(h)(1)?

The Agency does not recommend pro-rating the mass caps in the calendar year in which the unit stops operating because pro-rating would unnecessarily complicate the rule language and would serve no useful purpose from a compliance perspective. The proposed mass-based caps are annual and seasonal standards, making pro-rating on a monthly basis (or weekly basis for shutdowns that occur mid-month) imperfect from a compliance standpoint. Also, the concept of pro-rating does not make sense in relation to temporary shutdowns – if a temporary shutdown only occurs when a unit stops operating for an entire compliance period, there is nothing to pro-rate, as the entire compliance period would be implicated.

5. Please comment on which date the IEPA should consider a date of transfer and a date of permanent and temporary shutdown of an MPS EGU? Would the dates the owner/operator indicate in their written notifications required under Section 225.233(f)(3), (g)(3) and (h)(3) be proper dates? Please also comment on the following:

The Agency considers the actual date that ownership of one or more EGUs transfers from a seller to a buyer to be the transfer date for compliance purposes and is unaware of a tenable alternative. The date required in the notification provision in Section 225.233(f)(3) is the proper date.

For a permanent shutdown, as stated in the rule, the date of shutdown is the date the owner or operator submits a written request to the Agency to modify its permit to reflect the shutdown or submits a request to withdraw the permit for the source.

This is the clearest, most objective way to identify the “date of permanent shutdown” for purposes of this rule, as it is the date after which the source is no longer permitted to operate the unit. The Agency suggests modifying the language of Section 225.233(g)(3) (see Exhibit 2) to clarify what is considered “date of permanent shutdown,” consistent with the above.

The Board’s question is confusing for purposes of “date of temporary shutdown.” “Temporary shutdown” is a term of art under this rule because, as the rule is written, a temporary shutdown occurs when a unit is shut down for the entire compliance period, *i.e.*, the NOx seasonal compliance period or one calendar year. A temporary shutdown will not be deemed to have occurred until the unit is shut down for an entire compliance period. The “start date” of a temporary shutdown can therefore only be identified and communicated to the Agency following the end of the applicable compliance period. The Agency has suggested a change to Section 225.233(h)(3) to include such a notification (see Exhibit 2).

a. In case of discrepancy between the notification provided under Section 225.233(f)(3)(A) and (B), which date should control?

It is unlikely there would be a discrepancy between the notifications required of the transferring owner and the acquiring owner because these entities will have entered into a contract for the transfer of the units, which would likely include a transfer date. However, if the dates differ from one another, the Agency would investigate the matter and make a determination regarding the appropriate date of transfer.

b. Is there a conflict between Section 225.233(g)(1)(B) and (3)(D)? In case of discrepancy between dates provided under Section 225.233(g)(1)(B) and (3)(D), which date will control?

There is no conflict, but the Agency has suggested language revising Section 225.233(g)(3)(D) to remove any ambiguity. The Agency’s proposed revisions clarify that the date of permanent shutdown is the date the owner or operator submits a written request to the Agency to modify its permit to reflect the shutdown or submits a request to withdraw the permit for the source.

6. Please comment if there are limitations on how often and for how long an MPS EGU may be mothballed for.

To the Agency’s knowledge, there are no limitations on how often a unit can be temporarily shut down, nor would such limitations serve a useful purpose. For purposes of this rule, limiting the duration of a temporary shutdown is not needed, as the emissions caps are reduced by the same allocation amounts regardless of whether the unit is mothballed or permanently shut down.

The duration of the shutdown of a unit may be relevant for purposes of the Prevention of Significant Deterioration and Nonattainment New Source Review

permit programs, 40 CFR § 52.21 and 35 Ill. Adm. Code 203, respectively. A “mothballed” unit may eventually be considered to be permanently shut down pursuant to those regulations. Under USEPA policy, a source that has been shut down for two years is currently presumed to be permanently shut down. As such, if the owner or operator then proposed to reactivate the unit, the unit would be considered to be a new source, subject to New Source Review. However, the presumption that the unit has been permanently shut down is rebuttable. The owner or operator may show by its actions at the time that the unit was shut down, and thereafter, that the shutdown was not intended to be permanent. USEPA has indicated that it intends to reconsider this policy in the near future. Letter from William L. Wehrum, Assistant Adm’r, United States Evtl. Protection Agency, to LeAnn Johnson Koch, Perkins Coie (Apr. 5, 2018)

([http://www.4cleanair.org/sites/default/files/Documents/Signed Response to LeAnn Johnson Koch Perkins Coie re Limetree Bay Terminals OAR-18-000-6176.pdf](http://www.4cleanair.org/sites/default/files/Documents/Signed%20Response%20to%20LeAnn%20Johnson%20Koch%20Perkins%20Coie%20re%20Limetree%20Bay%20Terminals%20OAR-18-000-6176.pdf)).

7. Please comment on whether and how a mass caps should be adjusted for units retired and mothballed before the effective date of MPS revisions adopted in this rulemaking.

The mass caps should not be adjusted for units mothballed before the date the MPS revisions are adopted, as that unit may start operating again; the “baseline” mass cap should therefore account for that operation. If the unit continues to be mothballed for an entire compliance period following rule adoption, the Board’s current rule proposal already contains a mechanism for reducing the mass cap.

Similarly, the Board’s rule proposal also already addresses reduction of the emissions caps due to shutdown; however, any units that permanently shut down prior to the rule’s adoption could be removed from the proposed rule.

