

# Poisoning the Great Lakes: Mercury Emissions from Coal-Fired Power Plants In the Great Lakes Region

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## EXECUTIVE SUMMARY

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**M**ercury emitted into the air from coal-fired power plants is by far the leading man-made source of mercury deposition into the Great Lakes and the lakes, rivers, and streams of the Great Lakes region. While other such plants outside the region contribute to the problem, the report highlights the top 25 mercury polluting coal-fired plants in the Great Lakes States. The U.S. Environmental Protection Agency (EPA) recently issued nationwide rules to require coal-fired power plants to limit airborne mercury emissions and other toxic air pollutants by 2015. The technologies to meet the EPA's mercury limits are widely available and effective. A significant fraction of mercury and other air toxics can be removed by air pollution controls already installed or soon to be installed at many power plants. These technologies could reduce sulfur dioxide and other particle-forming pollutants enough to meet soot and smog standards. Other technology that would achieve additional reductions in mercury by removing at least 90 percent or more of the mercury in coal is readily available.<sup>1</sup>

Mercury is a naturally occurring element found in air, water, soil, and also in coal. When coal is burned to produce electricity, mercury is emitted into the air. The EPA estimates that coal-fired power plants are the largest man-made source of mercury pollution, accounting for 50 percent of mercury air emissions in the United States.<sup>2</sup>

Once mercury settles onto land and into water, certain microorganisms change the chemical into a highly toxic and persistent form—methylmercury—that builds up in shellfish, fish, and animals, including humans, that eat fish. Methylmercury is not easily broken down, and is slowly eliminated once it is absorbed. As a result, methylmercury moves up the aquatic food chain in a process known as bioaccumulation—concentrations increase as larger aquatic species consume smaller species contaminated with methylmercury.

Mercury can adversely affect the health of all humans, impacting the central nervous system and harming the brain, heart, kidneys, lungs, and immune system. Young children and developing fetuses are most at risk from the effects of mercury, which can damage their brains, and potentially

impact their ability to achieve the same standard of living later in life as their peers who are not exposed to mercury prenatally or during childhood. Subsistence fishers and Native American tribes whose cultural traditions involve consumption of fish and mammals are also extremely likely to be exposed to high levels of methylmercury.

The Great Lakes is the largest system of freshwater lakes in the world, containing one-fifth of the world's fresh surface water supply and nine-tenths of the United States supply. The region is comprised of the five Great Lakes (Erie, Ontario, Huron, Michigan, and Superior) and the eight surrounding states (Illinois, Indiana, Michigan, Minnesota, Ohio, Pennsylvania, New York, and Wisconsin). In addition to area residents, many tourists flock to these and the other numerous acres of inland lakes and rivers for recreation. In 2006, more than 11 million people, including 2.5 million children, fished in the Great Lakes and inland water bodies in the region.<sup>3</sup> Many people in the region rely on the Great Lakes fish through employment in the fishing industry or subsistence fishing.



The Great Lakes basin is considered a “net sink” for mercury, meaning more mercury is emitted and deposited in the basin than the amount that finds a way out of the basin through re-emission or down the St. Lawrence River, which drains the Great Lakes into the Atlantic Ocean.<sup>4</sup> The northern and eastern parts of the Great Lakes region are particularly sensitive to mercury deposition because of forest cover and surface water characteristics, including the water’s acidity, which allows the mercury that is deposited to more readily transform into methylmercury.<sup>5</sup>

In the eight states surrounding the five Great Lakes, there are more than 144 coal-fired power plants, pumping more than 13,000 pounds of mercury into the air every year.<sup>6</sup> Approximately 20 percent of those airborne mercury emissions are deposited locally, into the soil, rivers, and lakes.<sup>7</sup> Based on atmospheric deposition modeling conducted in 2005 by the EPA and the National Oceanic and Atmospheric Administration (NOAA), Lake Erie receives the largest amount of mercury deposition from coal-fired power plants nationally, followed by Lake Ontario, Lake Michigan, Lake Huron, and Lake Superior.<sup>8</sup>

Table 1 lists Great Lake states according to their level of mercury pollution from coal-fired power plants based on EPA projections for 2010. Ohio accounts for 21 percent of the total mercury emissions from power plants in the eight Great Lakes states; 12 power plants in Ohio and Indiana—owned in whole or part by American Electric Power—accounted for 19 percent of all mercury emitted in 2010 from the 144 coal-fired power plants in the region.<sup>9</sup>

All of the Great Lakes and the majority of the water bodies in the region are under fish consumption advisories, issued by state and provincial health agencies, due to mercury pollution. Mercury is the number one cause of fish consumption advisories in the region, and advisories have been increasing since 1993.<sup>10</sup>

A recently released report, “Great Lakes Mercury Connections: The Extent and Effects of Mercury Pollution in the Great Lakes Region,” issued by the Biodiversity Research Institute and the Great Lakes Commission, found the extent and magnitude of mercury pollution in the Great Lakes area is significantly greater than previously reported. The report compiled information from 35 peer-reviewed studies, based on the work of 170 scientists and other experts who used more than 300,000 mercury measurements and 45,000 samples from fish, birds, and other wildlife to evaluate

**Table 1: Mercury Emissions from Coal-Fired Power Plants in the Great Lakes States**

State	2010 Mercury Emissions from Coal-Fired Power Plants (per year)	Percent (%) of Total Power Plant Emissions in Great Lakes States	Top-Three Power Plants with Highest Mercury Emissions/Primary Owner or Parent Company/County
Ohio	2,865 pounds	21	Cardinal/AEP/Jefferson Muskingum River/AEP/Washington Walter C Beckjord/AEP/Clermont
Pennsylvania	2,720 pounds	20	Shawville/GenOn Energy/Clearfield Homer City/Edison International/Indiana Hatfield's Ferry/Allegheny Energy/Fayette
Indiana	2,174 pounds	16	Wabash River/Duke Energy/Vigo Clifty Creek /Ohio Valley Electric -AEP/Jefferson Rockport/AEP/Spencer
Michigan	1,924 pounds	14	Monroe/DTE Energy/Monroe Belle River/DTE Energy/ St. Clair St. Clair/DTE Energy/ St. Clair
Illinois	1,484 pounds	11	Newton/Ameren/Jasper Joppa Steam/Ameren/Massac Baldwin/Dynegy/Randolph
Wisconsin	1,269 pounds	9.5	Pleasant Prairie/We Energies/Kenosha Columbia/ Integrus Energy Services/Columbia South Oak Creek/We Energies/Milwaukee
Minnesota	873 pounds	6.5	Sherburne County/Xcel Energy/Sherburne Boswell/ALLETE/Itasca Allen S King/Xcel Energy/Washington
New York	239 pounds	2	Danskammer /Dynegy/Orange AES Somerset/AES/Niagara CR Huntley/NRG Energy/Erie

AEP=American Electrical Power

Note: Mercury emissions are based on estimates by the U.S. Environmental Protection Agency for 2010; the emissions numbers do not reflect any pollution controls installed at power plants since 2010.

Source: Based on the EPA's December 16, 2011 spreadsheet "Nationwide Current Base Inventory," (Docket ID EPA-HQ-OAR-2009-0234-19918) available at <http://www.epa.gov/ttn/atw/utility/utilitypg.html>.

current impacts of mercury pollution and trends in the Great Lakes region.<sup>11</sup> The study found that six of the 15 commonly consumed fish species have mercury levels that exceeded the EPA's recommendations for human consumption in 61 percent of the commission's study region.<sup>12</sup> The commission projects that future controls on atmospheric emissions of mercury "are expected to lower mercury concentrations in the food web, yielding multiple benefits to fish, wildlife and people in the Great Lakes region."<sup>13</sup>

Great Lakes fisheries have declined in the last 100 years due to overfishing and other environmental factors although, in recent years, there has been a resurgence in walleye, trout, and salmon populations. Still, many of the fish caught are not safe to eat due to various environmental contaminants—especially mercury. Unfortunately, state and provincial

governments are not consistent in the issuance of fish consumption advisories (for example, the state of Indiana has issued fish consumption advisories for bluegill in Lake Michigan, while the adjacent state of Michigan has not done so).

This contradictory information may confuse the public as to whether certain fish are safe to eat. Studies have shown that only half of Great Lakes fish consumers are aware of fish consumption advisories; women and minorities are much less likely to be aware of the warnings.<sup>14</sup> This is particularly important for some Native American groups, who consume fish as part of their cultural tradition and rituals.

