BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
AMENDMENTS TO 35 ILL.ADM.CODE 225:	)	**R09-10**
CONTROL OF EMISSIONS FROM LARGE	)	**(Rulemaking – Air)**
COMBUSTION SOURCES (MERCURY	)	
MONITORING)	)	

NOTICE OF FILING

To:

John T. Therriault, Assistant Clerk
Illinois Pollution Control Board
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Chicago, Illinois 60601

Persons included on the
ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that we have today filed with the Office of the Clerk of the Pollution Control Board the **TESTIMONY OF SCOTT MILLER ON BEHALF OF MIDWEST GENERATION.**

Kathleen C. Bassi

Dated: January 30, 2009

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TESTIMONY OF SCOTT MILLER
ON BEHALF OF MIDWEST GENERATION

My name is Scott Miller. I am testifying on behalf of Midwest Generation. Midwest Generation has three major concerns with IEPA's proposed amendments to the Illinois mercury rule, and my testimony addresses these concerns. Midwest Generation is very concerned with what it perceives to be a potential attempt to expand the scope of the Combined Pollutant Standard ("CPS") through an apparent new definition of the phrase "optimum manner." Midwest Generation supports the stack testing alternative that IEPA proposes to add to the rule. However, we are concerned with the 75% monitor uptime requirement over a quarterly period as opposed to an annual timeframe to calculate availability, based upon our experience with continuous mercury monitoring systems ("CMMS"). Finally, Midwest Generation requests that the Board delete or amend the requirement for correction for the difference in temperature in Section 225.294(g)(4). Otherwise, Midwest Generation generally supports the proposed amendments and encourages the Board to adopt them except as described in my testimony.

I am employed by Midwest Generation EME, LLC as an Environmental Program Manager – Air and am responsible for managing the air quality programs for the company's six coal-fired power stations in the State of Illinois. Specifically, I am responsible for overseeing compliance of the power stations with all applicable air quality programs, including the Acid Rain, NOx SIP Call (Part 217, Subpart W of the Board's rules), CAIR (Part 225, Subparts C, D, and E of the Board's rules), ERMS (Part 205 of the Board's rules), NSPS (New Source Performance Standards – 40 CFR Part 60), NSR (New Source Review), Title V (Illinois' Clean Air Act Permit Program – CAAPP), HAPs (hazardous air pollutants – 40 CFR Part 63), RACT (reasonably available control technology – proposed in the Board's Docket R08-19), BART (best available retrofit technology), and NAAQS (national ambient air quality standards) programs as well as the state mercury program and any other air programs and requirements applicable to the power stations under state law. I have held this position with the company since 1999 and served in the same capacity from 1982 through 1999 as an employee of Commonwealth Edison Company ("ComEd"), the previous owner and operator of these power stations. I began my career with ComEd in 1978 as an employee at the Zion Nuclear Station.

I received a Bachelor of Science degree in mechanical engineering from the University of Illinois at Urbana-Champaign in 1977 and a Master of Science degree in engineering management from Northwestern University in 1982.

I have 30 years of experience in the environmental field, including my 25 years of supervising the compliance of the power stations with air quality programs. As such, I am knowledgeable about Midwest Generation's compliance with air quality programs and the efforts it undertakes in order to comply with requirements applicable to the power stations.

Midwest Generation, LLC owns, in whole or in part, and operates six electric generation stations in the State of Illinois, all of which are subject to the Illinois mercury rule through the CPS and these amendments. These are the Waukegan Generating Station, located in Waukegan in Lake County; the Fisk and Crawford Generation Stations, located in Chicago; the Will County

Generation Station, located near Romeoville in Will County; the Joliet Generating Station, located in Joliet, also in Will County; and the Powerton Generating Station, located near Pekin in downstate Tazewell County. Midwest Generation's six generating stations are capable of generating around 6,015 megawatts, approximately 37% of the total coal-fired generation currently operating in the state.

Optimum Manner

Midwest Generation's decision to opt in to the CPS requires that it install and operate halogenated activated carbon injection systems ("sorbent injection") beginning July 1, 2008, for the units at Crawford, Fisk, and Waukegan and beginning July 1, 2009, for the units at Joliet, Powerton, and Will County, and ending on December 31, 2014, or such earlier date that the unit is subject to the applicable mercury emission standard. Units complying with the CPS are not required for several years to meet the mercury emission standard of the Illinois mercury rule, *i.e.*, 90% reduction from inlet mercury or an emission rate of 0.0080 lbs Hg/GWh gross electrical output.[1] Rather, Section 225.294(g)[2] requires that units inject sorbent in an "optimum manner," which is defined under that section as the injection of a specified activated carbon at a specific

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[1] My testimony will generally refer to the two alternative mercury emission standards as the 90% reduction requirement, and much of Midwest Generation's concern is with IEPA's position with requiring a mercury removal efficiency. However, my general reference to the percent reduction requirement is not intended to ignore the rate limit available as an alternative compliance method or to imply that Midwest Generation has made any decisions regarding the method of compliance, *i.e.*, with the percent reduction or the emission rate, that it will prefer in the future when the alternative emission standards become applicable.

[2] The proposed Mercury Monitoring Rule consolidated Part 225, reconstituting the CPS provisions from Part 225, Subpart F to Part 225, Subpart B at Sections 225.291 through 225.299. All further references to the CPS in this testimony will refer to the proposed regulatory section under Subpart B of the mercury rule.

rate by means of an injection system designed for effective absorption of mercury. "Optimum manner" is defined consistently throughout the mercury rule. IEPA has described the requirements or optimum manner consistent with the plain regulatory language of the mercury rule, *i.e.*, in the original mercury rulemaking; it was not until recently, around the time that this rulemaking was filed, that IEPA indicated a potential change to the definition of "optimum manner."