EXHIBIT 2

ILLINOIS EPA'S SUGGESTED AMENDMENTS TO SECTION 225.233

The Agency recommends the following revisions to the Board's Second First Notice proposal:

1. Amend Section 225.233(e)(1)(C), (D), and (E)(i) as follows:

e) Emission Standards for NO_x and SO₂

1) NO_x Emission Standards:

* * *

- C) Except as otherwise provided in subsections (f), (g), and (h), beginning in calendar year 2019 and continuing in each calendar year thereafter, the owner and operator of the EGUs in an MPS Group must not cause or allow to be discharged into the atmosphere combined annual NO_x emissions in excess of 22,469 tons from all EGUs.
- D) Except as otherwise provided in subsection (f), (g), and (h), beginning in ~~the~~ calendar year 2019 and continuing in each calendar year thereafter, from May 1 to September 30 the owner and operator of the EGUs in an MPS Group must not cause or allow to be discharged into the atmosphere combined NO_x emissions in excess of 11,500 tons from all EGUs.
- E) On and after January 1, 2019, the owner and operator of any of Baldwin Units 1 and 2, Coffeen Units 1 and 2, Duck Creek Unit 1, E.D. Edwards Unit 3, and Havana Unit 9 must comply with the following:
 - i) Operate each existing selective catalytic reduction (SCR) control system on each EGU in accordance with good operating practices and at all times when the unit it serves is in operation, provided that such operation of the SCR control system is consistent with the technological limitations, manufacturers' specifications, and good engineering and maintenance practices for the SCR control system. During any such period in which the SCR is not operational, the owner and operator must minimize emissions to the extent reasonably practicable. All NO_x emissions from each EGU, regardless of whether the SCR is operational or non-operational, must be included in

- ii) determining compliance with the emission standards set forth under subsections (e)(1)(C), (e)(1)(D), ~~and (f)(1), (g)(1), and (h)(1)~~ as applicable.

2. Amend Section 225.233(f)(1)(A) as follows:

- f) Transfer of EGUs in an MPS Group
 - 1) If EGUs in an MPS Group are transferred to a different owner:
 - A) For the MPS Group from which EGUs are transferred: The combined emissions limitations for the MPS Group set forth in this Section, as applicable, must be adjusted by subtracting from those limitations the applicable allocation amounts set forth in Columns A, B, and C in subsection (f)(2) that are attributable to the transferred EGUs. The owner and operator of the MPS Group must comply with the adjusted emissions limitations ~~beginning with the year in which the transfer occurs.~~

3. Amend Section 225.233(g)(3)(D) as follows:

- g) Permanent Shutdown of EGUs in an MPS Group
 - ***
 - 3) If one or more EGUs in an MPS Group are permanently shut down, the owner must notify the Agency's Bureau of Air, Compliance Section, in writing within seven days after the date of shutdown. Such notification must include the following information:
 - D) Date of permanent shutdown, which is the date the owner or operator submitted a written request to the Agency to modify its operating permit to reflect the shutdown or to withdraw the permit for the source.

4. Amend Section 225.233(h)(1)(B) as follows:

- h) Temporary shutdown of EGUs in an MPS Group
 - 1) If one or more EGUs in an MPS Group do not operate during ~~are temporarily shut down over~~ an entire compliance period or periods:
 - ***

- B) The owner and operator of the MPS Group must comply with the adjusted emissions limitations ~~for such, beginning with the compliance period or periods during which the temporary shutdown occurs. The adjusted emissions limitations will no longer apply, if the EGU or EGUs resume operation.~~

5. Amend Section 225.233(h)(3)(C) and (D) as follows:

h) Temporary shutdown of EGUs in an MPS Group

* * *

- 3) If one or more EGUs in an MPS Group ~~do not operate during are temporarily shut down over~~ an entire compliance period, the owner or operator must notify the Agency's Bureau of Air, Compliance Section in writing within seven days after the end of each such compliance period start date of shutdown. Such notification must include the following information:
 - A) Name and address of the owner and operator;
 - B) List of the EGUs temporarily shut down;
 - C) For the remaining EGUs in the MPS Group, calculations pursuant to subsection (g)(1)(B) demonstrating the adjusted combined annual NO_x emissions limitation, the adjusted combined NO_x emissions limitation from May 1 through September 30, and the adjusted combined annual SO₂ emissions limitation that are applicable to the MPS Group for the pertinent compliance period during the temporary shutdown of one or more EGUs; and
 - D) Date that the EGU or EGUs stopped operating~~Start date and duration of temporary shutdown.~~

6. Amend Section 225.233(k)(2)(A) and (B) as follows:

k) Reporting

* * *

- 2) On and after January 1, 2019, and continuing each year thereafter, the owner and operator of the EGUs in an MPS Group must demonstrate compliance with the applicable requirements set forth in this subsection (k)(2).
 - A) Beginning in 2020, and continuing each year thereafter, the owner and operator of EGUs in an MPS Group must submit to the

Agency's Bureau of Air, Compliance Section, a report demonstrating compliance with the annual emissions standards under subsections (e)(1)(C), (e)(2)(C), (e)(2)(D), ~~and (f)(1), (g)(1), and (h)(1)~~, as applicable, and with the requirements under subsection (e)(1)(E)(i), as applicable, on or before March 1 of each year. The compliance report must include the following for the preceding calendar year:

