

**Wisconsin Department of Natural Resources
Natural Resources Board Agenda Item**

SUBJECT: Request the Board approve the Department's recommendation contained in the report to the Board on Wisconsin's State Mercury Air Emission Rule

FOR: May 2013 Board meeting

PRESENTER'S NAME AND TITLE: Joseph Hoch, Regional Pollutant and Mobile Sources, Section Chief

SUMMARY:

The Department is submitting this report to the Natural Resources Board to provide information comparing state and federal rules that regulate mercury emitted by coal-fired electric power plants. The report also provides a recommendation to change the state mercury rule in response to promulgation of the federal rules.

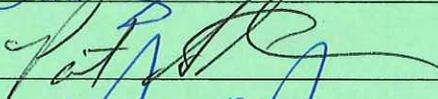
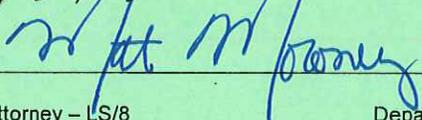
This report is submitted to the Natural Resources Board to fulfill requirements under the state mercury rule. The provision s. NR 446.19(2), Wis. Adm Code states:

"the department shall report to the natural resources board within 6 months of the date of promulgation of a federal regulation under section 111 or 112 of the Act (42 USC 74411 or 7412) or the enactment of a federal law that has mercury reduction requirements for the mercury emission sources affected by this subchapter. The report shall include a comparison of the federal requirements and the requirements of this subchapter along with recommendations for revisions to this subchapter or other actions".

RECOMMENDATION: Approval of the report "Wisconsin's State Mercury Air Emission Rule"

LIST OF ATTACHED MATERIALS (check all that are applicable):

- Report Wisconsin's State Mercury Air Emission Rule
- Statement of scope
- Fiscal estimate and economic impact analysis (EIA) form
- Response summary
- Attachments to background memo
- Governor approval of statement of scope
- Environmental assessment or impact statement
- Board order/rule

Approved by	Signature	Date
Bart Sponsellar, Bureau Director		4/30/13
Pat Stevens, Administrator		5/1/13
Cathy Stepp, Secretary		5/9/13

cc: Board Liaison - AD/8

Program attorney - LS/8

Department rule coordinator - LS/8

**Report to the
Wisconsin Natural Resources Board**

Wisconsin's State Mercury Air Emission Rule

April 2013

Prepared by

Wisconsin Department of Natural Resources
Bureau of Air Management

EXECUTIVE SUMMARY

The Wisconsin state mercury rule was promulgated to fulfill a finding made by the Natural Resources Board in 2008 that mercury emitted by coal-fired electric generating units (EGUs) must be controlled in order to protect public health and welfare. The state mercury rule means NR 446 subchapters II and III, Wis. Adm. Code.

Recently, the U.S. Environmental Protection Agency (EPA) promulgated two federal rules regulating mercury emitted by the same EGUs. These two federal rules are the Mercury Air Toxics Standards (MATS) rule, which is applicable to EGUs larger than 25 megawatts (MW) and the Industrial, Commercial and Institutional (ICI) Boiler rule, which is applicable to EGUs smaller than 25 MW. Both rules establish maximum achievable control technology (MACT) emission limitations for mercury as required under Section 112 of the Clean Air Act (CAA).

The Department of Natural Resources is required to provide a report to the Board that compares the state and federal rule requirements and recommends modifications to the state mercury rule. This report is intended to fulfill that requirement.

An important factor in the findings of this report is that state law, under s. 285.27(2)(d), Wis. Stats, provides that EGUs will be exempt from state mercury rule requirements when mercury emissions are regulated under federal rules.

Comparison of Rule Requirements

The Department compared requirements and projected mercury emission reductions achieved under the state and federal rules. The primary conclusions of this evaluation are the following:

- ***Mercury Emissions and Timing:*** In 2015, the state rule alone is estimated to reduce EGU mercury emission levels to between 550 to 743 pounds. The federal rules alone are estimated to reduce emissions to between 584 to 663 pounds of mercury. Projected emission levels resulting from the federal rules range from 80 pounds less to 34 pounds more than the state rule.

For the years 2016 through 2020, the federal rules may reduce mercury emissions by up to 185 pounds per year below that achieved by the state rule. However, the state rule could yield lower emission levels of up to 109 pounds per year below the federal rules when fully implemented by 2021.

In terms of the control efficiency, in 2015 the state rule may achieve 83 to 87 percent reduction and the federal rules may achieve 84 to 86 percent. By 2021, the state rule is expected to achieve 89 to 92 percent control efficiency and the federal rules together are expected to achieve 87 to 89 percent control efficiency.

- ***Regulatory Structure and Approach:*** Differences in the regulatory approach between the state and federal rules are anticipated to result in a different focus for planning, control

strategies, and different or added installations of control equipment. One major reason for the difference is that the federal rules allow less compliance flexibility and focus compliance to individual EGUs as compared to the state rule. As a result, individual EGUs under the federal MATS rule may need an allowed one-year extension in order to install the necessary equipment and retire older, less efficient EGUs while maintaining electric reliability.

- ***Compliance Demonstration:*** There is little difference in compliance monitoring requirements between the state rule and federal MATS rule. However, the state rule requires more costly continuous emissions monitoring for the three smallest affected EGUs, whereas the federal ICI Boiler rule requires periodic stack testing.