1. **The Apparent New Definition of "Optimum Manner"**

I attended the hearings held in the initial mercury rulemaking[3] and have recently carefully reviewed the transcript from the December 17, 2008, hearings in that rulemaking. Through my review I have confirmed my recollection of the meaning of "optimum manner" as that term was developed and then earlier promulgated. In this current rulemaking, some IEPA testimony suggests a potential new meaning of "optimum manner" that would be inconsistent both with its prior testimony in the original mercury rulemaking and with the plain regulatory language in the CPS. Despite any lack of ambiguity in the plain regulatory language, some of the testimony by Mr. Jim Ross could be read to mean that optimum manner will not be determined based solely on satisfaction of the enumerated regulatory requirements under Section 225.294(g), but rather, that IEPA will evaluate whether a unit is injecting sorbent in an optimum manner based on the unit's ability to achieve a control efficiency "around 90%" when injecting sorbent at the rates specified in the regulation. Tr. 47-76, R09-10, Dec. 17, 2008.[4]

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[3] The case number for the original mercury rulemaking is found at R06-25.

[4] All further references to the December 17, 2008, hearing transcript for this mercury monitoring rulemaking, R09-10, will be cited as "Tr. [__], R09-10," and refer to the page numbers of the transcript.

Mr. Ross did acknowledge in his testimony that "optimum manner" is defined in the mercury rule and that the definition does not specify a percent reduction in mercury emissions. Tr. 51-52, R09-10. However, Mr. Ross then seemed to qualify this admission by asserting that the requirement that units design their sorbent injection systems for effective absorption of mercury, as specified in Section 225.294(g)(1), may require around 90% reduction in mercury emissions. Tr. 51, R09-10. However, the express definition of "optimum manner" refers to sorbent injection and effective absorption of sorbent. Nowhere does the definition in the rule refer to a removal efficiency requirement. Further, the origins of the optimum manner requirement in the mercury rule and IEPA's prior description of the requirements associated with complying with optimum manner do not support any effort to "read" into the CPS an additional requirement that units achieve a near 90% mercury control efficiency.

2. <u>Temporary Technology Based Standard</u>

In the original mercury rulemaking, the IEPA did not provide any relief for entities that could not immediately achieve the high levels of mercury removal required under the rule. Relief was eventually incorporated under Section 225.234, the Temporary Technology Based Standard ("TTBS"), which provided additional time for eligible units to address technical problems preventing compliance with the rule. Significantly, the TTBS included a requirement to inject sorbent for mercury control in an "optimum manner," the term that was then repeated in the CPS. The TTBS defined "optimum manner" as requiring the injection of a specified activated carbon at a specific rate by means of an injection system designed for effective absorption of mercury. When Ameren, Dynegy, and Midwest Generation later requested that the mercury rule include temporary relief from the mercury emission standard requirements, the optimum manner definition and requirements from the TTBS were included in the provisions of both the CPS, which was crafted specifically for Midwest Generation, and the Multi-Pollutant Standard ("MPS"), which was the general relief available to any of the companies subject to the mercury rule. I understand that both Ameren and Dynegy have opted in to the MPS.

The Agency's original description of the purpose of the TTBS and its optimum manner requirement is revealing in that there is no discussion of a requirement to achieve a mercury removal efficiency when injecting sorbent in an optimum manner.[5] In fact, in my review of the 2006 hearing testimony for the original mercury rulemaking, I noted that the Agency explained that the TTBS and its optimum manner requirement were designed as an operational and technical standard. As such, the Agency testified that the TTBS provided for additional time to address technical issues preventing compliance with the mercury rule, and the optimum manner requirement ensured that the design of the sorbent injection system, despite any technical issues associated with compliance of the emission standard, still maximized the level of mercury control reasonably achievable for the particular unit. Tr. 206, R06-25, June 20, 2006. Thus, the focus was on the effective design of the sorbent system for the specific unit, not on achieving a particular percent mercury control efficiency. This is supported by the testimony of Dr. James Staudt and Mr. Christopher Romaine, who testified on behalf of IEPA, that the optimum manner requirement under the TTBS was a temporary operating standard rather than a requirement to meet or approximate a numeric limit.

> Q. And for those facilities, were the parameters that you provided to the agency intended to establish optimal operating conditions for the facilities that do not achieve

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[5] Though discussed in greater detail below, I would note here that the <u>purpose</u> of the CPS and, I believe, of the MPS, based upon its language, was to delay the requirement that opt-in units achieve any specified removal efficiency so long as they injected sorbent at a rate of 5 lbs/macf for subbituminous coal. In exchange, companies opting in to the MPS or CPS became subject to stringent NOx and SO_2 emission standards.

90 percent?

* * *

A. (by Mr. Romaine) My answer was built on the technical answer Dr. Staudt has provided. It's not optimal because it's a regulatory definition of the default activated carbon injection rate. A default regulatory number cannot ideally address the circumstances at individual plants. For purposes of the regulations, however, it was believed to be an appropriate injection rate, a default injection rate that if placed in the rule would be sufficient to assure that people who were operating under the temporary technology based standard were injecting activated carbon at a sufficient emission rate, that they were getting well at or above the amount of reduction that can be achieved with activated carbon. I need to say that the other way. That they're injecting activated carbon at a rate at or above that necessary to get the maximum performance with activated carbon for their particular unit.

Q. In that case, would it be appropriate to say, following the same protocol, that in the absence of a numerical standard, this would provide a standard which would optimize the treatment of the unit without having numerical limitation?

A. (by Mr. Romaine) Yes, it is certainly an operating standard that's established in a regulation. It is a technology based standard as stated. As a matter of policy, we do not believe that it is appropriate to rely upon this technology based standard on a long-term basis. Certainly, as Dr. Staudt has stated, the activated carbon injection rate that may be routinely needed to achieve the emission rate objectives of the rule hopefully will be far less than the default injection rate that's specified in the temporary technology based standard.

Tr. 192-94, R06-25, June 22 and 23, 2006.