* * *

- B) By November 1 of each year, the owner and operator of EGUs in an MPS Group must submit to the Agency's Bureau of Air, Compliance Section, a report demonstrating compliance with the seasonal emissions standards under subsections (e)(1)(D), (e)(1)(E)(ii), ~~and (f)(1), (g)(1), and (h)(1)~~, as applicable. The compliance report must include the following for the preceding May 1 through September 30:

* * *

Electronic Filing: Received, Clerk's Office 12/10/2018
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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)	
AMENDMENTS TO)	
35 ILL. ADM. CODE 225.233)	R18-20
MULTI-POLLUTANT STANDARDS)	(Rulemaking-Air)
(MPS))	

NOTICE OF FILING

PLEASE TAKE NOTICE that I have filed today with the Illinois Pollution Control Board the attached **PRE-FILED TESTIMONY OF JAMES P. GIGNAC ON BEHALF OF THE ENVIRONMENTAL LAW & POLICY CENTER, ENVIRONMENTAL DEFENSE FUND, NATURAL RESOURCES DEFENSE COUNCIL, RESPIRATORY HEALTH ASSOCIATION, AND SIERRA CLUB**, copies of which are served on you along with this notice.

Respectfully Submitted,

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*Exhibit 50
R18-20
1/29/2019
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Dated: December 10, 2018

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CERTIFICATE OF SERVICE

I, Jocelyn Castro, do certify that on December 10, 2018, I served the Notice of Filing and the Pre-Filed Testimony of James P. Gignac on behalf of The Environmental Law & Policy Center, Environmental Defense Fund, Natural Resources Defense Council, Respiratory Health Association, and Sierra Club, upon the persons listed in the attached Service List by email for those who have consented to email service, and by U.S. Mail for all others.

/s/ Jocelyn Castro
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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:)	
AMENDMENTS TO)	
35 ILL. ADM. CODE 225.233)	R18-20
MULTI-POLLUTANT STANDARDS)	(Rulemaking-Air)
(MPS))	

PRE-FILED TESTIMONY OF

JAMES P. GIGNAC

ON BEHALF OF

**THE ENVIRONMENTAL LAW & POLICY CENTER,
ENVIRONMENTAL DEFENSE FUND,
NATURAL RESOURCES DEFENSE COUNCIL,
RESPIRATORY HEALTH ASSOCIATION, AND
SIERRA CLUB**

December 10, 2018

1 **I. STATEMENT OF QUALIFICATIONS**

2 **Q. Please state your name and business address.**

3 A. My name is James P. Gignac. My business address is 1 N. LaSalle St., Suite 1904,
4 Chicago, Illinois, 60602.

5 **Q. By whom are you employed and in what capacity?**

6 A. I am employed by the Union of Concerned Scientists (“UCS”) as Lead Midwest Energy
7 Analyst. In this role, I conduct research and analysis to advance understanding of
8 renewable and other energy technologies, policies, and markets, and to evaluate energy
9 resource and climate change mitigation options in the electricity sector.

10 **Q. Please describe the Union of Concerned Scientists.**

11 A. The Union of Concerned Scientists was founded in 1969 by scientists and students at the
12 Massachusetts Institute of Technology. UCS employs scientists, analysts, and engineers
13 to develop and implement innovative, practical solutions to some of the most pressing
14 problems that society faces today—from developing sustainable ways of feeding,
15 powering, and transporting humanity, to reducing the threat of nuclear war. UCS’s
16 mission is to put rigorous, independent science to work by combining technical analysis
17 and effective advocacy to create policy solutions for a healthy, safe, and sustainable
18 future.¹

19 **Q. Please describe your educational background and professional affiliations.**

20 A. I received a B.A. in History and Political Science from Albion College located in Albion,
21 Michigan. I earned a Juris Doctorate from Harvard Law School located in Cambridge,

¹ For more information, including UCS’s history and mission statement, visit: <https://www.ucsusa.org/about-us>.

1 Massachusetts. I have been licensed to practice law by the Supreme Court of the State of
2 Illinois since 2005.

3 **Q. Please describe your professional background.**

4 A. I am an analyst and attorney with over thirteen years of experience in the environmental
5 and energy fields. I joined UCS after serving as Environmental and Energy Counsel and
6 an Assistant Attorney General to the Office of Illinois Attorney General Lisa Madigan.
7 In this capacity I was responsible for representing the office and the state in
8 environmental, energy, and utility regulatory matters including rulemakings and
9 enforcement cases. I began my career as an environmental attorney representing private
10 sector clients and then worked for a national environmental organization assisting efforts
11 related to coal-fired power plants in Midwest states including Illinois. My resume is
12 included as Exhibit JPG-1.

13 **Q. Did you previously provide testimony in this rulemaking docket?**

14 A. Yes. With the Illinois Attorney General's Office, I assisted in preparation of pre-filed
15 testimony to the Board and appeared for cross-examination as a testifying witness in this
16 rulemaking proceeding.