Recommendation for Rule Changes

The Department recommends modifying the effective date of the second phase requirements under the state mercury rule as provided in NR 446 subchapter III, Wis. Adm. Code. Specifically, the Department recommends extending the initial compliance date under the state rule from January 1, 2015 to April 16, 2016.

The Department is making this recommendation for the following reason. State law, under s. 285.27(2)(d), Wis. Stats, provides that EGUs will be exempt from the state mercury rule when mercury emissions are regulated under the federal rules. The proposed change in the state rule compliance date will allow EGUs to be regulated first under the federal rules and thus, according to the state law, be exempt from the second phase of the state rule requirements before they apply. This approach will avoid any additional cost and compliance burden that could result under the current staggered schedules for implementing the state rule and federal rules. This proposed rule change will also continue state rule requirements until mercury emissions are regulated under the federal rules.

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I. Purpose

This report is presented to the Wisconsin Natural Resources Board to fulfill a reporting requirement under the state mercury rule. Recently two federal rules were promulgated that regulate the same sources subject to the state mercury rule. As a result, the Department of Natural Resources is required to compare the state and federal requirements and recommend modifications to the state rule.

Note: “the state mercury rule” refers to the emission limitations and requirements for regulating mercury emitted by coal-fired electric generating units (EGUs) as specified in NR 446 subchapters II and III, Wis. Adm. Code.

II. Background

Mercury is a hazardous pollutant that bio-accumulates in the environment and impacts human and wildlife health. This impact resulted in the need to issue a state-wide advisory for the consumption of fish for all Wisconsin waters. In addressing this impact the Natural Resource Board made a “health-based finding” in 2008 in accordance with Wisconsin Statute 285.27(2)(b) that requires reduction of mercury emitted by coal-fired EGUs. To fulfill this finding, the state enacted the state mercury rule under NR 446 subchapters II and III, Wis. Adm. Code. Subchapter II initiated a first phase of mercury reductions starting in 2010 and subchapter III sets a second phase of deeper mercury reductions to begin on January 1, 2015.

The U.S. Environmental Protection Agency (EPA) recently promulgated two federal mercury control rules regulating the same coal-fired EGUs that are subject to the state mercury rule. The two federal rules are the Mercury and Air Toxics Standards (MATS) promulgated on February 16, 2012¹, and the Industrial, Commercial, and Institutional (ICI) Boiler rule finalized on January 31, 2013². These rules target deep mercury control efficiencies with initial compliance dates of April 16, 2015 for the MATS rule and January 31, 2016 for the ICI Boiler rule, respectively. The federal rules implement maximum achievable control technology (MACT) for controlling mercury emissions as required under Section 112 of the Clean Air Act. An important consideration is that both federal rules are currently the subject of legal challenges. This situation makes the final disposition and implementation of either federal rule unclear at this time.

The interaction of mercury requirements between the state and federal rules is directed by existing Wisconsin law under s. 285.27(2)(d), Wis. Stats. Under this provision, EGUs will be exempt from state mercury rule requirements when EGU operators begin regulating mercury emissions in accordance with the MATS and ICI Boiler rules. This statute provides:

¹ U.S. EPA, 2012, *National Emission Standards for Hazardous Air Pollutants From Coal and Oil-Fired Electric Utility Steam Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small Industrial-Commercial-Institutional Steam Generating Units*; Federal Register, Volume 32, No. 32, February 16, 2012.

² Initially Promulgated: U.S. EPA, 2011, *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers*; Federal Register, Volume 76, No. 54, March 21, 2011. Finalized Reconsideration: U.S. EPA, 2013, *National Emission Standards for Hazardous Air Pollutants for Major Sources: Industrial, Commercial, and Institutional Boilers*; Federal Register, Volume 78, No. 21, January 31, 2013.

“Emissions limitations promulgated under par. (b) and related control requirements do not apply to hazardous air contaminants emitted by emissions units, operations, or activities that are regulated by an emission standard promulgated under section 112 of the federal clean air act.”

Lastly, the promulgation of the federal rules triggered a requirement under the state mercury rule concerning the interaction between the state and federal rules. This requirement, under s. NR 446.19 (2), Wis. Adm. Code, specifies that the Department will provide the Board with a comparison of the state and federal rule requirements and any recommendations for changes to the state rule. This report fulfills that requirement.

III. Comparison of State and Federal Rules

Rule Requirements

As stated, subchapter II of the state mercury rule initiated a first phase reduction in 2010. This requirement called for the four largest utility companies in Wisconsin to achieve 40 percent control in mercury emissions. The affected utilities include We Energies, Wisconsin Power and Light (Alliant), Wisconsin Public Service Corporation, and Dairyland Power Cooperative.

The federal rules first regulate EGU mercury emissions after the second phase of the state rule begins on January 1, 2015. Therefore, the comparison of state and federal rules focuses on comparing the second phase of the state rule (subchapter III) to the federal requirements. A summary of the emission limitations and compliance requirements for each rule is provided in Table 1. A list of affected EGUs and applicable requirements under each rule is provided in Appendix A.

The Department anticipates 35 EGUs will be subject to the state rule second phase requirements. The second phase requirements are developed and set based on EGUs being larger or smaller than 150 megawatts (MW). Therefore, emission limitations are referred to as “Large” or “Small” EGU requirements.

Under the second phase of the state rule, all but four of the EGUs smaller than 150 MW have been designated by their operators to comply with the Large EGU emission limits. This compliance option is preferred by operators to allow averaging the Small EGUs emissions with Large EGUs under their operation. The outcome is that 31 EGUs (Large and Small) are designated for compliance under the state rule Large EGU limits. The remaining four Small EGUs, operated by Manitowoc Public Utilities (MPU) and Xcel Energy, are subject to operation of Best Available Control Technology (BACT). BACT is determined individually for each EGU, but for this report 80 percent reduction is assumed as the representative control level.