Because the optimum manner provisions in the TTBS were later inserted into the CPS, it is instructive that IEPA's testimony did not describe "optimum manner" to require the achievement of a percent mercury removal efficiency that IEPA now claims was included.

3. Contrary to IEPA's Previous Description of "Optimum Manner" in the MPS/CPS

The new apparent redefinition of "optimum manner" that seems to require units under the CPS to achieve around a 90% mercury control efficiency is contrary to the way "optimum manner" was described in the mercury rulemaking (Docket R06-25) and IEPA's original interpretation of the mercury rule's requirement to design the sorbent injection systems for effective absorption of mercury. IEPA did not testify or imply in the original mercury rulemaking that injecting sorbent in an optimum manner required anything other than compliance with the plain regulatory language of Section 225.294.[6] As part of my review of the 2006 hearing testimony, I noted that Mr. Romaine provided a description of "optimum manner" under the TTBS that mirrors the plain regulatory language and definition of "optimum manner." He did not refer to a percent mercury control efficiency requirement.

> MR. ROMAINE: The statement of optimum manner refers to the following -- well, it addresses the type of activated carbon and it addresses the rate of activated carbon injection.
>
> MR. HARRINGTON: So those are the only two requirements for it to be optimum, would be either one of the named activated carbons or an alternative and the rate.
>
> MR. ROMAINE: I'm sorry. There's a third criteria. With an injection system designed for effective absorption of mercury considering the configuration of the EGU's ductwork.
>
> MR. HARRINGTON: So there's three criteria in addition to just whether the plant qualifies.
>
> MR. ROMAINE: That's correct.
>
> MR. HARRINGTON: It's got to be the correct -- right activated carbon, it has to be in a system designed for effective absorption and it has to be at the rate specified.
>
> MR. ROMAINE: That's correct.

Tr. 178-79, R06-25, June 20, 2006.

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[6] The Agency's testimony cited herein may refer to the optimum manner requirement under the MPS, CPS, or TTBS Sections of the mercury rule. Because the optimum manner regulatory language is identical in all three sections of the mercury rule, the distinction is not relevant for purposes of my testimony.

The requirement under the rule's language that the injection system be designed for the effective absorption of mercury is entirely different from any new view that somehow the rule's language also means, even though it does not say so, that a particular mercury removal efficiency must be achieved by the injection system. As previously mentioned, some IEPA testimony in the current mercury monitoring rulemaking could be read to mean that because "optimum manner" requires that the injection system be "designed for effective absorption of mercury," a unit must achieve around 90% mercury control efficiency. Any such new interpretation would be contrary to the plain language of Section 225.294(g)(1) and to substantial testimony from IEPA in the original mercury rulemaking regarding compliance with the corresponding section in the TTBS.[7]

Section 225.294(g)(1) of the CPS is clear – Midwest Generation is required to consider the "configuration of the EGU and its ductwork" when designing its sorbent injection system. This primarily includes consideration of the circumstances of each particular unit to ensure that the unit is configured to effectively utilize activated carbon. Effective utilization depends largely upon implementing good engineering practices to determine the appropriate location of injection lances for carbon injection in order to maximize carbon distribution, mixing, and contact with the mercury in the gas stream. Accordingly, the optimum manner provision appropriately focuses on best engineering practices such as computational fluid dynamics, port location based on duct configuration, number of lances, the lances' orientation, nozzle design, velocity profiles, carbon concentration profiles, and residence time when designing an injection system for the effective

[7] I would note further that since this language had already been discussed in the context of the TTBS, we did not believe it was necessary for us to address the language again when the CPS was proposed in the CAIR rulemaking in Docket R06-26. Moreover, it was the same language as included in the MPS introduced in Docket R06-25.

absorption of mercury. Using best engineering practices is for the purpose of designing a system that achieves the maximum percent mercury reduction for the system.

Additionally, the 2006 hearing testimony further confirms that IEPA originally agreed that Section 225.294(g)(1) of the CPS requires units to design an effective injection system based on engineering principles tailored to each unique unit rather than control efficiency principles that he now suggests apply. The Agency's prior testimony could not be more clear.

> MR. ROSS: Section 225.223(c)(2)(A) [which corresponds to Section 225.294(g)(1)] includes the following phrase: Use of an injection system designed for effective absorption of mercury, considering the configuration of the EGU and its ductwork, (a), please explain the meaning of designed for effective absorption of mercury.
>
> > The parameters that will be looked at include placement of the injection lance to ensure sorbent distribution and in consideration of any SO3 injection. Another parameter would be engineering or a modeling study to determine how to optimize effectiveness.
>
> (b), please explain the role of the configuration of the EGU and its ductwork in the design for effective absorption of mercury.
>
> And the response is, where in the ductwork one places the injection lance is important to ensure good sorbent distribution. Placement is important in consideration of any SO3 injection as well. It should be upstream of SO3 injection. …
>
> * * *
>
> MR. ZABEL: So there could be circumstances where the ductwork is not conducive to good mixing or not conducive to avoidance of SO3 interference?
>
> MR. ROMAINE: That's correct. And then the goal is certainly the obligation to appropriately design the carbon injection system to address those less than desirable features that are present. …
>
> * * *
>
> MR. BONEBRAKE: Who makes the determination of whether an injection system is properly designed for effective absorption of mercury?

> MR. ROMAINE: This is a showing that the owner or operator of the EGU would make as it goes forward showing its use, standard engineering techniques for the design of the activated carbon injection system.

Tr. 355-58, R06-25, August 15, 2006. This testimony of Mr. Ross and Mr. Romaine on behalf of IEPA in the original mercury rulemaking is an appropriate description of the plain language of Section 225.294(g)(1). It makes no reference to a mercury control efficiency, let alone that removal efficiency should govern the design of a unit's sorbent injection system or suggest that the "optimum manner" requirement must be satisfied by some other measure. Because any new interpretation – that "optimum manner" requires a particular removal efficiency – runs contrary to the plain language of Section 225.294 and IEPA's testimony in the original mercury rulemaking and because the interpretation is inconsistent with the purpose and use of "optimum manner" in the TTBS – the foundation for the optimum manner requirement in the CPS – it is inappropriate to require units to achieve any specific control efficiency, let alone a control efficiency of "around 90%," in order for them to be injecting sorbent in an optimum manner.