17 **Q. Have you provided testimony or comment in other proceedings or venues?**

18 A. With UCS, I have provided written testimony to the Michigan Public Service
19 Commission regarding Consumers Energy's integrated resource plan and submitted
20 comments to the Illinois Commerce Commission ("ICC") with respect to distributed solar
21 power and electric grid modernization issues. With the Illinois Attorney General's
22 Office, I prepared comments and presentations to the ICC on renewable energy matters
23 such as net metering and grid integration of wind and solar power and to the Board with

1 respect to various air regulatory dockets involving coal-fired power plants; I assisted with
2 petitions and comments to the Federal Energy Regulatory Commission (“FERC”)
3 regarding capacity markets and grid resiliency matters; I prepared comments to the
4 Illinois Department of Natural Resources’ rulemaking on high-volume hydraulic
5 fracturing; and I appeared as a witness on behalf of the Illinois Attorney General’s Office
6 in state legislative hearings with respect to 2016 legislation on the Illinois Renewable
7 Portfolio Standard.

8 **Q. Are you sponsoring any exhibits?**

9 A. Yes, I am sponsoring the following exhibits:

- 10 • Exhibit JPG-1 Resume of James P. Gignac
- 11 • Exhibit JPG-2 Excel Worksheet of James P. Gignac

12 **II. PURPOSE OF TESTIMONY**

13 **Q. On whose behalf are you providing this testimony?**

14 A. I am testifying on behalf of the Environmental Law & Policy Center, Environmental
15 Defense Fund, Natural Resources Defense Council, Respiratory Health Association, and
16 Sierra Club.

17 **Q. What is the purpose of your testimony?**

18 A. The purpose of my testimony is to respond to the Board’s statement that “annual mass
19 caps at [the revised proposed] levels would limit and *prevent* potential sizeable shifts in
20 generation and emissions from controlled to uncontrolled plants.” Opinion and Order of
21 the Board, Proposed Rule, Second First Notice (“Order”), at 53 (emphasis added).

22 **Q. Please summarize your testimony.**

1 A. My testimony presents a scenario in which the proposed caps would allow for a shift in
2 generation and sulfur dioxide (“SO2”) emissions to occur from controlled plants to
3 uncontrolled and less-controlled plants in the MPS fleet. This scenario is only one of
4 multiple possibilities of how a shift in generation from plants with scrubbers to plants
5 without could occur under the proposed caps. This scenario, which I discuss in more
6 detail below, results in an increase of 12,088 tons of SO2 emissions compared to 2017
7 emissions.

8 **III. SCENARIO OF SHIFTED GENERATION AND EMISSIONS**

9 **Q. Have you reviewed the Board’s Second First Notice Order?**

10 A. Yes.

11 **Q. How does the Board describe its proposed mass-based caps?**

12 A. The Board states that “annual mass caps at [the revised proposed] levels would limit and
13 prevent potential sizeable shifts in generation and emissions from controlled to
14 uncontrolled plants.” Order at 53.

15 **Q. What is the status of pollution controls at the MPS plants?**

16 A. The status of pollution controls at the MPS plants is set forth on page 19 of the Order.
17 E.D. Edwards, Hennepin, Joppa, and Newton do not have SO2 controls; therefore, I
18 consider these plants to be “uncontrolled” for SO2. Coffeen and Duck Creek are
19 equipped with wet flue gas desulfurization which I classify as “controlled” for SO2.
20 Baldwin and Havana have spray dry absorbers for SO2 which are not as effective as the
21 wet flue gas desulfurization installed at Coffeen and Duck Creek as shown through a

1 comparison of the SO₂ emissions rates of the former plants with the latter plants.²

2 Accordingly, I consider Baldwin and Havana to be “less-controlled” with respect to SO₂.

3 **Q. Did you analyze whether the revised proposed caps would allow shifts in generation**
4 **and emissions from controlled to uncontrolled and less-controlled units?**

5 A. Yes.

6 **Q. Please describe your analysis.**

7 A. I began by downloading 2017 operations and emissions data for the eight MPS plants
8 from the U.S. Environmental Protection Agency’s Air Markets Program Database³ and
9 created the spreadsheet included with my testimony as Exhibit JPG-2. I then obtained for
10 each unit the operating capacity in megawatts and the 2017 net generation in megawatt-
11 hours from the S&P Global Market Intelligence Platform.⁴ I created a summation of the
12 total net generation of the plants, which equaled 29,877,599 for 2017. I also calculated
13 the total SO₂ emissions from the MPS plants for 2017, which resulted in 30,578 tons.
14 Then I calculated the units’ maximum output in megawatt-hours by multiplying the unit
15 operating capacity by 8,760 (the total number of hours in a year).

16 **Q. What did you do next?**

17 A. To begin creating a scenario, I selected two plants to remove to reflect potential
18 retirements.

19 **Q. Which plants did you remove and why?**

² According to U.S. EPA, wet flue gas desulfurization can achieve SO₂ reduction efficiencies as high as 98 percent, and spray dry absorbers achieve between 80 and 90 percent. See <https://www3.epa.gov/ttnecat1/dir1/ffdg.pdf>.

³ <https://ampd.epa.gov/ampd/>

⁴ S&P Global Market Intelligence defines “operating capacity” as “[t]he maximum load at which a generator can operate without exceeding approved limits of temperature and stress” and “net generation” as “[t]otal electric power generated by the plant or plant unit, net of any in-plant use or other drain on power delivered for station service or auxiliaries.” <https://www.spglobal.com/marketintelligence/en/>.

1 A. In the scenario I am describing, I modeled Dynegy-Vistra retiring Coffeen and Duck
2 Creek as these are the best-controlled plants for SO₂ among the MPS fleet. Accordingly,
3 in the "Scenario" columns in Exhibit JPG-2, the megawatt-hours, heat input, and
4 emissions for these plants becomes zero.