Mercury contamination of fish is also harming local wildlife that survives primarily on fish. Iconic waterfowl such as the common loon and the great snowy egret are

being negatively impacted by exposure to methylmercury; scientists have found reduced survival rates and reproductive effects that could be causing population reductions.<sup>15</sup> Adverse effects from mercury-contaminated fish have also been observed in river otters and minks.<sup>16</sup> Mercury contamination is also affecting the viability of popular sport and commercial fish populations, such as walleye.

Due to the numerous adverse impacts attributed to mercury pollution from coal-fired power plants, an effective national standard is critical. Based on projected reductions in fine particulate emissions due to the combined benefits of various air toxic pollution controls, the EPA has projected that the benefits of its Mercury and Air Toxics Standards (MATS), expressed in monetary terms, far outweigh the costs of pollution controls. The rules will result in significant public health benefits (see Benefits of the U.S. Environmental Protection Agency's Mercury and Air Toxics Standards for Coal-Burning Power Plants). The health benefits of the MATS are projected to be worth \$37 to \$90 billion in 2016 alone (based on 2007 dollars), and, in comparison, the costs of implementation are only projected to be \$9.6 billion annually.<sup>17</sup> The EPA has projected that the majority of the benefits would be reaped in the eastern United States, including the Great Lakes region.

The MATS are long overdue; they originally were to be adopted under the Clean Air Act in 2002. Since pollution controls for mercury are both readily available and cost-effective, and given the myriad of public health and environmental benefits of reducing mercury emitted from the largest man-made source of airborne mercury emissions, there should be no further delay in implementing these rules.



#### **Benefits of the U.S. Environmental Protection Agency's Mercury and Air Toxics Standards for Coal-Burning Power Plants**

- 4,200 to 11,000 fewer premature deaths
- 2,800 fewer cases of chronic bronchitis
- 4,700 fewer heart attacks
- 5,700 fewer hospital/emergency room trips
- 6,300 fewer cases of acute bronchitis
- 140,000 fewer cases of respiratory symptoms
- 540,000 fewer days of missed work
- 130,000 fewer cases of aggravated asthma

Source: EPA Final MATS Summary Fact Sheet



# INTRODUCTION



@tlick/swimfinfan

Airborne mercury from coal-fired power plants in the Great Lakes Region harms our health, and the benefits of reducing mercury emissions are well worth the cost. The purpose of this report is to inform the public of the extent and impact of airborne mercury pollution, and to quantify mercury emissions from coal-fired power plants. This type of power plant is the largest man-made source of airborne mercury emissions in the United States, accounting for 50 percent of all mercury emitted into the air from anthropogenic sources.<sup>18</sup>

Roughly 20 percent of these airborne mercury emissions are deposited locally,<sup>19</sup> in soil, rivers, and lakes, where bacteria convert the mercury into its most toxic form—methylmercury. This toxic chemical is a known neurotoxin that affects brain development and can cause a host of other health issues. Persistent methylmercury is consumed by fish and accumulates in the aquatic food chain, putting all species that eat fish, including humans, at risk.

The EPA has recently issued rules that will require coal-fired power plants to reduce emissions of mercury and other air toxics. These rules are called the Mercury and Air Toxics Standards or “MATS” for power plants.

A recent report issued by the Biodiversity Institute and the Great Lakes Commission, which summarizes numerous recent scientific studies of the impacts of mercury in the Great Lakes region, found a “strong connection between mercury loadings to the region and mercury emissions in the region” (see the Press Release for the *Great Lakes Mercury Connections Report* at [www.briloon.org/mercuryconnections/greatlakes](http://www.briloon.org/mercuryconnections/greatlakes)). Thus, the EPA’s MATS rule requiring that coal-fired power plants significantly reduce mercury emissions will be of enormous benefit to the people, the wildlife, and ecosystems of the Great Lakes region.

The technology to comply with these rules exists; the health benefits gained, including the elimination of between 4,200 and 11,000 premature deaths in the United States annually, will far outweigh the costs of installing controls. The EPA has projected that by 2016 the health benefits of the mercury and air toxics rule will be \$37 to \$90 billion dollars, while the costs for implementation are estimated to be \$9.6 billion dollars. The EPA also projected that the eastern United States, which includes the Great Lakes region, will incur the majority of these benefits.

# I. MERCURY AIR POLLUTION FROM COAL-FIRED POWER PLANTS IN THE GREAT LAKES REGION

In 2010, the EPA estimated that nationwide air emissions of mercury from coal-fired power plants amounted to 58,000 pounds per year.<sup>20</sup> To provide a perspective of the impact these annual emissions have on our health, mercury is so highly toxic in very small amounts, that the U.S. Food and Drug Administration (FDA) has set a consumption limit for methylmercury at 1 part per million parts of seafood (1 ppm).<sup>21</sup> In the eight states that surround the Great Lakes, there are more than 144 coal-fired power plants which pumped over 13,000 pounds of mercury into the air in 2010.<sup>22</sup> Mercury emissions from power plants in the Great Lakes region account for close to 25 percent of the nation's mercury emission total.

Ohio emits the largest amount of mercury from coal-fired power plants (21 percent of the total in the Great Lakes region), followed closely by Pennsylvania (20 percent), Indiana (16 percent), and Michigan (14 percent) (see figure 1).

After several years of study and analysis, the EPA determined in 2000 that it was necessary and appropriate to regulate mercury and other air toxic emissions from power plants. As a result, the agency listed the electric utility industry for regulation.<sup>23</sup> The EPA adopted a mercury emissions trading rule in 2005, but that rule was declared illegal by a Federal Appeals Court in 2008.<sup>24</sup> Due to the delay in adopting federal restrictions on mercury, some Great Lakes states have instituted statewide rules requiring coal-fired power plants to reduce mercury emissions (see Appendix C).

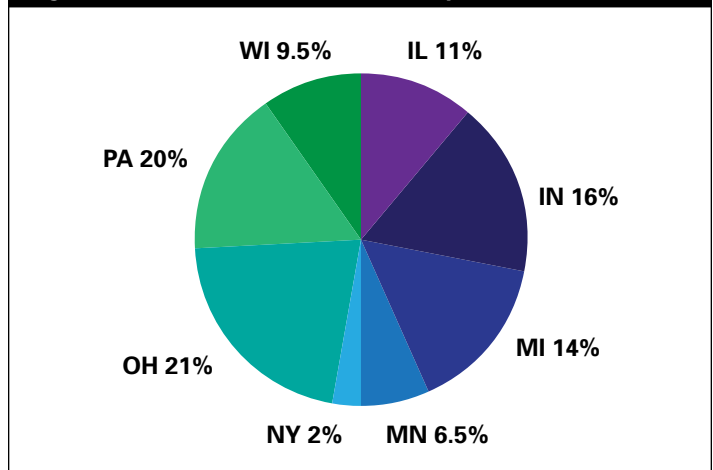
Nevertheless, in the top-three Great Lakes states for mercury emissions from power plants, no mercury reduction rules have been adopted in Ohio or Indiana, or rules have been overturned by the state courts, such as in Pennsylvania. The result is an unlevel playing field among regional power plant owners and residents of the Great Lakes area, which will persist until the EPA's MATs are implemented in 2015.