4. Implications of the Expansion of the CPS Through the Proposed Altered Definition of "Optimum Manner"

The CPS is comprised of provisions specifically applicable to Midwest Generation. These provisions were negotiated between Midwest Generation and IEPA and proposed as an amendment to the Illinois CAIR under Docket R06-26 pursuant to joint comments submitted by IEPA and Midwest Generation. That submittal reflected the extent of the agreement between IEPA and Midwest Generation. Any attempt in this rulemaking to expand the scope of the CPS would be contrary to that agreement. I am not aware of any discussions or common understanding that "optimum manner" implied any control efficiency, let alone a control efficiency "around 90%" at the time that the CPS was developed. "Optimum manner" meant injecting sorbent manufactured by one of the listed companies at a rate of 5 lbs/macf, since Midwest Generation burns subbituminous coal, in a manner designed for effective absorption of mercury. Midwest Generation complies with each of these elements and is meeting the terms of its agreement with IEPA. In return for the delay in compliance with the emission standard of the mercury rule, Midwest Generation agreed to reduce its emissions of nitrogen oxides ("NOx") and sulfur dioxide ("SO_2") to levels not otherwise required by any rule and to install equipment on certain units or to shut down certain units. These agreements were properly reflected in the CPS. Midwest Generation is complying with them. Any change in the definition of "optimum manner" through a new interpretation would an impermissible expansion of the CPS. Indeed, temporary relief from the mercury removal requirement was a primary motivator for Midwest Generation's interest in the CPS in the first place.

Midwest Generation strongly encourages the Board to confirm that "optimum manner" is not related to any specific control efficiency.

<u>Monitoring</u>

Midwest Generation supports the stack testing option proposed in Section 225.239 as an alternative to CMMS or sorbent traps to measure mercury emissions for the first three years of the mercury reduction program. However, given our experience with operating CMMS over the past two years, we propose an availability calculation based on a rolling annual basis as opposed to the quarterly basis.

In anticipation of the federal Clean Air Mercury Rule ("CAMR") and CAMR's January 1, 2009, compliance deadline for mercury monitor operation, in early 2007, Midwest Generation awarded a contract to supply, install, and certify CMMS equipment to Thermo Fisher

Scientific ("Thermo"), one of the two leading CMMS vendors in the United States that meets CAMR specifications. Midwest Generation had let the contract in order to ensure that it would be able to meet the monitoring and certification deadlines, since approximately 800 coal-fired power plants across the country would be subject to the same requirements. As the Board knows from the original mercury rulemaking in Docket R06-25, CMMS are a new technology, still under development. As a result, they have had and continue to have significant problems.

With the vacatur of the CAMR in *New Jersey v. USEPA*, 517 F.3d 574 (D.C. Cir. 2008), the compliance dates applicable to Midwest Generation changed through the Illinois mercury rule. Nevertheless, Midwest Generation did not change course and proceeded with its commitment to get the CMMS operating for the Illinois mercury program. To date, Midwest Generation has spent over $6 million on the basic equipment for 11 CMMS projects at its power plants. We expect those costs to escalate as we work to make the systems reliably measure mercury emissions.

During the original mercury rulemaking hearings in 2006, Midwest Generation supported the testimony of CMMS expert Richard D. McRanie of RMB Associates regarding continuous mercury emissions monitoring. During his testimony, Mr. McRanie made several conclusions that hold true today:

- CMMS are very complex pieces of equipment that contain many components that are subject to failure. The level of complexity is probably a factor of 10 greater than conventional SO_2 and NOx continuous emissions monitoring systems ("CEMS").
- The overall reliability of Hg CEMS is not satisfactory for a hard cap emissions regulatory program [*i.e.*, a command and control program such as the Illinois mercury rule].
- When a CMMS malfunctions, the repair can require many hours and even days to complete.

- Calibration error and system integrity tests have been unreliable QA/QC tests. Therefore, it is very difficult to discern if the CMMS is operating properly.

See Testimony of Richard D. McRanie at 45-46, R06-25 (July 25, 2006). Midwest Generation's experience demonstrates the truth of these statements.

Midwest Generation's coal-fired units emit mercury in the range of 0.1-0.5 parts per trillion. Measuring this level of mercury emissions with our CMMS has been challenging. At this time, Thermo has over 500 CMMS operating and another 100 shipped to various power plants throughout the country. However, Thermo has only a maximum of 13 technicians to service the mercury monitoring equipment in the field, and the nearest Thermo technician is located a four- to eight-hour drive away from Midwest Generation's generating stations. As a result, Thermo has been unable to provide sufficient support for the CMMS projects, including providing project management, providing startup assistance, sending out qualified technicians, scheduling follow-up visits, and providing general technical support.

I estimate that it may take our instrument mechanics 12-18 months to be fully trained and comfortable with troubleshooting the CMMS equipment. However, the problems we have encountered in operating the equipment have delayed the training period.

During our first year of operation of the CMMS (2008), almost every major part on one or more of the CMMS have failed. This includes circuit boards, converter tubes, oxidizers, component heaters, the dilution probe in whole or subassemblies, probe pluggage (currently investigating sorbent plugging in the main filter), mercury analyzer, thermocouples, transducers, intensity lamps, vacuum pumps, and many other parts. Rather than learning to operate the CMMS, we are in constant parts replacement mode.