In looking at the federal rules, all of the 31 EGUs subject to the state rule Large EGU requirements are subject to the MATS requirements. Therefore, whether under the state or federal rules, 31 of the 35 EGUs will be subject to emission limitations representing deep mercury control. All of these EGUs, under both rules, are also required to demonstrate

compliance using continuous emissions monitoring systems (CEMS). Therefore, the major difference between the rules to this point is that the MATS requirements on April 16, 2015 begin 3.5 months after the state rule requirements.

Table 1. Comparison of Rule Requirements: State vs. Federal

Rule Element	State Rule Second Phase	Federal MATS Rule	Federal ICI Boiler rule
Number of EGUs	35	32	3
Initial Compliance	January 1, 2015	April 16, 2015	January 31, 2016
<u>Emission Limits</u> Large EGU or Elected Small EGU ¹	31 EGUs a. 90% Control (~ 1.0 lbs/TBtu) or 0.008 lbs/GWh b. Annual Average	32 EGUS a. 1.2 lbs / TBtu or 0.013 lbs/GWh b. 30 day average	N/A
<u>Emission Limits</u> Small Units EGU ²	4 EGUs BACT ³ (~ 80% control)		3 EGUs 3.1 lbs/TBtu
Monitoring	CEMS ⁴	CEMS	Stack Test 2x / Year
Additional Compliance Option	<u>MPO Hg Reductions</u> ⁵ 2015: 70% or 0.013 lbs/Gwh 2018: 80% or 0.011 lbs/GWh 2021: 90% of 0.008 lbs/GWh	1-Year Extension (<i>case-by-case</i>)	1-Year Extension (<i>case-by-case</i>)
Emissions Averaging	a. Emission limits same as primary requirement b. Averaging across corporate <u>EGU fleet</u>	a. 1.0 lbs / TBtu or 0.011 lbs/GWh on 90 day average b. Average across EGUs at <u>facility</u>	Facility

- 1) Large and Small EGUs are defined as coal-fired units either larger or smaller than 150 megawatts in capacity. All small EGUs in the state, except for 4 EGUs at Manitowoc Public Utilities and Xcel Energy have elected to meet Large EGU emission requirements. Small EGUs meeting Large EGU standards can average emissions with Large EGUs.
- 2) Small EGUs include 4 EGUs operated by Manitowoc Public Utilities and Xcel Energy.
- 3) BACT – Best Available Control Technology.
- 4) CEMS – Continuous Emissions Monitoring System
- 5) MPO Hg reductions – Multi-pollutant control option (MPO) allows for phased mercury (Hg) reductions, while controlling NOx and SO2 emissions. We Energies elected to apply the MPO option to 10 EGUs.

In comparing the state Large EGU and MATS rule requirements further, the MATS rule compliance requirements are structured more stringently than the state rule. Although the federal emission limitation appears less stringent than the state rule (e.g. 0.013 lbs/GWh vs. 0.008 lbs/GWh), compliance with the MATS limit is demonstrated each day based on the average of the previous 30 days of emissions (30-day rolling average). The state rule is much more flexible,

with compliance based on averaging the previous 12 months of emissions (12-month rolling average). Another significant difference is that the state rule allows utility operators to average emissions over their entire fleet of EGUs. In contrast, both of the federal rules (MATS and ICI Boiler) limit emissions averaging to EGUs at a single power plant.

The result of both the format of the emission limits and restriction to emissions averaging is that the MATS rule will likely require more EGUs to comply on a unit-by-unit basis. For this reason, the federal rules may require more and deeper control equipment installations than the state rule in meeting initial 2015 requirements. A number of these EGUs are older and less efficient and do not warrant the investment of additional controls. Therefore, operators are more likely to retire older, less efficient EGUs under the federal rules as compared to the state rule. To account for the more stringent regulatory approach, the federal rules do allow for a one year extension granted on a case-by-case basis by the state or local air permitting authority.

The state rule has an additional compliance option that adds significant flexibility as compared to the MATS rule. This is called the multi-pollutant option (MPO), where the EGU operators can phase in mercury reductions from 70 percent in 2015 to 90 percent by 2021. This flexibility is allowed while achieving reductions of sulfur dioxide and nitrogen oxide emissions. We Energies elected to apply this MPO compliance alternative to ten EGUs.

The last comparison is between the four Small EGUs subject to state rule BACT requirements and the federal rules. One of these four EGUs is subject to MATS and therefore the deep control emission limitations and CEMS monitoring requirement. In this case, the MATS rule is likely as stringent as the state BACT requirement. The remaining three EGUs will be subject to the ICI Boiler rule and state BACT requirement. A major difference between the rules is that the emission limitations under the state BACT may vary between each EGU whereas one emission limit is consistently applied under the federal rule to all of the affected EGUs. The state rule will also require CEMS for these three EGUs versus simple periodic stack testing required under the ICI Boiler rule. Therefore, the ICI Boiler rule is more straight-forward in applying emission requirements and less costly for compliance monitoring than the state rule for the smallest EGUs subject to BACT.