## *The three biggest emitters in the Great Lakes region—Ohio, Pennsylvania and Indiana—have no mercury reduction rules.*

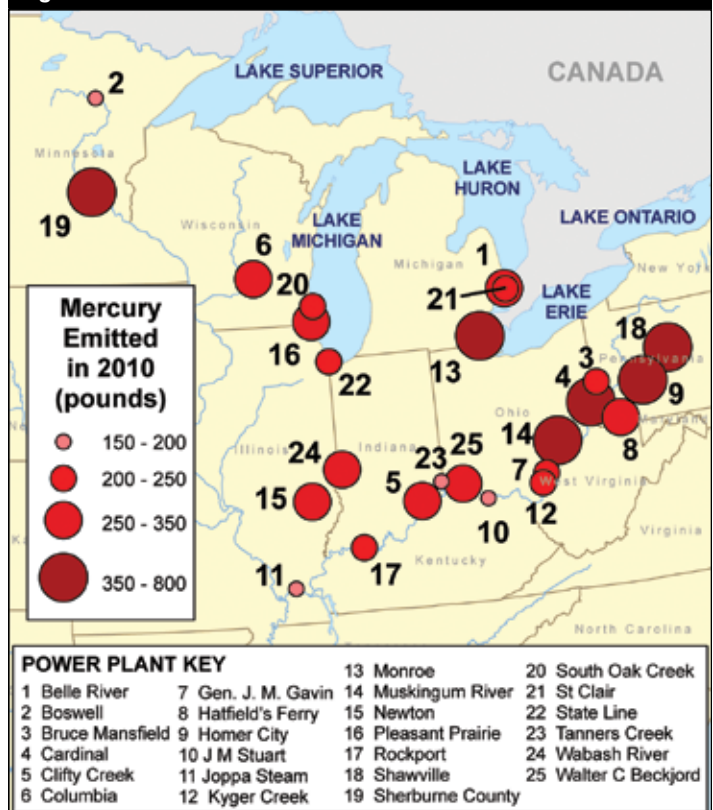
The 25 coal-fired power plants that emit the most mercury in the Great Lakes States contributed more than 7,000 pounds of the toxin to the air in 2010, more than half of all mercury air emissions from the 144 coal-fired power plants in the Great Lakes States (see figure 2).<sup>25</sup> Figure 3 shows the significant reductions in mercury emissions that would occur under the EPA's MATs.

Companies are planning to retire some of the units listed in figures 2 and 3 before compliance with the EPA's MATs is required. For example, American Electric Power (AEP)

**Figure 1: Percent of Mercury Emissions in the Great Lakes Region from Coal-Fired Power Plants, by State**

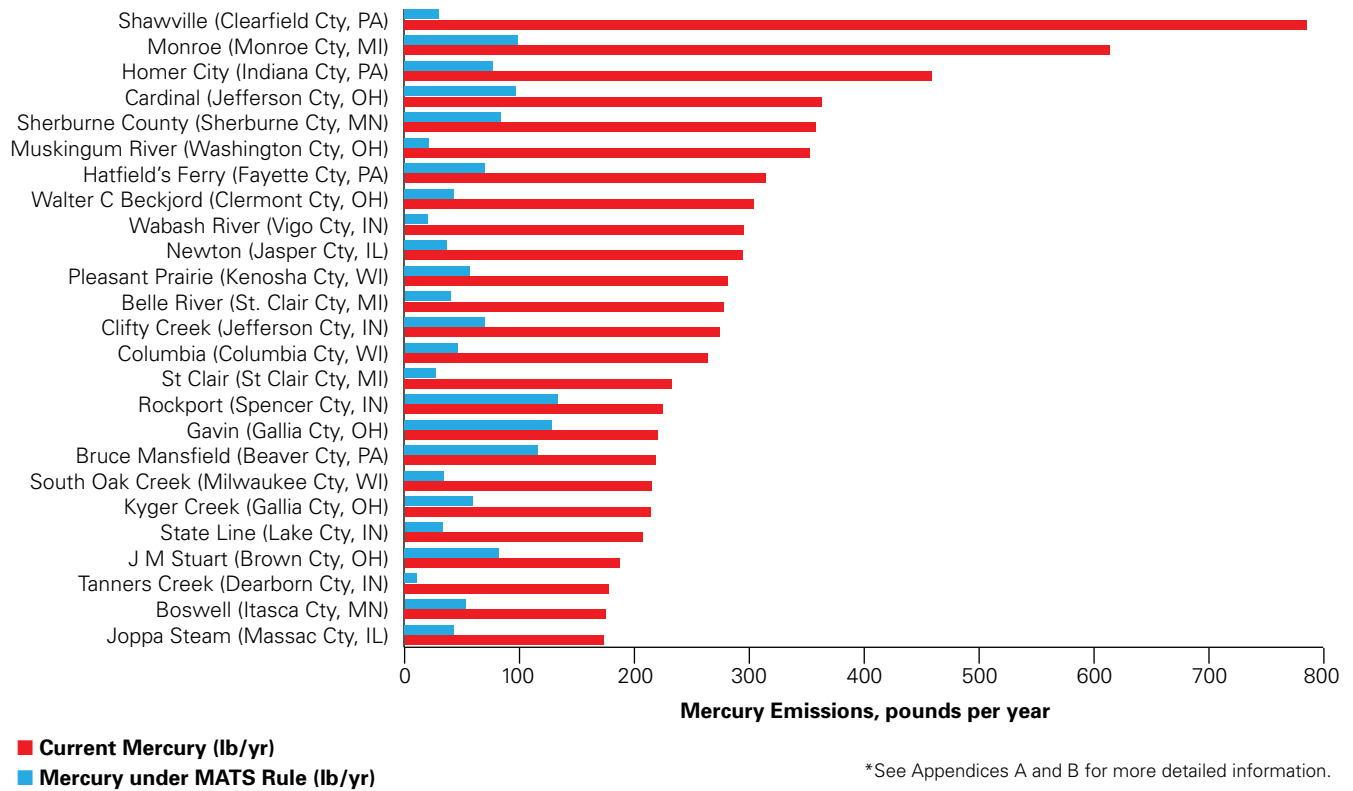


**Figure 2: Coal-Fired Power Plants in the Great Lakes States**



has announced plans to shut down Units 1 through 4 at the Muskingum River Plant, in Ohio.<sup>26</sup> These units have been operating for 50 to 60 years and are at the end of their useful lives. Other units planned for shutdown in the next few years include all of the State Line units in Indiana and Beckjord units in Ohio.<sup>27</sup>

**Figure 3: The 25 Power Plants in the Great Lakes Region with the Highest Mercury Emissions in 2010 and 2015 (Projected Emissions under the Environmental Protection Agency's Mercury and Air Toxics Standards).\***



The emissions figures for coal-fired power plants in this report are based on 2010 EPA mercury emissions estimates for each coal-fired electric utility generating unit that is more than 25 megawatts (MW) in generating capacity in the United States.<sup>28</sup> The EPA developed estimates based on actual emissions data collected in 2010 for roughly 15 percent of U.S. coal-fired power plants, which were used by the EPA in developing its emission standards for the MATS.<sup>29</sup> These emission estimates are thus likely to be more reliable than those provided by industry to the EPA under the Toxic Release Inventory, which has no consistent approach to reporting mercury emissions and need not be based on actual stack test data.<sup>30</sup> However, the EPA stated that its estimates may underestimate mercury emissions for certain units because they may not accurately account for poorly operated emissions controls (see Appendix A for more information).<sup>31</sup>

These decisions by utilities to shut down coal-fired power plants rather than invest in long-overdue modernizations of their pollution controls are business decisions that are driven by a number of factors well beyond EPA's MATS rule. Many utilities are choosing to close their aging, dirty coal-fired units because it is a quicker and cheaper way both to improve their environmental performance and save money that can then be invested in cleaner resources, such as energy efficiency and renewable energy. (In addition to the public health benefits of closing coal plants, each coal unit retirement would, on average, halt the emissions of more than one million tons of carbon pollution every year.)

Cleaner forms of energy have become increasingly cost-competitive to coal in recent years, and many of the coal-fired units that are now closing would likely have closed due to these and other factors even without EPA's MATS rule. Many of these units are 50-60 years old and are simply at the end of their useful life. As utilities transition away from their aging, dirty coal-fired power plants, it may unfortunately result in some job losses. However, it is very likely that jobs will be created as the utilities make new investments in cleaner energy, which will ultimately create more jobs and greatly benefit public health in the affected regions.

This report also provides the EPA's projections for mercury emissions from coal-fired power plants in 2015 under its MATS.<sup>32</sup> To develop these estimates, the agency used a planning model to forecast electricity dispatch, most cost effective expansions, retirements, and emission control strategies, taking into account the costs of the MATS and considering other environmental rules such as the EPA's Cross-State Air Pollution Rule (CSAPR) that was issued in July 2011.<sup>33</sup> The agency also included energy demands, and transmission and reliability constraints.<sup>34</sup> The EPA then used the results to determine the economic impacts of the control costs and to evaluate the environmental and economic benefits of the regulation.<sup>35</sup> The agency's planning model projected mercury and other air toxic emission levels for each electric generating unit in 2015.<sup>36</sup> These serve as the report's basis for the EPA's projections of mercury emissions under MATS.