Exacerbating the repairs issue is the fact that most of the repairs must be done on a stack platform where the probe is located rather than in the ground shelter that houses the mercury analyzers, generators, and controllers. The stack probes are located 250-350 feet above the ground. In cold weather, there are safety concerns related to climbing the stack on a continuous basis since stack elevators have a tendency to malfunction in cold weather. During the CMMS installations, one Midwest Generation employee at Waukegan was stuck on the stack elevator for many hours because of cold weather-related elevator malfunction, and one Thermo employee was stranded on the stack platform at Fisk Station for an entire operating shift during cold weather with very little heat.

The biggest problem we have encountered is the failure of some of the umbilicals. The umbilicals transport the mercury sample from the stack to the ground-level shelter. Pictures of some of the damage are attached to my testimony (Attachment 1). The umbilicals are from 285-460 feet in length and are attached to the outside of the stack. Midwest Generation has installed 13 umbilicals at all of its Illinois and Pennsylvania coal-fired units, and to date, six have failed (Crawford 7 and 8, Fisk 19, Joliet 8, Waukegan 8, and Homer City 3 in Pennsylvania). Three of the six failed umbilicals have already been replaced, requiring another round of installation, startup, and warranty testing in each case. Midwest Generation is aware of approximately 50 umbilical failures for CMMS in the power industry, undoubtedly setting back projects for months. The root cause of the umbilical failures is still under investigation; however, it seems that the heat trace utilized to keep the mercury in the elemental state at 120-160°C may have failed due to design flaws and the equipment that supports the operation of the heat trace may also have design flaws, such as not regulating temperatures properly through the temperature controller, thermocouple placement or failure, and electrical connectors. Moreover, the umbilical is very fragile, leading to issues during installation and when they are hanging on the stack with respect to expansion and contraction once in operation. Midwest Generation is investigating a new umbilical design with a self-regulating heat trace, as opposed to the constant power density heat trace currently used. The self-regulating heat trace has one continuous trace for heating compared to the multiple zone heaters of the constant power density type. Note that self-regulating heat traces were not available when Midwest Generation undertook this project.

Midwest Generation has also encountered dilution air lines freezing up[8] and numerous software updates for the mercury analyzers and has had difficulties getting the communications of a new data logger and data acquisition and handling system to work.

Midwest Generation is engaged with Thermo and our engineering firm, Burns and McDonnell, to develop other design changes to address other operating issues. Necessary design changes have slowed down our progress toward reliable CMMS operation. The major design changes currently ongoing at this time include installation of surge protection to protect against lightning strikes, the addition of a chlorine monitoring system utilized for the integrity test, and dual zone temperature control for the umbilical. We are also investigating failure modes regarding blowback and overheating.

Maintenance of the CMMS is very time-consuming. Thermo advised Midwest Generation that we would need to devote considerable time and personnel to make the system operate properly. At this time, I estimate it takes an average of four hours daily to properly maintain the mercury monitoring system and an additional hour to run the Integrity test if it passes the first time. If the Integrity test does not pass, we have to troubleshoot, diagnose, and

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[8] These have since been freeze-protected.

correct the cause of the failure and then retest, repeating this process until the Integrity test passes. We estimate that we will need to spend at least three times the amount of time necessary to work on the CMMS as compared to the traditional CEMS for NOx and SO_2.

At this point in time, despite over two years of effort, Midwest Generation still does not have a single fully accepted CMMS because of the numerous parts failures and engineering redesigns. We are working with Thermo to make the necessary changes and repairs so that we will have fully accepted CMMS. Although not accepted and certified, some CMMS are operating but have not passed all the QA/QC testing, which would be required by Appendix B of the proposed rule. Midwest Generation's CMMS currently do not have a good record in consistently passing an integrity check. Most of the integrity checks completed for the warranty have failed.[9]

A rolling annual monitor availability requirement would help to mitigate this enforcement/compliance exposure, and Midwest Generation suggests that the Board consider such an approach. Such rolling average availability requirements are already established and have been in use since the early 1990s for other programs, such as the Acid Rain program and the NOx SIP Call. Midwest Generation suggests the following language to accomplish this end:

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[9] The integrity check is required as a weekly quality control test in many sections of proposed Appendix B and its Exhibits. The CMMS is considered out of control (OOC), and therefore noncompliant, when an integrity test fails. Thermo first delivered the integrity test equipment for commercial use in late 2007, yet most tests still fail. The integrity check utilizes Thermo's mercuric chloride generator, which uses a patented process by which chlorine gas is mixed with elemental mercury. This mixing is done a short distance away from the probe injection point to help minimize contact of mercuric chloride with cold spots, which would lessen the oxidizing effect. Mercuric chloride ($HgCl_2$) will absorb or react on any "cool" surface (below 190°C). The chlorine is supplied by a cylinder (900 ppm Cl_2 in N_2 Balance), and the elemental mercury is supplied by the Thermo Model 81 elemental Hg generator.

Section 225.260 Out of Control Periods and Data Availability for Emission Monitors

b) Monitor data availability must be determined on a ~~calendar quarter~~ rolling annual basis in accordance with Section 1.8 of Appendix B . . . .

We note that changes to corresponding language in other sections of the rule or Appendix B and/or its Exhibits may also be necessary.

Correction for Temperature in Measuring Flue Gas Flow Under the CPS

IEPA suggested in its testimony at the December 17, 2008, hearing in this matter that "optimum manner" may require that sorbent be injected upstream of the air heater. Section 225.294(g)(4) requires for a correction in the flow rate used in determining the amount of sorbent to be injected when there is at least a 100°F difference in temperature between the point of measurement of the flow rate and the point of injection of the sorbent. While recognizing that injecting sorbent upstream of the air heater may be more "optimum" or, better put, may reflect more effective absorption considering the configuration of the particular unit in some cases, Midwest Generation is concerned about IEPA's potential requirement that sorbent be injected upstream of the air heater, as described at the December 17th hearing, for several reasons. However, in subsequent discussions with IEPA, Midwest Generation understands that IEPA will propose to amend this requirement for adjusting for the temperature difference. Midwest Generation appreciates IEPA's willingness to discuss this issue further and to address the issue.