5 **Q. What did you do next?**

6 A. I then selected capacity factors at which the remaining MPS units could operate in a
7 scenario where almost all the megawatt-hours from Coffeen and Duck Creek were
8 replaced by the other MPS units (in other words, all other MPS units increasing output to
9 "cover" the retirement of Coffeen and Duck Creek). Specifically, in the scenario I
10 selected the Baldwin units to increase to 85 percent capacity factor; E.D. Edwards Unit 3,
11 Havana, the Hennepin units, and Newton Unit 1 to increase to 80 percent; and E.D.
12 Edwards Unit 2 and the Joppa units to increase to 75 percent. Applying these capacity
13 factors results in a total net generation of 28,806,384 megawatt-hours in the scenario.

14 **Q. Couldn't the output from Coffeen and Duck Creek be replaced by other types of**
15 **generating units spread throughout the grid?**

16 A. Yes, they could. For the purpose of this analysis, I am only describing a hypothetical
17 scenario in which only other MPS units make up virtually all the lost generation from
18 Coffeen and Duck Creek. While this is unlikely, I have made this assumption to provide
19 an example of one of many scenarios under which generation from controlled units, upon
20 their mothballing or retirement, could be shifted to uncontrolled or less-controlled units
21 thereby leading to an emission increase from the MPS fleet under the Board's Second
22 First Notice Proposal.

23 **Q. What was the next step in your analysis?**

1 A. Next, I assumed that the heat input for the remaining MPS units would increase by the
2 same percentage as the increase in their megawatt-hours under the scenario. I also
3 assumed that the SO₂ and nitrogen oxides (“NO_x”) emission rates for the units stayed the
4 same; accordingly, SO₂ and NO_x emissions in tons also increase by the same percentage
5 for each remaining unit in the scenario I am describing.

6 **Q. What did you conclude?**

7 A. I concluded that the total SO₂ emissions in the scenario add up to 42,666 tons and the
8 NO_x emissions to 15,801 tons.

9 **Q. What would the adjusted SO₂ MPS cap be under this scenario?**

10 A. The Board proposes that the MPS caps decline with the retirement of MPS units and
11 provides allocation amounts per plant and unit upon retirement. *See* Order at 58, 60. The
12 SO₂ allocation for both Coffeen and Duck Creek is 200 tons per year. Thus, a retirement
13 of Coffeen and Duck Creek would result in a new SO₂ cap of 44,520 tons (44,920 minus
14 400).

15 **Q. What would the adjusted NO_x MPS caps be under the scenario?**

16 A. The NO_x allocation for Coffeen is 1,800 tons per year and for Duck Creek it is 1,260.
17 Thus, a retirement of Coffeen and Duck Creek would result in a new NO_x cap of 19,409
18 (22,469 minus 3,060). With respect to seasonal NO_x, the Coffeen allocation is 900 tons
19 and for Duck Creek it is 630. Thus, a retirement of those plants would result in a new
20 seasonal NO_x cap of 9,970 (11,500 minus 1,530).

21 **Q. Would the scenario described in this testimony comply with that adjusted cap?**

22 A. Yes, because the scenario emissions total of 42,666 tons of SO₂ is less than 44,520 tons
23 and the scenario total of 15,801 tons of NO_x is less than 19,409. The remaining MPS

1 units would, however, need to ensure that their emissions during the ozone season of May
2 1 to September 30 do not exceed the adjusted seasonal NOx cap of 9,970 tons as well as
3 the proposed rate-based NOx emission limits for specified units.

4 **Q. What about plant-specific limits at Joppa?**

5 A. There is a proposed cap of 19,680 tons per year of SO₂ emissions from Joppa units 1-6.
6 Order at 61. The total SO₂ emissions in the scenario described here is 17,484 tons for the
7 Joppa plant.

8 **Q. And what about the Data Requirements Rule?**

9 A. Since this scenario entails a 15 percent increase in emissions at each plant other than
10 Baldwin, the emission increases under this scenario would appear to trigger general
11 guidelines under the Data Requirements Rule in those cases. *See* 80 Fed. Reg. 51052,
12 51081 (Aug. 21, 2015).⁵ Nonetheless, such increases would presumably not cause
13 violations of National Ambient Air Quality Standards (“NAAQS”) because the level of
14 emissions for each plant in this scenario is below the level assumed by Illinois EPA for
15 purposes of its revised proposed fleetwide cap (*see, e.g.*, Ex. 29 at 2) and/or below the
16 level analyzed by Illinois EPA for NAAQS compliance (*see, e.g.*, Ex. 29 at 8-11).

17 **Q. What is the SO₂ emissions increase in the scenario you are describing compared to
18 2017 levels?**

19 A. The difference between the scenario total of 42,666 tons of SO₂ and the 2017 emissions
20 total of 30,578 is 12,088 tons.

⁵ As stated in the Data Requirements Rule: “[T]he [U.S.] EPA recommends as a general guideline that the air agency [*i.e.*, Illinois EPA] should conduct additional modeling (using the most recent actual emissions as inputs) for an area if (1) the original modeling level was equal to or greater than 90 percent of the standard, and there is any increase in emissions in the area; or (2) if the original modeling level was between 50 percent and 90 percent of the standard, and emissions in the area increased by 15 percent or more.” 80 Fed. Reg. 51052, 51081 (Aug. 21, 2015).