## MERCURY POLLUTION FROM POWER PLANTS IN THE GREAT LAKES: A STATE-BY-STATE ANALYSIS

A closer look at each state's top emitters reveals a clear need for a broader approach to mercury control to ensure an effective and consistent regional solution to the mercury pollution in the Great Lakes.

### Ohio

Based on the EPA's mercury emission estimates for 2010, coal-fired power plants in the state of Ohio emit the largest amount of mercury of any Great Lakes state, comprising 21 percent of mercury emissions for the region at almost 2,900 pounds per year. Table 2 lists the top three power plants in Ohio.

The state of Ohio has not taken any action to control mercury emissions from coal-fired power plants, opting instead to wait for federal regulation. None of the top mercury emitters in Ohio have installed control technology specifically to reduce mercury, such as activated carbon injection, (see Appendix B). Given that 20 percent of mercury emissions from coal-fired power plants are deposited locally,<sup>38</sup> it is clear why Lake Erie is the most affected by mercury deposition from power plants.

Mercury emissions from coal-fired power plants in Ohio are expected to drop from 2,865 to 846 pounds per year by 2015 with MATS and due to planned retirement of some power plant units.

***Coal-burning power plants in the Great Lakes region owned in whole or in part by Columbus, Ohio-based American Electric Power account for 19 percent of the total mercury emissions from power plants in the Great Lakes region, which is by far the most of any utility in the region.***

**Table 2: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Ohio**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Cardinal	AEP	Jefferson	363	97
Muskingum River	AEP	Washington	353	21*
Walter C. Beckjord	AEP	Clermont	304	43**

AEP=American Electric Power

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

\* As stated above, AEP has announced plans to shut down Units 1 through 4 at the Muskingum River Plant by December 2014;<sup>37</sup> those emission reductions are not reflected in the 2015 projected emissions.

\*\* Duke Energy has announced that the Walter C. Beckjord Station will close in 2015; those emission reductions are not reflected in the 2015 projected emissions.

## Pennsylvania

Pennsylvania ranks second on the list of mercury emissions from coal-fired power plants in the Great Lakes states, with 20 percent of mercury emissions for the region. According to the EPA's 2010 mercury emission estimates, coal-fired power plants in this state emit more than 2,700 pounds of mercury per year. The Shawville Power Plant and Homer City Station are the first and third highest mercury-emitters of all coal-fired power plants in the Great Lakes region, respectively; see table 3 for the top-three.

In 2000, the state of Pennsylvania adopted a rule to cut mercury emissions from 1999 emission levels by 80 percent in 2010 and 90 percent in 2015, but implementation was blocked by a state court appeal in 2009. The EPA projects that emissions from coal-fired power plants in Pennsylvania will drop in 2015 from 2,720 to 746 pounds per year with the MATS rule.

**Table 3: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Pennsylvania**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Shawville	GenOn Energy	Clearfield	785	30
Homer City	Edison International	Indiana	459	77
Hatfield's Ferry	Allegheny Energy	Fayette	314	70

EPA=Environmental Protection Agency

MATS = Mercury and Air Toxics Standards

## Indiana

Indiana ranks third in total power plant mercury emissions, comprising 16 percent of the total emissions in the Great Lakes region in 2010; table 4 lists the top-three power plants in Indiana. More than 2,100 pounds of mercury are emitted per year from coal-burning power plants in the state.

Indiana has not enacted any regulatory requirements for mercury control at coal-fired power plants.

Emissions from coal-fired power plants in Indiana are projected to decrease from 2,174 to 754 pounds per year by 2015 with the MATS rule and due to planned retirement of some units.

**Table 4: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Indiana**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Wabash River	Duke Energy	Vigo	295	20
Clifty Creek	Ohio Valley Electric (AEP)	Jefferson	274	70
Rockport	Indiana Michigan Power Co. (AEP)	Spencer	225	133

EPA=Environmental Protection Agency

MATS = Mercury and Air Toxics Standards

AEP=American Electric Power

## Michigan

Michigan ranks fourth on the list, with 14 percent of mercury emissions from power plants for the region. In 2010, the power plants in the state emitted more than 1,900 pounds of mercury into the air. Detroit Edison, which is a subsidiary of DTE Energy, owns the top-three mercury-emitting power plants in the state (see table 5). Monroe Power Plant on the western edge of Lake Erie is the second largest emitter of mercury from coal-burning power plants in the Great Lakes region.

In 2006, the state of Michigan adopted a rule that, by 2015, will require 90 percent reductions in mercury emissions from existing power plants that emit more than 9 pounds of

mercury per year. Alternatively, sources are required to meet a 75 percent reduction rate with a multi-pollutant plan.<sup>39</sup>

As is shown in table 5, with implementation of MATS, Michigan power plant emissions are projected to decrease from 1,924 to 301 pounds per year by 2015.

***Coal-fired power plants owned by Detroit Edison, a subsidiary of Detroit-based DTE Energy, are responsible for 10 percent of all mercury emissions from coal-fired power plants in the Great Lakes region.***

**Table 5: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Michigan**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Monroe	DTE Energy	Monroe	614	99
Belle River	DTE Energy	St. Clair	278	40
St. Clair	DTE Energy	St. Clair	233	27

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

## Illinois

Illinois ranks fifth, contributing 11 percent of mercury emissions for the region. According to the EPA's 2010 estimates, power plants in Illinois currently emit almost 1,500 pounds of mercury into the air every year.

Illinois currently has the most stringent state-level control program for mercury emissions in the Great Lakes region. Since July 2009, all power plants must have achieved either a 90 percent reduction from the uncontrolled levels of mercury in the coal or have met a specified mercury emission limit of 0.0080 pounds of mercury per gigawatt-hour gross electrical output.

As a result, most coal-fired power plants in Illinois are currently controlling mercury emissions with the use of activated carbon-injection systems. Nevertheless, emissions are projected to be lower in 2015, possibly due to the combined effect of the pollution controls required for other air toxics under the MATS and CSAPR rules (such as scrubbers and baghouses). These controls can also have a major role in reducing mercury emissions. The EPA predicts that in 2015, mercury emissions from Illinois power plants will decrease from 1,484 pounds to 487 pounds per year (see table 6).

**Table 6: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Illinois**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Newton	Ameren Corporation	Jasper	294	37 pounds per year
Joppa Steam	Ameren Corporation	Massac	173	43 pounds per year
Baldwin Energy Complex	Dynergy, Inc.	Randolph	167	87 pounds per year

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

## Wisconsin

Wisconsin ranks sixth among the eight Great Lakes states in terms of mercury emissions from power plants, with 9.5 percent—almost 1,300 pounds—of mercury emissions for the region. See table 7 for the top-three plants.

Wisconsin required four of its major utilities to reduce mercury emissions by 40 percent by 2010. Wisconsin’s mercury reductions initiatives further include a requirement that large coal-fired power plants (of at least 150 megawatts

of generating capacity) either reach a 90 percent reduction from mercury in coal by the year 2015, or reduce multiple pollutants, including nitrogen oxides and sulfur dioxide, along with 90 percent reductions in mercury emissions, by 2021.<sup>40</sup>

Mercury emissions from coal-fired power plants in Wisconsin are projected to decline in 2015, from 1,269 to 270 pounds per year, under the new toxics standards.

**Table 7: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Wisconsin**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA’s Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Pleasant Prairie	We Energies	Kenosha	281	57
Columbia	Integrus Energy Services	Columbia	264	46
South Oak Creek	We Energies	Milwaukee	215	34

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

## Minnesota

According to 2010 EPA estimates, coal-fired power plants in Minnesota emit almost 900 pounds of mercury per year, accounting for 6.5 percent of mercury emissions from power plants in the region; see table 8.

The Minnesota Mercury Emissions Reduction Act of 2006, when fully implemented in 2014, will result in a 90 percent reduction of emissions from six generating units at three of Minnesota’s coal-fired power plants. These reductions will occur in two phases, depending on the type of emissions control equipment currently in use at each plant. Units

with dry scrubbers, which also typically have fabric filter baghouses (the most effective particulate controls for mercury), were required to modify units to capture more mercury by the end of 2009. The majority of units equipped with wet scrubbers are allowed until 2014 to reduce emissions.<sup>41</sup>

With implementation of the EPA’s MATS, mercury emissions from coal-burning power plants in Minnesota are projected to decrease in 2015 from 873 to 178 pounds per year.