The sorbent injection rate required by Section 225.294(g)(3)(A) is 5 lbs/macf. The actual flue gas flow rate must be determined at the point of sorbent injection, except that if the gas temperature at the point of injection and at the stack are normally within 100°F, then the flue gas flow rate and temperature can be assumed to be equal to the stack flue gas flow rate according to Section 225.294(g)(4). If the temperature at the injection location is more than 100°F greater than at the stack, the stack flow rate must be corrected for temperature.

At Midwest Generation, the current injection locations for the sorbent injection systems are downstream of the air heaters, which typically operate around 300°F. This temperature is within 100°F of the stack. Therefore, the stack flow rate is used for determining the injection rate.[10] We note that the flow at the injection location is very close to the stack flow. Placing a flow monitor at the injection location would require significant maintenance due to flue gas conditions at the injection point. The stack flow monitor is a certified monitor that is subject to rigorous quality assurance. Therefore, it is a reliable and consistent source for obtaining the flow value used for sorbent injection.

For cold side precipitators, an option considered when designing for effective absorption of the sorbent is to inject carbon upstream of the air heater.[11] At this injection location, the flue gas temperature is greater than 100°F different from the flue gas temperature at the stack, and so the flow, under the current language of the rule, must be corrected. Based on the ideal gas law – which is derived from the fact that in the ideal state of any gas a given number of its "particles" occupy the same volume and that volume changes are inverse to pressure changes and linear to temperature changes – the amount of carbon required to be injected would be upwards of 50% greater at the higher temperature than at the lower temperatures downstream of the air heater.

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[10] The exception is for our two units with hot-side precipitators, Will County 3 and Waukegan 7. Measurements at these units are corrected for the temperature difference.

[11] Note that the air heater has been referred to in testimony at the December 2008 hearing as the preheater.

The higher the temperature, the less dense the flue gas is and, therefore, the volume is also greater. Hence, a much greater quantity of carbon would be injected at the 5 lbs/macf rate as measured at a point of injection upstream of the air heater. The following equation illustrates this phenomenon:

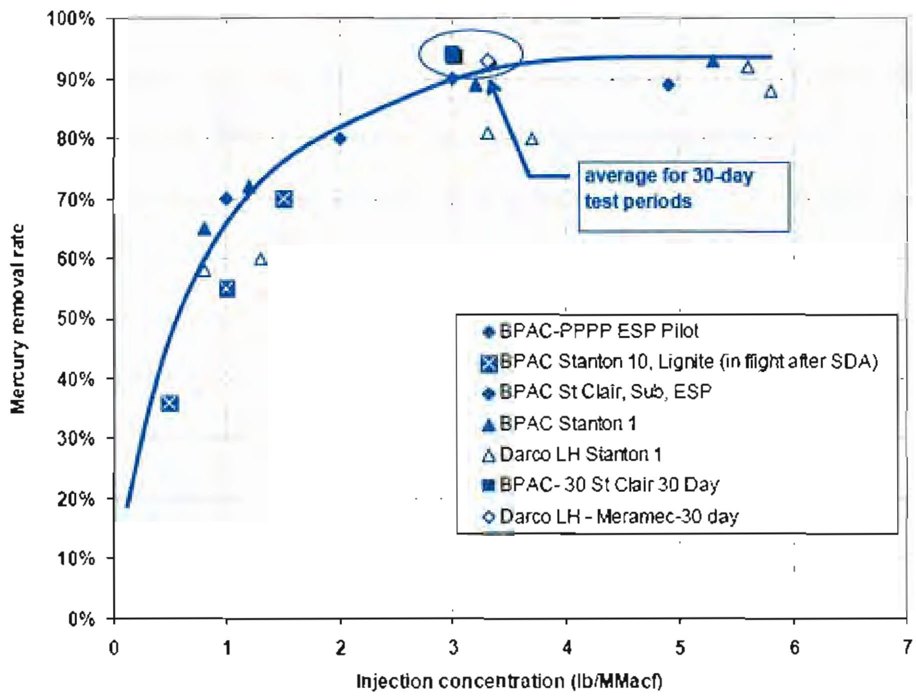
$V_1 = V_2(\frac{P_2}{P_1})(\frac{T_1}{T_2})$ V = volume of gas flow (acfm)

T = Temperature (Rankin)

P = Pressure

When IEPA determined that 5 lbs/macf was a conservative sorbent injection rate to ensure maximum mercury removal for units gaining temporary relief from the mercury standards in the original mercury rulemaking, it appears that IEPA never anticipated that sorbent injection would occur upstream of the air heater. Section 8.4 of the Technical Support Document ("TSD"), dated March 16, 2006, prepared by Dr. Staudt for the original mercury rulemaking describes mercury-specific controls. In particular, Figure 8.10 shows the mercury removal test results of halogenated powdered activated carbon ("PAC") on low rank coals:

Figure 8.10. In-Flight Mercury Removal Results of Full Scale Field Tests of Halogenated PAC Sorbent Injection on Low-Rank Coals ***(Durham 2005, Staudt 2005, Nelson 2005)***



Technical Support Document at 127, R06-25 (March 14, 2006). This illustrates that the data used to develop the Rule consisted of testing at the following units:

Pleasant Prairie burning PRB with a pilot cold side ESP
Stanton 10 burning lignite with a SDA/baghouse
St Clair burning PRB with a cold side ESP
Stanton 1 burning Lignite with a cold side ESP
Meremec burning PRB with a cold side ESP

Although the TSD does not specifically describe the injection location in each of these tests other than that they are upstream of the ESP/baghouse, the reports of each test make it clear that the injection points were downstream of the air heaters. From this information, we can tell that the 5 lbs/macf injection rate was based on the flue gas flow rate as measured downstream of the air heater where the flue gas temperatures are much lower than the temperatures upstream of the air heater.