1 **Q. What is the value of this analysis to the Board in considering the revised proposal?**

2 A. There are many variables outside the control of the Board, including which plants may be
3 retired and when. Additionally, when plants do retire, the extent to which other non-MPS
4 resources replace the generation of the retired plants and their pollution rates is not
5 currently known. But, as this analysis illustrates, there is at least one possible scenario in
6 which compliance with the alternative mass limits results in an increase in SO₂ emissions
7 as generation is shifted from controlled to uncontrolled and less-controlled MPS units. In
8 proposing the alternative mass emission limits, the Board stated its expectation that the
9 caps would “limit and prevent potential sizeable shifts in generation and emissions from
10 controlled to uncontrolled plants” and “foreclose a dramatic increase in annual emissions
11 over the status quo.” Order at 53, 52. My analysis illustrates a scenario in which the
12 alternative mass-based caps proposed in the Second First Notice Order does not meet that
13 objective with respect to SO₂.

14 **Q. Does this conclude your testimony?**

15 A. Yes.

Respectfully Submitted,



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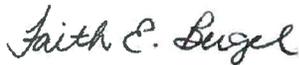
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Exhibits to Pre-Filed Testimony

Exhibit JPG 1 – Resume of James P. Gignac

Exhibit JPG 2 – Excel Worksheet of James P. Gignac

EXHIBIT JPG-1

JAMES P. GIGNAC

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<https://www.ucsusa.org/bio/james-gignac> | www.linkedin.com/in/jgignac

EXPERIENCE

Lead Midwest Energy Analyst, Union of Concerned Scientists, Chicago, IL

(March 2018-Present). Conduct research and analysis to advance understanding of renewable and other energy technologies, policies, and markets, and to evaluate energy resource and climate change mitigation options in the electricity sector. Write and edit technical reports, fact sheets, and other materials to document and communicate research results; prepare regulatory and legislative comments and testimony; develop policy and legislative proposals; meet with policymakers, regulators, and stakeholders; represent UCS and its positions at public forums.

Environmental and Energy Counsel and Assistant Attorney General to the Office of Illinois Attorney General Lisa Madigan, Chicago, IL

(Nov. 2011-March 2018). Summary: Served as assistant attorney general in advanced special counsel role; handled select regulatory, legislative, and litigation matters with an emphasis on renewable energy, coal, nuclear, efficiency, and climate change issues; explored and evaluated new matters and cases; served as liaison to external stakeholders and groups; interacted with government officials and decision-makers; frequently appeared before state and regional gatherings to speak and present on energy and environmental issues.

Examples of specific roles/efforts:

- Provided expert advice to the Attorney General and senior staff on environmental and energy policy matters;
- Prepared comments, testimony, and draft language for legislative and state commissions and agencies;
- Spearheaded Illinois participation in multi-state attorneys general matters involving federal issues such as: Clean Power Plan litigation, methane regulation, DOE efficiency standards, and other Clean Air Act rules;
- Advised re: Volkswagen \$3 billion environmental mitigation trust fund and zero emission vehicle program;
- Focused on implementation of new renewable energy programs in Illinois, especially low-income solar.

Midwest Director, Sierra Club's Beyond Coal Campaign, Chicago, IL

(June 2008-Oct. 2011). Coordinated legal, grassroots organizing, and communications activities to prevent new coal plant projects and to replace existing coal capacity with clean energy

solutions; served as coal working group leader for regional network of foundations and advocacy organizations.

Associate, Mayer Brown LLP, Chicago, IL

(Sept. 2005-May 2008). Represented wide variety of private sector clients in environmental litigation, regulatory, and transactional matters, including chemical, railroad, real estate, manufacturing, mining, and wind energy industries.

Judicial Law Clerk, Alaska Supreme Court, Anchorage, AK

(Sept. 2004-Sept.2005). Assisted with all aspects of resolving appellate litigation.

EDUCATION

Harvard Law School, J.D. (2004) (Dean's Award, Community Leadership)

Albion College, B.A., History and Political Science (2001) (*summa cum laude*; Phi Beta Kappa)

TESTIMONY IN REGULATORY AND LEGISLATIVE PROCEEDINGS

- Direct Testimony on Behalf of the Environmental Law & Policy Center, Ecology Center, Union of Concerned Scientists, and Vote Solar Before the Michigan Public Service Commission in *In the Matter of the Application of Consumers Energy Company for Approval of Its Integrated Resource Plan*, Case No. U-20165 (October 12, 2018)
- Pre-Filed Testimony on Behalf of the Illinois Attorney General's Office Before the Illinois Pollution Control Board in *In the Matter of: Amendments to 35 Ill. Adm. Code 225.233 Multi-Pollutant Standards (MPS)*, R18-20 (December 11, 2017)
 - Responses to Pre-Filed Questions (January 12, 2018)
 - Testifying Witness at Hearings (January 17-18, 2018)
 - Responses to Questions (February 16, 2018)
 - Testifying Witness at Hearing (March 7, 2018)
- Testimony Before the State of Illinois House of Representatives Renewable Energy & Sustainability Committee, Hearing on Consumer and Public Health Impacts of Utilizing Renewable Energy Sources and Increased Energy Efficiency Programs (April 29, 2015)