**Table 8: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in Minnesota**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA’s Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Sherburne County	Xcel Energy	Sherburne	358	84
Boswell	ALLETE	Itasca	175	53
Allen S King	Xcel Energy	Washington	103	16

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

## New York

New York State has the lowest mercury emissions from coal-fired power plants of any Great Lakes state, with 239 pounds of mercury emissions in 2010, accounting for two percent of total mercury emissions in the region.

The State of New York has established an emission cap on facility-wide mercury emissions for the years 2010 through 2014, and beginning in 2015 New York's rule establishes a facility-wide emission limit that is half of the mercury limit under the EPA's MATS.<sup>42</sup> The EPA's MATS projections for New York show that mercury emissions from coal-fired power plants in New York are projected to drop from 239 to 101 pounds per year in 2015.

**Table 9: The Three Largest Mercury-Emitting, Coal-Fired Power Plants in New York**

Power Plant	Primary Owner (by Parent Company)	County	2010 Mercury Emissions in Pounds Per Year	EPA's Projected Mercury Emissions in 2015 with the MATS in Pounds Per Year
Danskammer	Dynegy, Inc.	Orange	97	6
AES Somersset	AES	Niagara	54	36
CR Huntley	NRG Energy, Inc.	Erie	28	12

MATS = Mercury and Air Toxics Standards

EPA=Environmental Protection Agency

## CONTROLLING MERCURY POLLUTION: THE IMPORTANCE OF A NATIONAL STANDARD

Some Great Lakes states have made progress in adopting programs to reduce mercury emissions from power plants, while others, like Ohio, have done nothing. While several of these state programs are slated to significantly reduce mercury emissions, the actual reductions will vary widely. Given that the impact of mercury emissions on the Great Lakes is a regional issue, regulation on a broader scale is critically important. The EPA's nationwide MATS will fill the regulatory gaps at the state level and create a level playing field among power plants and states, ensuring mercury reductions in all states that impact the Great Lakes region. Overall, the EPA's rule is expected to reduce mercury emissions from power plants in the Great Lakes states from 13,548 pounds per year to 3,685 pounds per year, based on the EPA's projections of current and 2015 emissions.

## HOW FAR DO MERCURY EMISSIONS TRAVEL?

When coal is burned to make steam, which is used to generate electricity, the mercury in the coal becomes airborne in three different forms—elemental mercury, particulate mercury, and reactive (ionic) mercury. In general, the mercury emissions from a coal-fired power plant consist

of 42 percent reactive mercury, five percent particulate mercury, and 53 percent elemental mercury.<sup>43</sup> The specific percentage of mercury emitted in each form by a particular coal-burning power plant varies according to the type of coal burned and the pollution controls installed.

Mercury emitted in the reactive form most readily deposits in soil, rivers, and lakes through wet and dry deposition. About half of the reactive mercury emitted into the air is deposited within 300 miles of the source of emissions.<sup>44</sup> This means that approximately 20 percent of a coal-fired power plant's mercury emissions are deposited on land and in water within 300 miles of the power plant, with the largest percentage of deposition found closer to the facility.<sup>45</sup> The reactive mercury continues to travel in the atmosphere, but about 80 percent of it deposits on land within 1,500 miles of the power plant.<sup>46</sup> Elemental mercury can travel across the globe and remain in the atmosphere for 6 to 12 months or longer, until it converts to other forms, which results in deposition on land and in water.<sup>47</sup>

Once mercury is deposited on land and in water, it is converted by microbial action to highly toxic methylmercury. Not much mercury is required to cause widespread fish contamination. As mentioned above, the FDA's consumption limit for methylmercury in seafood is 1 part per million parts of seafood (1 ppm).<sup>48</sup> Methylmercury poses serious danger to the health of the Great Lakes ecosystem, and threatens the regional economy.



## II. THE MYRIAD IMPACTS OF MERCURY POLLUTION

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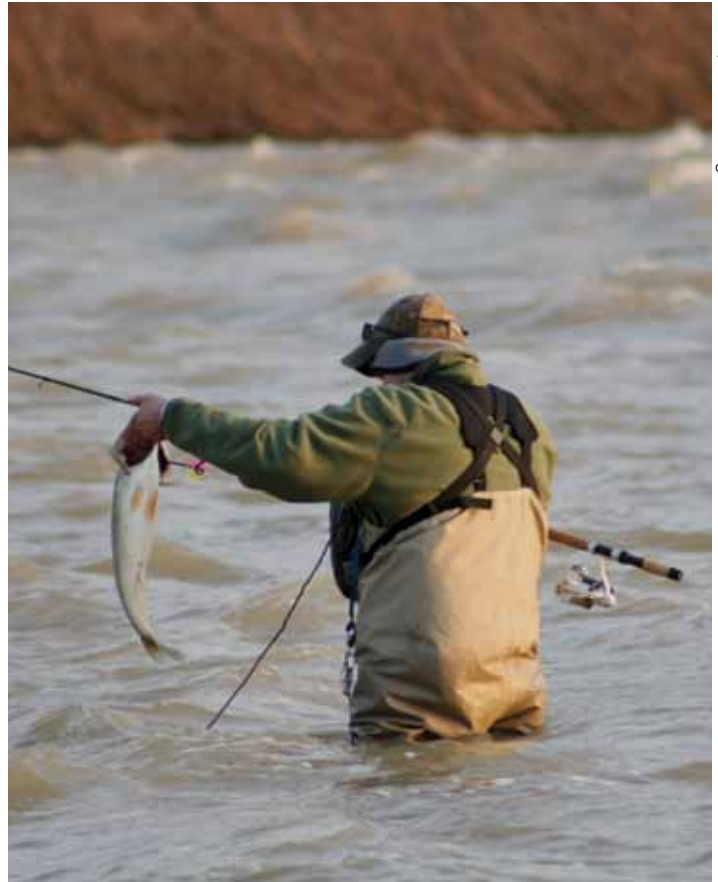
### MERCURY DEPOSITION AND THE GREAT LAKES

Due to the higher concentration of mercury-emitting coal-fired power plants in states like Ohio, Indiana, and Pennsylvania, people in the Great Lakes region are subjected to much higher mercury deposition levels from coal-fired power plants than most Americans.<sup>49</sup>

Airborne mercury is deposited on the land and in water bodies via both wet and dry deposition. Wet deposition, which can be measured directly, occurs when mercury is removed from the air by precipitation, such as rain and snow, and falls to the earth.<sup>50</sup> Dry deposition, which is difficult to measure but can be estimated, occurs when mercury is absorbed by trees, soil, dust, or water, and then is deposited on land and in water bodies.<sup>51</sup>

NOAA conducted a modeling evaluation of coal-fired power plants and other sources of mercury emissions to ascertain these sources' contribution to mercury deposition in the Great Lakes, and found that coal-fired power plants were the largest man-made contributor. The agency

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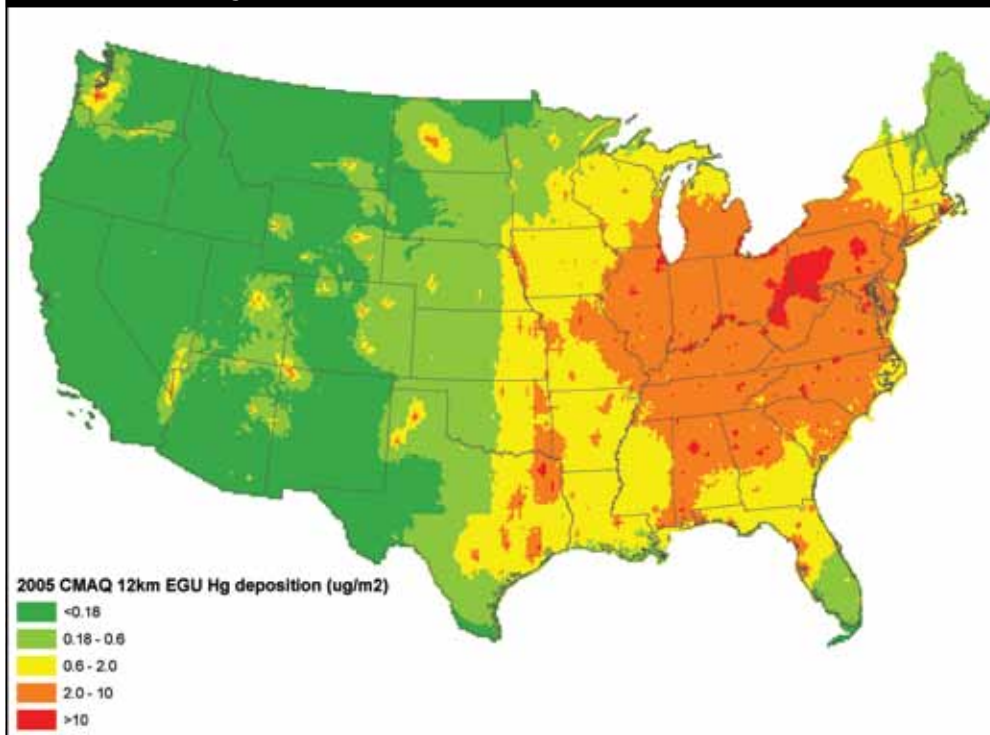