Mercury Emissions and Timing

A primary measure in comparing the state and federal rules is to look at the overall control efficiency and mass emission levels achieved under each rule. This information is provided in Table 2. The presented control efficiencies are estimated by comparing the mass emissions in each case to an established baseline of uncontrolled mercury emissions (which reflects the mercury content of the consumed fuel). Refer to Appendix A for baseline emissions, Appendix B for 2012 actual and 2014 projected emissions, and Appendix C for the projection of emissions under each rule option in 2015 and later years.

In addition to comparing the state and federal requirements for 2015 and later years, Table 2 shows emission levels achieved under phase one of the state mercury rule. In 2012, the utilities reported total mercury emissions of 1,162 pounds, which is a 73 percent reduction from the uncontrolled baseline of 4,275 pounds per year.

Before the second phase of the state rule or federal requirements apply, further emission reductions are anticipated due to committed nitrogen oxides (NOx) and sulfur dioxide (SO₂) pollution control equipment. These installations are expected to further decrease mercury to a rate of 919 pounds per year by 2014 or approximately 79 percent control efficiency. In this context, a high level of overall mercury reduction is expected by the end of 2014, prior to the applicability of the state rule second phase or federal rule requirements. This 2014 emission level is therefore used as the baseline to estimate additional reductions that result from requirements beginning after 2015.

Table 2. Summary of Statewide Mercury Control and Emissions

	State		Federal	
	% Control	Emissions (lbs) ^{2,4}	% Control	Emissions (lbs) ^{2,5}
Baseline ¹	NA	4,275	--	--
2012 ³	73%	1,162	--	--
2014	79%	919	--	--
2015	83 – 87%	550 – 743	84 – 86%	584 – 663
2016	83 – 87%	550 – 743	87 – 89%	446 – 558
2021	89 – 92%	345 – 449	87 – 89%	446 – 558

1. “Baseline” means the uncontrolled baseline emissions. The uncontrolled baseline emissions scenario represents the amount of mercury contained in fuels during the baseline year(s). For major utilities, the uncontrolled baseline emissions is determined from 2002 to 2004 data as required under s. NR 446.06, Wis. Adm. Code. For remaining sources, the uncontrolled baseline emissions are calculated from 2011 fuel consumption and applying appropriate 2011 control efficiencies and reported emissions.
2. The estimated annual mercury emissions are based on implementation of subchapter III of NR 446, Wis. Adm. Code, as published in the Wisconsin Administrative Register on November 30, 2008, and the federal rules as promulgated on March 21, 2011 (76 FR 15608) for the ICI Boiler rule and February 16, 2012 (77 FR 9303) for the EGU MATS rule.
3. 2012 Emissions – Emissions as reported under NR 446 Subchapter II, Wis. Adm. Code, by major utilities. For remaining sources it is the sum of reported emissions for 2011 or 2011 fuel consumption multiplied by the applicable emission requirements or control efficiency.
4. State 2015 to 2021 Emissions – Emissions are calculated by applying emission limitations to 2011 operating levels. The MPO emission limits are applied for EGUs designated for compliance under that option. Emissions are presented as a range due to the different emission limitations and compliance approaches allowed under the rule.
5. Federal 2015 and Later Year Emissions – Emissions are calculated based on application of MATS or ICI Boiler rule emission limits to 2011 operating levels. Emissions are presented as a range due to the different emission limitations and compliance approaches allowed under the rule.

The Department projected emissions that result from implementing the state rule and the federal rules based on the rule requirements presented in Table 1. The resulting range in emissions for 2015 and later years reflects flexibilities, including the MPO option, and different emission limitations that are applicable under each rule. Of particular note is that the impact of the state and federal rules is calculated based on each rule functioning in the absence of the other. This means that the emissions impact for the federal rule in 2015 is determined by carrying forward projected 2014 emissions into 2015 for three and a half months until the federal emission control requirements become effective on April 16, 2015. The emissions and control efficiency change in 2016 because the federal rules are effective for the full year. The state rule total emission

levels are decreasing from 2015 through 2021 because of the MPO compliance option that We Energies is following.

The information in Table 2 highlights the following points in comparing the state and federal rules:

- For the compliance year 2015, estimates show that the state and federal rules may yield similar reduction results. The state rule alone is estimated to bring mercury emission levels down to between 550 to 743 pounds in 2015. The federal rule alone reduces emission levels to between 584 to 663 pounds of mercury in 2015.
- By 2016 the federal rules are fully implemented and result in total emissions lower than may be achieved under the state rule. After 2016, the federal rule emission levels and control efficiencies are not anticipated to change due to rule requirements.
- By 2021, the state rule is expected to achieve lower emissions than the federal rules by approximately 109 pounds.
- When fully implemented the state rule is expected to achieve 89 to 92 percent control efficiency and the federal rules together achieve 87 to 89 percent control efficiency.

It must be noted that the projections do not account for larger compliance margins anticipated under the federal MATS rule in meeting 30-day rolling emission limits compared to the state rule annual emission limits.

IV. Recommended Changes to NR 446 Subchapter III, Wis. Adm. Code.

The Department evaluated the interaction of the state and federal rules and is providing the following recommendation for changing the state mercury rule. The assessment and recommendation for potential rule changes is required under NR 446.19(2), Wis. Adm. Code.

Recommendation: The Department recommends modifying the state mercury rule to begin second phase emission reductions on April 16, 2016, instead of on the current January 1, 2015 compliance date.

This proposed rule change is consistent with state law in providing that EGUs will be regulated under federal rules instead of the state mercury rule. Basically, the federal rules are the long-term requirement for regulating EGU mercury emissions. In addition, the proposed rule change maintains the current state rule mercury emission requirement until the federal emission requirements become effective.