COMMENTS IN REGULATORY PROCEEDINGS

- Illinois Commerce Commission *NextGrid* Process, Multiple Written Comment Submissions and Participation in Working Groups on Behalf of Union of Concerned Scientists (June-September 2018)
- Comments on Behalf of Union of Concerned Scientists, et al. to the Illinois Commerce Commission's Distributed Generation Valuation and Compensation Workshop (July 27, 2018 and March 30, 2018)
- Comments on Behalf of the Illinois Attorney General's Office to the Illinois Commerce Commission Workshops Regarding Resource Adequacy in MISO Zone 4 (January 30, 2018 and November 30, 2017)
- Verified Reply to Responses to Objections to the Illinois Commerce Commission on the *Illinois Power Agency Petition for Approval of the Long-Term Renewable Resources Procurement Plan*, Docket No. 17-0838 (January 25, 2018); Response to Objections (January 11, 2018)
- Comments on Behalf of the Illinois Attorney General's Office to the Illinois Power Agency Regarding the Draft Long-Term Renewable Resources Procurement Plan (November 13, 2017)
- Comments on Behalf of the Illinois Attorney General, et al. to the Federal Energy Regulatory Commission in *Grid Reliability and Resiliency Pricing*, Docket No. RM18-1 (October 23, 2017)
- Comments on Behalf of the Illinois Attorney General's Office to the Illinois Power Agency Regarding Development of Long-Term Renewable Resources Procurement Plan (July 5, 2017)
- Comments on Behalf of the Illinois Attorney General's Office to the U.S. Department of Justice on the Proposed Partial Consent Decree in *In re: Volkswagen "Clean Diesel" Marketing, Sales Practices, and Products Liability Litigation*, Case No: MDL No. 2672 CRB (JSC) (August 5, 2016)
- Response Comments on Behalf of the People of the State of Illinois Before the Illinois Pollution Control Board in *In the Matter of Amendments to 35 Ill. Adm. Code Part 214, Sulfur Limitations, Part 217 Nitrogen Oxides Limitations, and Part 225, Control of Emissions From Large Combustion Sources*, R-15-21 (September 11, 2015); Initial Comments (August 28, 2015)
- Verified Initial Comments on Behalf of the People of the State of Illinois Before the Illinois Commerce Commission in *Amendment of 83 Ill. Adm. Code 465 [Net Metering]*, ICC Docket No. 15-0273 (June 24, 2015); Verified Reply Comments (July 27, 2015)

Electronic Filing: Received, Clerk's Office 12/10/2018

- Complaint to Federal Energy Regulatory Commission, *Challenging the MISO 2015-16 Planning Resource Auction Rate for Zone 4 as Unjust and Unreasonable*, Docket No. EL15-71 (May 28, 2015); Response to Motions to Dismiss and Answer (July 17, 2015); Answer (August 14, 2015)
- Post-Hearing Comments to the Illinois Pollution Control Board in *In the Matter of: Coal Combustion Waste (CCW) Surface Impoundments at Power Generating Facilities: Proposed New 35 Ill. Adm. Code 841, R14-10* (October 20, 2014)
- Comments to the Illinois Department of Natural Resources on Proposed Administrative Rules for the Hydraulic Fracturing Regulatory Act (62 Ill. Adm. Code 245 and 240.796) (January 2, 2014)
- Comments to the Illinois Pollution Control Board in *Illinois Power Holdings, LLC v. Illinois Environmental Protection Agency*, PCB 14-10 (Variance-Air) (September 24, 2013)
- Comments to the Illinois Power Agency on the 2013 Draft Procurement Plan (September 14, 2012)
- Comments to the Illinois Pollution Control Board in *Ameren Energy Resources v. Illinois Environmental Protection Agency*, PCB 12-126 (Variance-Air) (July 23, 2012); Post-Hearing Comments (August 10, 2012)

PRESENTATIONS

- Illinois Climate and Energy Activities: Federal and State, Chicago Bar Association (Chicago, IL) (February 21, 2018)
- Illinois Commerce Commission Renewable Energy Policy Session (Chicago, IL) (July 12, 2017)
- The Changing Electricity Grid: Issues and Opportunities for State Attorney General Offices, National Association of Attorneys General (Charlotte, NC) (March 17, 2016)
- Clean Power Plan Litigation, Chicago Bar Association (Chicago, IL) (March 2016)
- Closing and Redeveloping Power Plant Sites: Lessons from the Chicago Area, American Bar Association (Chicago, IL) (October 29, 2015)
- Clean Power Plan Update, Illinois State Bar Association (Chicago, IL) (October 21, 2015)
- Clean Power Plan Implementation, Air & Waste Management National Conference (Rosemont, IL) (September 2015)
- Air Regulatory Update & Clean Power Plan Implementation, Midwest Environmental Enforcement Association (Madison, MI) (July 1, 2015)