identified the industrial facilities that contributed the most to mercury deposition in each of the Great Lakes. Numerous coal-burning power plants in the Great Lakes states were on the list of the top 25 mercury contributors for the area.<sup>52</sup> Table 10 shows which of Great Lakes receive the most mercury deposition from coal-burning power plants based on NOAA modeling analyses and 1999 to 2000 mercury emissions data.

**Table 10: Ranking of the Great Lakes by Mercury Impacts from Coal-Burning Power Plants<sup>53</sup>**

Ranking Based on Amount of Mercury Deposited from Coal-Fired Power Plants	Great Lake
1	Lake Erie
2	Lake Ontario
3	Lake Michigan
4	Lake Huron
5	Lake Superior

**Figure 4: Watersheds with Elevated Levels of Mercury Deposition due to Coal-Fired Electrical Generating Units**



HUC = Hydrologic unit code

EGU = Electrical generating unit

Hg = Mercury

Source: U.S. Environmental Protection Agency, *Revised Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish In Support of the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units*, EPA-452/R-11-009, December 2011, Figure 2-3. Reprinted with permission of U.S. EPA.

Modeling conducted by Ohio University and the Argonne National Laboratory shows that mercury deposition is higher in the southern portions of the Great Lakes, including Lakes Erie, Ontario, and Huron, due to local coal-fired power plants.<sup>54</sup> In addition, a 2006 study that focused on wet deposition of mercury in eastern Ohio found that coal combustion was the dominant contributor to the mercury wet deposition in the area.<sup>55</sup>

Recent modeling from the EPA found that the eastern United States, and especially the area encompassing the Ohio River Valley, has elevated levels of mercury deposition (compared to average deposition levels across the United States) due to coal-fired power plant emissions.<sup>56</sup> Such areas of elevated mercury deposition are called “hot spots.” Other mercury hot spots from coal-fired power plants have been found in Michigan, Ohio, and New York along Lake Erie, and areas around the southern half of Lake Michigan in Wisconsin and Illinois (see figure 4).<sup>57</sup>

The EPA’s modeling results are similar to recent analyses of monitoring data on wet deposition of mercury in the Great Lakes region. Specifically, recent studies of monitoring data showed that wet deposition of mercury is the highest in Indiana, Ohio, Illinois, eastern and northwestern

Pennsylvania, southern Michigan, and southeastern Wisconsin, areas where industrial sources of mercury emissions are relatively higher.<sup>58</sup> Other studies of the mercury in “litterfall” —the leaves and needles of trees and other plants—have shown that dry deposition of mercury to forests can be as large a source of mercury deposition, if not larger, than wet deposition, ranging from 25 percent to 69 percent of total deposition.<sup>59</sup>

## **METHYLMERCURY’S MYRIAD EFFECTS ON THE REGION**

As noted above, the dangerous chemical methylmercury is produced as a by-product of coal-fired power plants and moves up the aquatic food chain in increasing concentrations as larger aquatic species consume smaller species contaminated with the compound.

Other air pollution emitted by power plants may contribute to the methylation of mercury in the environment; several studies have shown that the presence of sulfates increases the amount of methylmercury formed.<sup>60</sup> Sulfates form when sulfur dioxide gas is emitted into the air and then



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converts to sulfate (a fine particulate) in the presence of water molecules. Decreases in methylmercury in fish have been observed in Little Rock Lake, Wisconsin, and in Isle Royale National Park in Lake Superior due to decreases in sulfate and mercury deposition.<sup>61,62</sup> The EPA has suggested that lowering the rate of sulfur deposition would also reduce mercury methylation, resulting in both reduced acidification of lakes and decreased mercury contamination.<sup>63</sup>

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***Coal-fired power plants account for 70 percent of sulfur dioxide emissions in the United States,<sup>64</sup> and reducing these emissions could reduce the rate at which mercury is transformed into methylmercury in the environment.***

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The northern and eastern parts of the Great Lakes region are particularly sensitive to mercury deposition because of forest cover, which results in more mercury deposition due to litterfall; wetlands and more acidic waters also enhance the transformation of mercury into methylmercury.<sup>65</sup> Further, the average mercury concentrations in fish have been found to be higher in the northern and eastern Great Lakes region and in inland lakes.<sup>66</sup>

## **ADVERSE IMPACTS ON HUMAN HEALTH**

Methylmercury is highly toxic, and can affect multiple organ systems in the body throughout a person's life.<sup>67</sup> Consumption of mercury-laden fish is the primary route of exposure to methylmercury for people in the United States, making this exposure mechanism the focus of human health studies.<sup>68</sup>

Since methylmercury accumulates in the aquatic food chain, fish consumption is the primary way humans are exposed to this most dangerous form of mercury. Mercury is found throughout the muscle tissue in fish, so, unlike polychlorinated biphenyl (PCB) contamination, a person cannot simply trim the fat away to make a fish safer to eat; the only way to limit exposure is to not eat fish. Consequently, all of the Great Lakes states have issued fish consumption advisories secondary to mercury contamination.

Methylmercury exposure is implicated in neurological impairment in fetuses and young children, as well as adults. Once methylmercury is in the digestive tract, it is absorbed by the bloodstream and enters the red blood cells, where more than 90 percent of it is bound to hemoglobin.<sup>69</sup> The

compound causes damage to the central nervous system (brain and spinal cord)<sup>70</sup> and the developing brain of a fetus can be harmed if a pregnant woman consumes methylmercury-containing fish or already has an accumulation of it in her blood from prior fish consumption (it is absorbed through umbilical cord blood). Studies show that methylmercury levels in a fetus (as measured in the umbilical cord blood) are, on average, 70 percent higher than levels in maternal blood.<sup>71</sup>

### **Human Health Impacts from Mercury Exposure**

- Neurologic damage in fetuses
- Neurologic damage in adults
- Cardiovascular impairment
- Immune system impacts
- Possible effects on fertility and reproduction
- Possible human carcinogen
- Possible genetic damage

Prenatal exposure to methylmercury may pose a risk to brain development in more than 200,000 newborns in the United States each year (some estimates place the number at 400,000).<sup>72</sup> Analyses of blood mercury levels in U.S. women of childbearing years (ages 16 to 49) show that 5 percent may have blood mercury levels exceeding the EPA's reference dose for mercury.<sup>73</sup> A new study conducted by the Minnesota Department of Health found elevated mercury levels in 8 percent of tested babies born in Minnesota between 2008 and 2010. Babies born during summer months were more likely to have higher mercury blood levels, suggesting a link between locally caught fish consumption in pregnant mothers during warm summer months. This is the first study to collect mercury levels in newborns.<sup>74</sup> Prenatal exposure to methylmercury in fish has been linked to lower IQ levels, and negative effects on memory, attention, language, and other cognitive skills due to the vulnerability of the developing nervous system.<sup>75,76,77</sup>



In addition to the neurological effects of methylmercury on fetuses, there is also evidence of neurologic damage in adults in the visual and neuromotor systems.<sup>78</sup> High prenatal exposures (from disasters that cause mercury poisoning, such as the Minamata disaster in Japan) have shown effects very similar to those of cerebral palsy; adults exposed to high mercury levels have suffered brain lesions.<sup>79</sup>