This recommendation is made for the following reasons:

- State law already provides that EGUs will be exempt from the state mercury rule when emissions are regulated by the federal rules as provided in s. 285.27(2)(d), Wis. Stats. The proposed change in compliance dates will allow EGUs to be regulated first under the

federal rules and thus, according to state law, be exempt from the second phase of the state requirements before they apply.

- Responding to different requirements under the state and federal rules on the current staggered compliance schedule will likely result in additional complexity, cost and compliance burden. This approach will avoid this issue. The added cost and burden may result from planning for two different rule requirements and meeting state requirements for only a short period of time. An example of the difference between rule requirements is the state rule's unit-by-unit BACT requirement versus a single emission limit under the federal rules. Another example is the individual EGU compliance focus of the federal rules.
- For the 2015 compliance year, extending the state rule compliance date does not result in a definable difference in total emitted mercury as compared to applying only the state rule second phase requirements. In 2015, the projected federal rule emission levels range from 80 pounds less to 34 pounds more than the state rule. This overlap in emissions assumes that the first phase of state rule requirements will remain in place until the federal rules are effective.
- The proposed compliance date of April 16, 2016 aligns better with the federal requirements. The proposed compliance date ensures that facilities can obtain a one-year extension to complying with federal MATS rule standards, as needed, and at the same time not be subject to the second phase requirements of the state rule. This extension may be needed to allow for installing control equipment or placing new generation equipment while maintaining electric reliability. The Department does not anticipate that an extension will be needed for the EGUs subject to the ICI Boiler rule and that rule's later compliance date.
- The proposed rule change will continue the current state mercury rule requirements until emissions are regulated under the federal rules.

The Department believes that extending the rule compliance date addresses potential state and federal rule conflicts and maintains current policy regarding control of EGU mercury emissions.

Appendix A

Affected EGUs Baseline Emissions and Rule Requirements

The definition of affected sources and the total number of EGUs affected under each rule is presented in Table A1. A full list of affected EGUs is contained as part of this appendix. For the purposes of this discussion, an EGU is the entirety of a boiler and the electric generator that is driven by the boiler’s steam output. Since mercury emissions are the result of the boiler operation, references to “EGU” or “source” emissions in the report refer to mercury emitted by the individual boiler supplying steam to the electric generator.

Table A1. Applicability of State and Federal Rules

	ch. NR 446 Subchapter III	Federal MATS	Federal ICI Boiler
Definition of Regulation	A coal fired EGU serving at any time since the startup of the unit’s combustion chamber a generator with nameplate capacity of more than 25 MW that produces electricity for sale.	A fossil fuel-fired combustion unit of more than 25 MW serving a generator that produces electricity for sale.	Any solid fuel-fired boiler larger than 10 mmBtu/hr not subject to MATS
Effective date of Emission Limits	January 1, 2015	April 16, 2015	January 31, 2016
No. of Coal-Fired Boilers	35	32	3
Boiler Size (MW)	22 – 615	25 – 615	22 – 25
Uncontrolled Baseline Emissions (lbs.) ¹	4,275	4,260	15

1. For those EGUs subject to ch. NR 446 Subchapter II, *Wis. Adm. Code*, the uncontrolled baseline emissions are the 2008 baseline emissions determined for EGUs operated by major utilities. For EGUs not subject to ch. NR 446 subchapter II, *Wis. Adm. Code*, the uncontrolled baseline emissions are estimated using 2011 fuel consumption, reported emissions, and current applicable control efficiencies. Refer to the table on page 10 for the uncontrolled baseline emissions of each EGU.

Under subchapter III of the state rule, an affected source is a coal-fired boiler, which feeds steam to a generator of 25 MW or larger. There are currently 35 coal-fired boilers in Wisconsin that, if operating in 2015, will be subject to state mercury rule 2015 requirements. As shown in Table A1, the actual size of these boilers ranges from 22 MW to 615 MW. Of these 35 boilers, three are smaller than 25 MW. The boilers smaller than 25 MW are subject to the state rule because

they supply steam in common with other boilers to generators larger than 25 MW. In contrast, the applicability of the MATS rule is based on the size of the boiler. Therefore, these three boilers are not subject to the MATS rule and are instead subject to the ICI Boiler rule. In summary, of the 35 boilers affected by the state mercury rule 32 boilers are subject to the MATS rule and three boilers are subject to the ICI Boiler rule. The three boilers subject to the ICI Boiler rule are Bayfront Unit 1 – 22 MW, Bayfront Unit 2 – 22 MW, and Manitowoc Public Utility Unit 8 – 22 MW.

Table A1 shows the “uncontrolled baseline emissions,” which represent the amount of mercury contained in fuel consumed by the EGUs. For the EGUs operated by major utilities, these values are the uncontrolled baseline emissions measured in 2008 as required under subchapter II. For those sources not subject subchapter II, the baseline uncontrolled emissions are estimated by applying factors of 2011 fuel consumption, reported emissions, and reported or required control efficiencies. The uncontrolled baseline emissions and source for each EGU are listed at the end of this appendix. These values for uncontrolled baseline emissions are not absolute but provide a relative comparison of emission requirements under each rule.

As summarized in Table A1, the 35 boilers subject to the state mercury rule have total uncontrolled baseline mercury emissions of 4,246 pounds per year. The sources affected by the MATS rule have total uncontrolled baseline emissions of 4,231 pounds per year. This is approximately 99.7 percent of the EGU total of 4,246 pounds. The EGUs affected by the ICI Boiler rule account for the remaining pounds per year of uncontrolled baseline emissions. This shows that the MATS rule regulates the vast majority of sources and emissions regulated by the state rule.