When sorbent is injected upstream of the air heater on units with cold side precipitators, its residence time or the time for it to be exposed to the mercury in the flue gas, is increased because of the greater distance between the point of injection, *i.e.*, upstream of the air heater, and the point of removal at the ESP is longer than if the sorbent were injected downstream of the air heater. The flue gas, along with the sorbent entrained in the flue gas, cools as it passes through the air heater. At the outlet of the air heater, the sorbent in the flue gas continues to capture mercury as it passes into the cold-side precipitator. In the precipitator, the sorbent is then captured with the flyash and removed from the gas stream, thereby removing the mercury from the flue gas. The configuration of some EGUs may indicate that injection upstream of the air heater is appropriate. However, for those units, the total amount of sorbent injected throughout the gas path should be equivalent to 5 lbs/macf as measured at the location downstream of the air heater, similar to the units referenced in the TSD.[12]

Following is an example of the way in which the amount of sorbent required to be injected upstream of the air heater is considerably greater than if injected downstream of the air heater if the requirement for temperature correction is not amended:

$V_1 = V_2(\frac{P_2}{P_1})(\frac{T_1}{T_2})$ V = volume of gas flow (acfm)

T = Temperature (Rankin)

P = Pressure

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[12] Injecting sorbent upstream of the air heater can cause pluggage and force additional outages for the purpose of cleaning the air heater. It could also be physically difficult to install lances upstream of the air heater, depending upon the unit's configuration. Therefore, injection of sorbent upstream of the air heater is not necessarily appropriate for all units with cold-side precipitators, and my testimony is not intended to suggest otherwise.

For this calculation the assumption is made that the pressure is equal at both locations.

Downstream of the air heater (Midwest Generation's current injection location):

Air Flow = 1,000,000 acfm

Carbon injection is required to be 5 lbs/macf

In one hour we would inject

5 lbs/macf*1,000,000 acfm*60 min/hr = **300 lbs carbon**

Upstream of the air heater:

V1 = Volumetric flow of gas upstream of the air heater

V2 = Volumetric flow as measured at the stack

T1 = Temperature at air heater injection location (700°F; 1159.67R)

T2 = Temperature at the stack (300°F; 759.67R)

V1 = 1,000,000 *(1159/759) = 1,527,009 acfm

In one hour we would inject:

5 lbs/macf*1,527,009 acfm*60 min/hour = **458 lbs carbon**

Midwest Generation suggests that the language in Section 225.294(g) be changed to remove the requirement to adjust for the temperature difference from the stack flow for systems with cold side precipitators,[13] as follows:

Section 225.294(g):

4) For purposes of subsection (g)(3) of this Section, the flue gas flow rate must be determined for the point sorbent injection; provided that this flow rate may shall be assumed to be identical to the stack flow rate if the gas temperatures at the point of injection and the stack are normally within 100°F, or the flue gas flow rate may otherwise be calculated from the stack flow rate, corrected for the difference in gas temperature determined at the inlet to the electrostatic precipitator for all units except

[13] Midwest Generation does not believe this should apply to the hot side precipitators

> for those with hot-side electrostatic precipitators; for units with hot-side electrostatic precipitators, the flue gas flow rate shall be the stack flow rate, corrected for the difference in gas temperature between the stack and the point of injection.

Conclusion

Midwest Generation has worked with IEPA regarding various amendments to the proposal and appreciates IEPA's willingness to work through the numerous and very technical issues involved in these proposed amendments. Midwest Generation generally supports the proposal with the exceptions that have been the focus of my testimony.

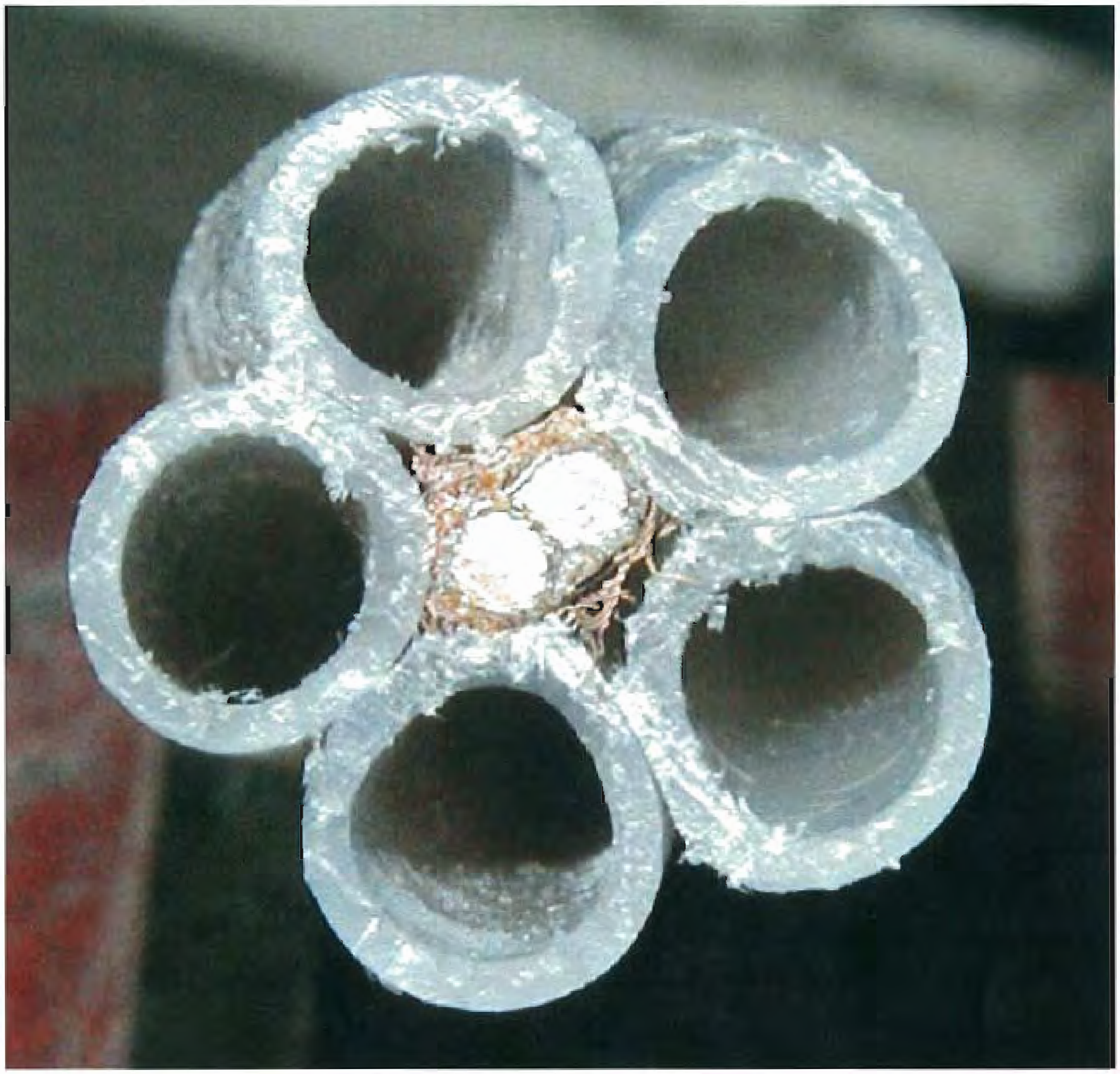
I am pleased to answer any questions regarding my testimony. I have conferred with Ms. Andrea Crapisi and Mr. Chris Nagel, who are experts at Midwest Generation regarding, respectively, certain areas of my testimony, in the development of my testimony, and they will be available to answer any more detailed, technical questions that the Board, IEPA, or the public may have.