Although the neurodevelopmental effects of methylmercury are the most studied, there is also evidence that exposure is related to cardiovascular impairment, fertility and reproductive impairment, and genetic damage.<sup>80</sup> Cardiovascular effects may include heart disease, heart-rate variability, and blood-pressure irregularities.<sup>81</sup> While the effects on the immune system are poorly understood, susceptibility to infectious diseases and autoimmune disorders are implicated in some studies.<sup>82</sup> Methylmercury is also considered a possible human carcinogen.<sup>83</sup>

## RUINING A FRESH FOOD SOURCE: FISH CONSUMPTION DANGERS

It is estimated that the Great Lakes region has more consumers of freshwater fish than any other region in the United States.<sup>84</sup> The Great Lakes region also contains one of six high fish-consuming subpopulations in the country, as identified by the EPA (i.e., the Chippewa/Ojibwe Tribe members of the Great Lakes region).<sup>85</sup> According to data compiled by the EPA, many watersheds in the Great Lakes area, especially around Lake Erie, and in Ohio, Wisconsin, and Indiana, have high concentrations of mercury in fish attributable to coal-fired power plants.<sup>86</sup>

A recent analysis evaluated the mercury concentrations of six commonly consumed game fish (small and largemouth bass, lake trout, walleye, northern pike, and muskellunge) from fish sample data collected throughout the Great Lakes region. That analysis found 62 percent of the areas evaluated in the Great Lakes region had average mercury concentrations in these six game fish species that exceeded the EPA's risk level of 0.30 parts per million.<sup>87</sup> However, the EPA's methylmercury reference dose of 0.30 parts per million was published ten years ago.<sup>88</sup> Research since that time has shown that adverse effects can occur at lower exposure levels.<sup>89</sup> The Great Lakes Fish Advisory Workgroup currently recommends a methylmercury reference dose of 0.05 parts per million, six times lower than the 2001 level.<sup>90</sup> Alarming, the study of mercury concentration in the six commonly consumed game fish species found that 100 percent of the Great Lakes areas studied had average mercury in fish concentrations that equaled or exceeded the 0.05 parts per million reference dose recommended by the Great Lakes Fish Advisory Workgroup.<sup>91</sup>

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*All of the Great Lakes and the bulk of the inland lakes and rivers in the region are under fish consumption advisories for mercury.<sup>92</sup>*

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The number and extent of fish consumption advisories in the Great Lakes region reflects how significant an issue mercury contamination has become. See Appendix D for more information on fish consumption and Great Lakes advisories, including those for inland lakes and rivers. Advisories can be found at [water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories\\_index.cfm](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories_index.cfm), and each state has a website for fish consumption advisories.<sup>93</sup>

The presence of mercury is, by far, the primary reason for fish consumption advisories. In the EPA's 2010 National Listing of Fish Advisories, 81 percent were, at least in part, due to mercury.<sup>94</sup> Unfortunately, the public is not always aware of, nor does it always follow, fish consumption warnings.

To develop fish advisories, states continuously monitor the amount of mercury in different species of fish from specific bodies of water, and then use that data to make recommendations to the public regarding which fish are safe or unsafe to eat. These advisories recommend limiting consumption of a particular species (and often size) of fish for the general or more vulnerable populations. Advisories typically include different levels of recommendations based

on the concentrations of mercury present and are usually either “do not eat” warnings, or “limit consumption” to a certain number of meals on a weekly or monthly basis. The warning levels often apply to different categories of consumers, such as:

- All people
- Women of childbearing age and children under 15 years old
- Women older than childbearing age and males more than 15 years old

Predator fish, like walleye and lake trout, typically contain higher amounts of mercury than smaller fish because they are higher up on the food chain; walleye is one of the most popular species for fishing in the Great Lakes area. The fish advisories extend well beyond the top predator fish, but may only apply to fish over a certain size or weight because bigger fish are typically older, consume more small fish, and will likely have accumulated more mercury. There are 15 commonly eaten species from the Great Lakes with mercury concentrations that exceed the Great Lakes Fish Advisory Workgroup recommended methylmercury reference dose of 0.05 parts per million (see Common Great Lakes Fish Exceeding Recommended Methylmercury Reference Dose of 0.05 ppm).<sup>95</sup>

Common Great Lakes Fish Exceeding Recommended Methylmercury Reference Dose of 0.05 ppm	
Walleye	Yellow perch
Largemouth bass	Rainbow trout
Northern pike	Lake sturgeon
Smallmouth bass	Coho salmon
Lake trout	Brown trout
Common carp	Whitefish
American eel	Alewife
Chinook salmon	

There are no federal standards for fish consumption advisories, so warnings may vary per state due to different threshold concentrations of mercury required to issue a warning. For example, although Michigan and Indiana both border Lake Michigan, Indiana has issued fish consumption advisories for bluegill in Lake Michigan. Michigan has not. A 2004 report compiled for the International Joint Commission found that the threshold levels for fish advisories varied in the Great Lakes states, ranging, for sensitive populations, from 0 parts per million in Indiana (if any level of mercury is detected, Indiana sets fish consumption advisories for that

species) to 0.50 parts per million in Illinois and Michigan.<sup>96</sup> Similarly, the thresholds for consumption for the general population range from 0.05 parts per million in Ohio to 0.50 parts per million in Illinois and Michigan.<sup>97</sup>

Studies have also shown that fish advisories are not widely observed by the general public, and specifically not by sub-populations such as those in lower income brackets, communities of color, women, and younger anglers.<sup>98</sup> Only about 50 percent of anglers are aware of the fish consumption advisories, and 40 percent of people surveyed thought the health risks were minor considering other risks.<sup>99</sup>

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***The Great Lakes region is home to a multi-million dollar commercial fishing industry that is not covered by fish advisories.<sup>100</sup>***

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Fish consumption advisories only apply to fish caught via sport or subsistence fishing, since it is difficult to determine exactly where fish purchased at a store or restaurant originated, and hard to link that particular type of fish with one covered by a monitoring program.<sup>101,102</sup> It is not only anglers who are at risk for methylmercury exposure—anyone who consumes fish from the region is potentially at risk, depending on the fish and where it was caught.

## MERCURY POLLUTION AND LOCAL ECONOMIES

Fish consumption advisories hurt local economies because they result in a loss of recreational fishing revenue. In 2006, more than 11 million people, including 2.5 million children, fished in the Great Lakes, and in inland lakes, and rivers in the region. Table 11 shows the anglers as a percentage of a state’s population for all the Great Lakes states, information that is important for understanding which populations are more affected by mercury levels in fish and the fish consumption advisories.

Anglers contribute to local economies with their fishing trips; in 2006, 1.4 million anglers spent \$1.5 billion in the Great Lakes region on freshwater fishing.<sup>103</sup> The total economic impact of sport fishing in the Great Lakes states totals more than \$20 billion, supporting approximately 190,000 jobs.<sup>104</sup> However, in virtually all of the Great Lakes states, the number of anglers has declined in recent years—between 2001 and 2006, the number of anglers declined by 12 percent on a national level.<sup>105</sup>

**Table 11: Percentage of Anglers in the Great Lakes States**

State	Anglers as percent (%) of State Population
Illinois	7%
Indiana	12%
Michigan	14%
Minnesota	27%
New York	5%
Ohio	12%
Pennsylvania	8%
Wisconsin	23%

Source: U.S. EPA Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, Table 4-1.

Studies have also shown that more people would fish if there were fewer fish consumption advisories. A public survey in Wisconsin, for example, found that fishing trips in Green Bay would increase by about 10 percent if all fish consumption advisories were eliminated.<sup>106</sup> Studies in other parts of the country have shown similar results.<sup>107</sup>

Further, research shows there are adverse reproductive effects on fish species secondary to methylmercury exposure, including trout, bass (large and smallmouth), northern pike, carp, walleye, and salmon.<sup>108</sup> The EPA noted that these issues could cause declines in fish populations, which would have a negative economic effect on those sectors related to fishing as well as to the ecosystem.<sup>109</sup>

On a national level, the EPA estimated the monetary impact of the IQ losses for the 240,000 children nationwide exposed to mercury prenatally. The EPA projected that the monetary value of the IQ losses in 2007 dollars due to mercury exposure to these children at 2005 emission levels ranged from \$16 to \$24 million at the 3 percent discount rate and \$1.8 to \$3.9 million at a 7 percent discount rate (the discount rate converts dollars to present value).<sup>110</sup> These losses reflect declines in future net earnings over the lifetimes of children exposed to methylmercury prenatally.