Note: Madison Gas and Electric (MGE) switched three coal-firing boilers at their Blount Street facility to natural-gas-firing boilers. Likewise, Xcel Energy plans to fire natural gas in their largest boiler at the Bayfront facility, which is currently fired with coal. Accordingly, these boilers will not be subject to state and federal requirements. Therefore they are not included in the analysis for this report.

EGU / Boiler	Boiler Capacity (MW)	Generator Capacity (MW)	Baseline Uncontrolled Emissions (Mercury in Fuel)	Baseline Controlled Emissions	Baseline Notes	NR 446 Applicability				Federal Applicability		
						EGU Category	Emission Limit Election	Input Limit (% Control)	Output Limit (lbs/GWh)	Rule	Input Limit (lbs/TBtu)	Output Limit (lbs/GWh)
Elm Road 1	615	615	273.8	27.38	1	Large		90%	0.008	MATS	1.2	0.013
Elm Road 1	615	615	326.0	32.60	1	Large		90%	0.008	MATS	1.2	0.013
Pleasant Prairie 1	580	580	463.0	424.40	2	Large		90%	0.008	MATS	1.2	0.013
Pleasant Prairie 2	580	580	480.0	385.40	2	Large		90%	0.008	MATS	1.2	0.013
Weston 4	519	519	332.2	56.00	1	Large		90%	0.008	MATS	1.2	0.013
Columbia 2	512	512	300.0	200.40	2	Large		90%	0.008	MATS	1.2	0.013
Columbia 1	511	511	320.0	249.60	2	Large		90%	0.008	MATS	1.2	0.013
Edgewater 5	380	380	213.0	161.90	2	Large		90%	0.008	MATS	1.2	0.013
Genoa	376	376	117.0	38.70	2	Large		90%	0.008	MATS	1.2	0.013
JPM	374	374	119.0	33.80	2	Large		90%	0.008	MATS	1.2	0.013
Weston 3	337	337	246.0	224.90	2	Large		90%	0.008	MATS	1.2	0.013
Edgewater 4	330	330	161.0	124.00	2	Large		90%	0.008	MATS	1.2	0.013
Oak Creek 8	305	305	100.0	73.50	2	Large		90%	0.008	MATS	1.2	0.013
Oak Creek 7	280	280	125.0	89.90	2	Large		90%	0.008	MATS	1.2	0.013
Oak Creek 6	260	260	91.0	80.70	2	Large		90%	0.008	MATS	1.2	0.013
Oak Creek 5	258	258	95.0	51.50	2	Large		90%	0.008	MATS	1.2	0.013
Pulliam 8	135	135	80.0	52.90	2	Small	Large	90%	0.008	MATS	1.2	0.013
Nelson Dewey 1	110	110	26.0	20.90	2	Small	Large	90%	0.008	MATS	1.2	0.013
Nelson Dewey 2	110	110	25.0	24.70	2	Small	Large	90%	0.008	MATS	1.2	0.013
Edgewater 3	60	60	36.0	29.00	2	Small	Large	90%	0.008	MATS	1.2	0.013
Pulliam 5	52	52	29.0	25.00	2	Small	Large	90%	0.008	MATS	1.2	0.013
Pulliam 6	67	67	42.0	40.40	2	Small	Large	90%	0.008	MATS	1.2	0.013
Pulliam 7	88	88	48.0	48.00	2	Small	Large	90%	0.008	MATS	1.2	0.013
Weston 1	68	68	43.0	39.20	2	Small	Large	90%	0.008	MATS	1.2	0.013
Weston 2	92	92	67.0	56.70	2	Small	Large	90%	0.008	MATS	1.2	0.013
Valley 1	62	62	8.0	1.70	2	Small	Large	90%	0.008	MATS	1.2	0.013
Valley 2	64	64	8.0	1.90	2	Small	Large	90%	0.008	MATS	1.2	0.013
Valley 3	70	70	8.0	1.00	2	Small	Large	90%	0.008	MATS	1.2	0.013
Valley 4	70	70	8.0	0.90	2	Small	Large	90%	0.008	MATS	1.2	0.013
Alma 4	59	59	15.0	1.40	2	Small	Large	90%	0.008	MATS	1.2	0.013
Alma 5	85	85	20.0	5.30	2	Small	Large	90%	0.008	MATS	1.2	0.013
MPU 9	33	33	6.4	1.28	3	Small		BACT - assume 80%	0.008	MATS	1.2	0.013
MPU 8	22	33	1.3	0.27	3	Small		BACT - assume 80%		ICI Boiler	3.1	
Bayfront 1	22	73	7.1	7.06	3	Small		BACT - assume 80%		ICI Boiler	3.1	
Bayfront 2	22	73	6.6	6.55	3	Small		BACT - assume 80%		ICI Boiler	3.1	
Total			4,275	2,619								
Sum Based on 446 Physical Size Category												
Large EGUS			3,791	2,255								
Small EGUs			484	364								
Sum Based on 446 Election of Emission Limit												
Large EGUS			4,254	2,604								
Small EGUs			21	15								
Sum Federal Rules												
MATS			4,260	2,605								
ICI Boiler			15	14								