Attachment A
Umbilical Failure Pictures

1. Umbilical Failure (burned through outer jacket)

2. Umbilical Failure (Teflon tubes that carry mercury sample melted from heat trace over heating)

3. Umbilical Failure (Teflon tubes that carry mercury sample begin to melt)



4. Umbilical Failure (Teflon tubes that carry mercury sample completely melted)

CH2\2931104.1

CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 30th day of January, 2009, I have served electronically the attached **TESTIMONY OF SCOTT MILLER ON BEHALF OF MIDWEST GENERATION** upon the following persons:

John T. Therriault, Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph
Chicago, Illinois 60601

and electronically and by first class mail, postage affixed upon persons included on the **ATTACHED SERVICE LIST**.

Kathleen C. Bassi

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BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	**)**	
	)	
AMENDMENTS TO 35 ILL.ADM.CODE 225:	**)**	**R09-10**
CONTROL OF EMISSIONS FROM LARGE	**)**	**(Rulemaking – Air)**
COMBUSTION SOURCES (MERCURY	**)**	
MONITORING)	**)**	

NOTICE OF FILING

To:

John T. Therriault, Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph
Chicago, Illinois 60601

Persons included on the
ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that we have today filed with the Office of the Clerk of the Pollution Control Board the **REQUEST TO REPLACE PROPOSED REGULATORY LANGUAGE CONTAINED IN THE TESTIMONY OF SCOTT MILLER ON BEHALF OF MIDWEST GENERATION.**

/s/ Kathleen C. Bassi
Kathleen C. Bassi

Dated: February 1, 2009

Kathleen C. Bassi
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CERTIFICATE OF SERVICE

I, the undersigned, certify that on this 1st day of February, 2009, I have served electronically the attached **REQUEST TO REPLACE PROPOSED REGULATORY LANGUAGE CONTAINED IN THE TESTIMONY OF SCOTT MILLER ON BEHALF OF MIDWEST GENERATION** upon the following persons:

John T. Therriault, Assistant Clerk
Illinois Pollution Control Board
James R. Thompson Center
Suite 11-500
100 West Randolph
Chicago, Illinois 60601

and electronically and by first class mail, postage affixed upon persons included on the **ATTACHED SERVICE LIST**.

/s/ Kathleen C. Bassi
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CH2\2804086.3

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	**)**	
	)	
AMENDMENTS TO 35 ILL.ADM.CODE 225:	**)**	**R09-10**
CONTROL OF EMISSIONS FROM LARGE	**)**	**(Rulemaking – Air)**
COMBUSTION SOURCES (MERCURY	**)**	
MONITORING)	**)**	

<u>REQUEST TO REPLACE PROPOSED REGULATORY LANGUAGE</u>
<u>CONTAINED IN THE TESTIMONY OF SCOTT MILLER</u>
<u>ON BEHALF OF MIDWEST GENERATION</u>

NOW COMES Participant, MIDWEST GENERATION, LLC, by and through its attorneys, SCHIFF HARDIN LLP, and requests that the Board replace the regulatory language set forth below for the language that appears on pages 23-24 of the Testimony of Scott Miller on Behalf of Midwest Generation filed in this matter late on January 30, 2009. Subsequent to filing Mr. Miller's testimony, we discovered that the strike-throughs intended to be inserted in the proposed amendatory language had not properly printed.

Section 225.294(g):

4) For purposes of subsection (g)(3) of this Section, the flue gas flow rate ~~must be determined for the point sorbent injection; provided that this flow rate may~~ <u>shall</u> be ~~assumed to be identical to~~ the stack flow rate ~~if the gas temperatures at the point of injection and the stack are normally within 100°F, or the flue gas flow rate may otherwise be calculated from the stack flow rate, corrected for the difference in gas temperature determined at the inlet to the electrostatic precipitator~~ <u>for all units except for those with hot-side electrostatic precipitators; for units with hot-side electrostatic precipitators, the flue gas flow rate shall be the stack flow rate, corrected for the difference in gas temperature between the stack and the point of injection</u>.

Respectfully submitted,

MIDWEST GENERATION, LLC

by: /s/ Kathleen C. Bassi
one of its attorneys

Dated: February 1, 2009

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