Electronic Filing: Received, Clerk's Office 12/10/2018

- Nuclear Power Update, Midwest Environmental Enforcement Association (Madison, WI) (July 1, 2015)
- Petroleum Coke Regulation, Illinois State Bar Association (Chicago, IL) (April 2015)
- Climate Adaptation and Environmental Law, Chicago Bar Association (Chicago, IL) (February 24, 2015)
- Illinois Fracking Regulations, Illinois Institute for Continuing Legal Education (Chicago, IL) (January 2015)
- Illinois Air Update, Lake Michigan Association of Air & Waste Management (Oak Brook, IL) (November 12, 2014)
- Moderator to Illinois State Bar Association Panel on Illinois Renewable and Energy Efficiency Portfolio Standards Panel (Chicago, IL) (March 2014)
- Carbon Pollution and the Clean Air Act: Where We've Been and Where We're Going, Chicago Bar Association (Chicago, IL) (February 25, 2014)
- High-Volume Horizontal Fracturing Regulation in Illinois, Illinois State Bar Association (Chicago, IL) (March 2013)
- Update on Clean Air Act Regulatory Activity and Current Events in the Electricity Sector, Midwest Environmental Enforcement Association (Jefferson City, MO) (June 28, 2012)
- Update on Recent Clean Air Act Rulemakings and Litigation, Chicago Bar Association (Chicago, IL) (March 21, 2012)

PUBLICATIONS

Co-Author, *Achieving a Clean Energy Transition in Illinois: Economic and Public Health Benefits of Replacing Coal Plants in Illinois with Local Clean Energy Alternatives*, The Electricity Journal (Nov. 2018)

Co-Author, *Soot to Solar: Illinois' Clean Energy Transition*, Union of Concerned Scientists (2018)

Blog posts available at: <https://blog.ucsusa.org/author/james-gignac>

EXHIBIT JPG-2

Electronic Filing: Received, Clerk's Office 12/10/2018

Exhibit JPG-2: Excel Worksheet of James P. Gignac - Pre-Filed Testimony 12/10/18 - R-18-20

Facility	Unit ID	Operating Capacity (MW)	Maximum Output (MW-h)	2017 Net Generation (MW-h)	2017 SO2 (tons)	2017 NOx (tons)	2017 Heat Input (MMBtu)	2017 SO2 Rate (lbs/MMBtu)	2017 NOx Rate (lbs/MMBtu)	2017 Capacity Factor	Scenario Capacity Factor	Scenario Net Generation (MW-h)	Scenario Increase in Output	Scenario Heat Input (MMBtu)	Scenario SO2 (tons)	Scenario NOx (tons)
Baldwin	1	590	5,168,400	3,954,327	1,505	1,593	38,824,663	0.0775	0.0821	76.51%	85.00%	4,393,140	11.10%	43,134,201	1,672	1,820
Baldwin	2	595	5,212,200	3,920,012	1,617	1,638	40,385,824	0.0801	0.0811	75.21%	85.00%	4,430,370	13.02%	45,644,058	1,828	1,852
Coffeen	1	335	2,934,600	1,838,358	19	699	19,939,412	0.0019	0.0701	62.64%	0.00%	0	-100.00%	0	0	0
Coffeen	2	580	5,080,800	3,728,360	29	1,783	39,101,271	0.0015	0.0912	73.38%	0.00%	0	-100.00%	0	0	0
Duck Creek	1	425	3,723,000	1,944,069	25	1,478	19,985,699	0.0025	0.1479	52.22%	0.00%	0	-100.00%	0	0	0
E D Edwards	2	255	2,233,800	1,195,940	2,726	1,318	13,212,705	0.4126	0.1996	53.54%	75.00%	1,675,350	40.09%	18,509,679	3,819	1,847
E D Edwards	3	330	2,890,800	1,908,769	3,666	787	17,698,112	0.4142	0.0890	66.03%	80.00%	2,312,640	21.16%	21,443,032	4,441	954
Havana	9	434	3,801,840	2,525,569	1,090	1,240	30,567,133	0.0713	0.0811	66.43%	80.00%	3,041,472	20.43%	36,811,998	1,312	1,494
Hennepin	1	68	595,680	398,342	1,123	327	4,508,524	0.4984	0.1453	66.87%	80.00%	476,544	19.63%	5,393,547	1,344	392
Hennepin	2	226	1,979,760	1,268,067	3,495	1,030	14,201,402	0.4922	0.1451	64.05%	80.00%	1,583,808	24.90%	17,737,551	4,365	1,287
Joppa	1	167	1,462,920	805,775	2,158	522	8,983,253	0.4804	0.1161	55.08%	75.00%	1,097,190	36.17%	12,232,495	2,938	710
Joppa	2	167	1,462,920	741,161	1,955	487	8,140,886	0.4804	0.1197	50.66%	75.00%	1,097,190	48.04%	12,051,767	2,895	722
Joppa	3	167	1,462,920	633,899	1,702	400	7,034,467	0.4839	0.1137	43.33%	75.00%	1,097,190	73.09%	12,175,959	2,946	692
Joppa	4	167	1,462,920	495,584	1,266	304	5,244,525	0.4826	0.1160	33.88%	75.00%	1,097,190	121.39%	11,610,853	2,802	673
Joppa	5	167	1,462,920	573,991	1,547	353	6,357,587	0.4868	0.1110	39.24%	75.00%	1,097,190	91.15%	12,152,527	2,958	675
Joppa	6	167	1,462,920	663,844	1,782	401	7,292,449	0.4887	0.1101	45.38%	75.00%	1,097,190	65.28%	12,052,959	2,945	664
Newton	1	615	5,387,400	3,281,532	4,873	1,538	33,298,298	0.2927	0.0924	60.91%	80.00%	4,309,920	31.34%	43,733,984	6,401	2,020
TOTAL				29,877,599	30,578	15,900						28,806,384			42,666	15,801

SO2 Difference 2017 & Scenario:	12,088
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Joppa Scenario SO2 Total:	17,484
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