Appendix B: EGU Mercury Emissions - Actual 2012 and Projected 2014

446 Category	Federal Rule	Facility	Unit	2011 Generation (MWh)	2011 Fuel (mmBtu)	2011 heat rate (btu/kwh)	2011 Emissions			2012 Emissions Total Lbs	2014 Projected Emission Levels		
							Total Lbs	Lbs/TBtu	lbs/GWh		Controls Added Since 2012	Control Efficiency	Total Lbs
Large	MATS	Alma	4	27,851	317,275	11,392	0.12	0.38	0.004	0.12			0.12
Large	MATS	Alma	5	75,114	853,048	11,357	0.88	1.03	0.012	0.60			0.60
Large	MATS	Columbia	1	3,558,075	37,755,265	10,611	293.40	7.77	0.082	309.40	FF / dFGD	50%	154.70
Large	MATS	Columbia	2	3,849,007	38,026,957	9,880	174.60	4.59	0.045	134.40	FF / dFGD	50%	67.20
Large	MATS	Edgewater	3	195,462	2,291,102	11,721	2.90	1.27	0.015	0.12			0.12
Large	MATS	Edgewater	4	1,906,827	19,236,917	10,088	24.10	1.25	0.013	20.30			20.30
Large	MATS	Edgewater	5	2,534,762	24,517,391	9,672	35.50	1.45	0.014	30.70	SCr	0%	30.70
Large	MATS	Genoa	1	951,672	9,251,203	9,721	47.10	5.09	0.049	72.30			72.30
Large	MATS	J P Madgett	1	2,149,970	22,484,457	10,458	26.17	1.16	0.012	22.79	running FGD by end	0%	22.79
Large	MATS	Nelson Dewey	1	565,125	6,719,100	11,890	21.70	3.23	0.038	10.90			10.90
Large	MATS	Nelson Dewey	2	595,046	7,121,281	11,968	21.70	3.05	0.036	20.90			20.90
Large	MATS	Pulliam	5	66,244	802,585	12,116	4.00	4.98	0.060	2.00			2.00
Large	MATS	Pulliam	6	121,674	1,487,869	12,228	8.00	5.38	0.066	5.00			5.00
Large	MATS	Pulliam	7	238,600	2,540,454	10,647	14.00	5.51	0.059	7.00			7.00
Large	MATS	Pulliam	8	565,271	5,794,040	10,250	30.00	5.18	0.053	20.00			20.00
Large	MATS	Weston	1	148,751	1,897,523	12,756	10.00	5.27	0.067	5.00			5.00
Large	MATS	Weston	2	369,794	3,929,054	10,625	22.00	5.60	0.059	17.00			17.00
Large	MATS	Weston	3	2,065,865	19,290,220	9,338	69.00	3.58	0.033	53.00			53.00
Large	MATS	Weston	4	4,049,374	33,222,446	8,204	56.48	1.70	0.014	50.22			50.22
Large - MPO	MATS	Elm Road	1	2,386,145	22,819,790	9,563	27.38	1.20	0.011	7.25			7.25
Large - MPO	MATS	Elm Road	2	2,884,252	27,166,595	9,419	32.60	1.20	0.011	18.84			18.84
Large - MPO	MATS	Oak Creek	5	1,331,679	14,538,266	10,917	59.69	4.11	0.045	40.63			40.63
Large - MPO	MATS	Oak Creek	6	1,191,885	12,645,649	10,610	54.83	4.34	0.046	51.61			51.61
Large - MPO	MATS	Oak Creek	7	1,382,481	14,392,650	10,411	70.66	4.91	0.051	66.92	SCR/FGD	10%	60.23
Large - MPO	MATS	Oak Creek	8	1,883,905	19,249,900	10,218	85.83	4.46	0.046	65.39	SCR/FGD	10%	58.85
Large - MPO	MATS	Pleasant Prairie	1	3,906,402	42,981,785	11,003	73.55	1.71	0.019	71.53			71.53
Large - MPO	MATS	Pleasant Prairie	2	2,889,083	32,102,308	11,112	33.40	1.04	0.012	42.81			42.81
Large - MPO	MATS	Valley	1	244,733	3,621,554	14,798	0.04	0.01	0.000	0.12			0.12
Large - MPO	MATS	Valley	2	195,355	2,890,859	14,798	0.11	0.04	0.001	0.12			0.12
Large - MPO	MATS	Valley	3	124,380	1,840,581	14,798	0.06	0.03	0.000	0.08			0.08
Large - MPO	MATS	Valley	4	182,630	2,702,555	14,798	0.06	0.02	0.000	0.09			0.09
Small	MATS	Manitowoc	9	282,000	2,471,166	8,763	1.28	0.52	0.005	1.28			1.28
Small	ICI Boiler	Manitowoc	8	41,635	431,800	10,371	0.27	0.62	0.006	0.27			0.27
Small	ICI Boiler	Bay Front	1	95,585	1,643,806	17,197	7.06	4.29	0.074	7.06	fabric filter	60%	2.82
Small	ICI Boiler	Bay Front	2	93,367	1,605,247	17,193	6.55	4.08	0.070	6.55	fabric filter	60%	2.62
Total				43,150,001	440,642,697		1,315	2.98	0.030	1,162			919
Sum Based on 446 Elected Emission Limit													
Large EGU				42,637,413	434,490,678		1,300	2.99	0.030	1,147			912
Small EGU				512,588	6,152,019		15	2.46	0.030	15			7
Sum Federal Rules													
MATS				42,919,413	436,961,844		1,301	2.98	0.030	1,148			913
ICI Boiler				230,588	3,680,853		14	3.77	0.060	14			6

Appendix C: EGU Mercury Emissions - Projected 2015 – 2021 for the State and Federal Rule

446 Category	Federal Rule	Facility	Unit	Federal Rules (MATS & ICI Boiler)				State Mercury Rule w/ Multipollutant Option					
				Output 30day	Output 90day	Input 30day	Input 90day	2015		2018		2021	
								Output	Input	Output	Input	Output	Input
Large	MATS	Alma	B4	0.4	0.3	0.4	0.3	0.2	0.3	0.2	0.3	0.2	0.3
Large	MATS	Alma	B5	1.0	0.8	1.0	0.9	0.6	0.9	0.6	0.9	0.6	0.9
Large	MATS	Columbia	1	46.3	39.1	45.3	37.8	28.5	37.8	28.5	37.8	28.5	37.8
Large	MATS	Columbia	2	50.0	42.3	45.6	38.0	30.8	38.0	30.8	38.0	30.8	38.0
Large	MATS	Edgewater	3	2.5	2.2	2.7	2.3	1.6	2.3	1.6	2.3	1.6	2.3
Large	MATS	Edgewater	4	24.8	21.0	23.1	19.2	15.3	19.2	15.3	19.2	15.3	19.2
Large	MATS	Edgewater	5	33.0	27.9	29.4	24.5	20.3	24.5	20.3	24.5	20.3	24.5
Large	MATS	Elm Road	1	27.4	27.4	27.4	22.8	45.3	27.4	31.0	27.4	19.1	27.4
Large	MATS	Elm Road	2	32.6	32.6	32.6	27.2	54.8	32.6	37.5	32.6	23.1	32.6
Large	MATS	Genoa	1	12.4	10.5	11.1	9.3	7.6	9.3	7.6	9.3	7.6	9.3
Large	MATS	J P Madgett	B1	27.9	23.6	27.0	22.5	17.2	22.5	17.2	22.5	17.2	22.5
Large	MATS	Nelson Dewey	1	7.3	6.2	8.1	6.7	4.5	6.7	4.5	6.7	4.5	6.7
Large	MATS	Nelson Dewey	2	7.7	6.5	8.5	7.1	4.8	7.1	4.8	7.1	4.8	7.1
Large	MATS	Pleasant Prairie	1	50.8	43.0	51.6	43.0	74.2	128.9	50.8	86.0	31.3	43.0
Large	MATS	Pleasant Prairie	2	37.6	31.8	38.5	32.1	54.9	96.3	37.6	64.2	23.1	32.1
Large	MATS	Pulliam	5	0.9	0.7	1.0	0.8	0.5	0.8	0.5	0.8	0.5	0.8
Large	MATS	Pulliam	6	1.6	1.3	1.8	1.5	1.0	1.5	1.0	1.5	1.0	1.5
Large	MATS	Pulliam	7	3.1	2.6	3.0	2.5	1.9	2.5	1.9	2.5	1.9	2.5
Large	MATS	Pulliam	8	7.3	6.2	7.0	5.8	4.5	5.8	4.5	5.8	4.5	5.8
Large	MATS	South Oak Creek	5	17.3	14.6	17.4	14.5	25.3	43.6	17.3	29.1	10.7	14.5
Large	MATS	South Oak Creek	6	15.5	13.1	15.2	12.6	22.6	37.9	15.5	25.3	9.5	12.6
Large	MATS	South Oak Creek	7	18.0	15.2	17.3	14.4	26.3	43.2	18.0	28.8	11.1	14.4
Large	MATS	South Oak Creek	8	24.5	20.7	23.1	19.2	35.8	57.7	24.5	38.5	15.1	19.2
Large	MATS	Valley	1	3.2	2.7	4.3	3.6	4.6	10.9	3.2	7.2	2.0	3.6
Large	MATS	Valley	2	2.5	2.1	3.5	2.9	3.7	8.7	2.5	5.8	1.6	2.9
Large	MATS	Valley	3	1.6	1.4	2.2	1.8	2.4	5.5	1.6	3.7	1.0	1.8
Large	MATS	Valley	4	2.4	2.0	3.2	2.7	3.5	8.1	2.4	5.4	1.5	2.7
Large	MATS	Weston	1	1.9	1.6	2.3	1.9	1.2	1.9	1.2	1.9	1.2	1.9
Large	MATS	Weston	2	4.8	4.1	4.7	3.9	3.0	3.9	3.0	3.9	3.0	3.9
Large	MATS	Weston	3	26.9	22.7	23.1	19.3	16.5	19.3	16.5	19.3	16.5	19.3
Large	MATS	Weston	4	52.6	44.5	39.9	33.2	32.4	33.2	32.4	33.2	32.4	33.2
Small	MATS	Manitowoc	9	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Small	ICI Boiler	Manitowoc	8	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Small	ICI Boiler	Bay Front	1	5.3	5.3	5.3	5.3	1.4	1.4	1.4	1.4	1.4	1.4
Small	ICI Boiler	Bay Front	2	5.1	5.1	5.1	5.1	1.3	1.3	1.3	1.3	1.3	1.3
Total				558	483	533	446	550	743	438	596	345	449
<i>Sum Based on 446 Elected Emission Limit</i>													
Large EGU				546	471	521	434	546	738	434	591	341	444
Small EGU				12	12	12	12	4	4	4	4	4	4
<i>Sum Federal Rules</i>													
MATS				547	472	523	436	547	740	435	593	342	446
ICI Boiler				11	11	11	11	3	3	3	3	3	3