## MERCURY POLLUTION AND WILDLIFE

Mercury deposition has negative effects on wildlife and the ecosystem as a whole. Recent studies have shown that the adverse impacts of mercury to the Great Lakes ecosystem are more widespread than previously thought.<sup>111</sup> Not only have additional species been identified as showing adverse impacts due to mercury, but also adverse effects have been documented to occur at progressively lower mercury concentrations.<sup>112</sup>

### Health Impacts on Wildlife from Mercury Exposure

- Neurological impacts that may change foraging and mating behaviors
- Increased predation of eggs due to less time spent on nests/caring for young
- Adverse impacts on liver and kidneys
- Reduced survival rates
- Decreases in population viability

One well known resident of the Great Lakes region, the common loon, has been significantly impacted by mercury pollution. The common loon is a symbol of northern lakes and wilderness, and has been used by scientists as an indicator species for assessing risks to birds due to mercury exposure.<sup>113</sup> Scientists are finding that mercury is impacting the viability of loon populations. Specifically, an 18-year study in the northern Midwest and Northeast has shown that loons with the highest levels of methylmercury, which represented 16 percent of the study population, spent less time on the nest protecting eggs from predators, produced less offspring, and were more sluggish which resulted in decreased foraging for fish.<sup>114</sup>

Scientists have also found that bald eagles in the Great Lakes region have unhealthy levels of mercury, with 14 percent to 27 percent of the eagles studied having mercury levels at or higher than proposed risk thresholds for birds.<sup>115</sup> The great snowy egret is another bird species negatively affected by chronic exposure to methylmercury, with research showing liver and possible kidney effects.<sup>116</sup> Adverse effects from methylmercury have also been found in river otter and mink.<sup>117</sup> Mercury contamination also threatens the viability of fish populations in the Great Lakes, by impacting fish health and ability to reproduce.<sup>118</sup>

In summary, there are myriad public health and environmental effects in the Great Lakes region due to mercury exposure that are substantially due to the mercury emitted into the air by coal-fired plants. Fortunately, there are readily available options to reduce these levels. The EPA's final rule requiring achievable mercury reductions at coal-fired power plants will have widespread health and economic benefits, as discussed in the next section of this report.

### III. FEDERAL ACTIONS TO ADDRESS THE DEVASTATING IMPACTS OF MERCURY POLLUTION

The pollution control technology used at coal-fired power plants to remove several air pollutants often reduces mercury pollution as well. For example, the EPA's recently issued CSAPR will work in conjunction with the MATS and require power plants to reduce emissions of sulfur dioxide and nitrogen oxides starting in 2012. This could mean even larger reductions in mercury emissions from power plants.<sup>119</sup>

Several states in the region have proactively required coal-fired power plants to reduce airborne mercury pollution, as have other states. But there are significant regulatory gaps in the Great Lakes States, such as in Ohio, which has the highest total mercury emissions from coal-fired power plants of any Great Lakes state. There is a need for national rulemaking to level the playing field among all coal-fired power plants. Accordingly, the EPA's MATS will require coal-fired power plants to reduce mercury and other air toxic emissions by no later than early 2016.<sup>120</sup>

#### NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS ARE OVERDUE

In 1990, the U.S. Congress adopted as law a requirement that the EPA study and report to Congress on the air toxic emissions from coal- and other fossil fuel-fired power plants and determine whether it was necessary and appropriate to regulate the air toxic emissions from these facilities. In 1998, the EPA wrote a report to Congress detailing the emissions and public health impacts of various toxic pollutants, including mercury, emitted by coal-fired and other fossil fuel-fired power plants.<sup>121</sup> In 2000, the agency issued a final formal finding stating it was necessary and appropriate to regulate mercury and other air toxics emitted from coal-fired power plants, and the EPA listed the industry for regulation.<sup>122</sup>

Although the EPA's listing decision triggered a duty to issue nationwide standards for the mercury and other air toxics emitted by the power plant industry by December 2002, the agency instead enacted an unlawful "cap and trade" program in 2005 pertaining only to mercury, which allowed companies to either choose to reduce mercury emissions or buy mercury pollution permits.<sup>123</sup> In 2008, a federal appeals court in Washington, D.C., overturned that rule because it did not comply with the law Congress enacted in 1990,<sup>124</sup> and required the EPA to rewrite the standards to comply with the Clean Air Act. The agency collected even more information to support mercury and other air toxic emission standards for power plants, and in March 2011, made publicly available a proposed rule to reduce mercury and air toxics from coal-fired power plants.<sup>125</sup> On December 16, 2011, the EPA finalized Mercury and Air Toxics Standards for power plants. Existing power plants have three years to meet the standards,



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with the possibility of an extra fourth, and in certain circumstances, a fifth year to meet the standards. The rule requires existing power plants to comply with the mercury and other air toxics standards within three years of April 16, 2012, which is the effective date of the EPA's final rule.<sup>126</sup> The rule allows for the possibility of a one-year extension to comply with the rule, which means that coal-fired power plants will have to comply with the MATS by early 2016 at the latest.<sup>127</sup>

Around the same time that the EPA's illegal mercury cap and trade program was invalidated, the agency significantly tightened the ambient air standards for fine particulates and ground-level ozone,<sup>128</sup> after reviewing thousands of scientific studies on the health impacts from these pollutants. Further, in 2005, the agency issued the Clean Air Interstate Rule (CAIR) to address transport of pollutants that contribute to fine particulate and ozone formation, including sulfur dioxide and nitrogen oxides, across state lines.<sup>129</sup> Coal-fired power plants are large sources of these precursors to fine particulates and ozone. CAIR capped sulfur dioxide and nitrogen oxide emissions in the eastern third of the United States, including all of the Great Lakes states. This rule was remanded to the EPA by the federal appeals court in Washington, D.C. in 2008 because the second phase of the CAIR program did not satisfy the Clean Air Act.<sup>130</sup> The EPA replaced CAIR with the recently finalized CSAPR.<sup>131</sup> In a December 30, 2011 decision, the United States Court of Appeals for the D.C. Circuit stayed the Cross-State Rule pending resolution of petitions for review of the EPA's rule.<sup>132</sup>

The Court has ordered a swift schedule for resolution of the appeals, and had mandated that CAIR remain in effect during the stay.<sup>133</sup> Under both CAIR and CSAPR, existing power plants in the Great Lakes states will have to clean up their pollution.

The Cross-State Rule will apply to 28 states and require sulfur dioxide and nitrogen oxide emissions reductions from existing power plants in these states. The MATS and the Cross-State rule will, together, result in significant reductions in mercury and other air toxics, as well as sulfur dioxide, nitrogen oxides, and fine particulates from coal-fired power plants. The pollution control equipment that will be used to reduce sulfur dioxides and nitrogen oxides (“scrubbers” for sulfur dioxide and selective catalytic reduction for nitrogen oxides) often has the added benefit of reducing mercury emissions and other air toxics such as acid gas pollutants.

Because different forms of mercury result from burning coal in a boiler, various factors at coal-fired power plants affect the amount of mercury emitted. To ensure the greatest level of mercury reduction, mercury should be converted from its elemental form to a more reactive form that will adhere to particles and be captured in particulate and sulfur dioxide controls. For example, selective catalytic reduction that is used to achieve significant control of nitrogen oxides also helps oxidize mercury emissions (i.e., changing the mercury to a reactive form), enabling easier capture of mercury in downstream particulate control and sulfur dioxide scrubbers.

## THE TECHNOLOGY TO REDUCE MERCURY POLLUTION IS WIDELY AVAILABLE AND EFFECTIVE

Some coal-fired power plants will be able to achieve the EPA’s proposed mercury standards with the pollution control equipment they install as a result of the CSAPR. For example, pollution control technologies such as sulfur dioxide scrubbers and fabric filters (“baghouses”), used primarily for particulate matter, have been shown to achieve high levels of mercury control as well. Other plants may need to install mercury-specific controls such as “activated carbon injection” to achieve the needed mercury reductions; this technology helps with conversion of elemental mercury to the more reactive form, and targets removal of reactive mercury in particulate controls. To be most effective, activated carbon injection works best for mercury control with baghouse pollution control technology, a highly efficient technology that controls fine particulate matter and also improves mercury reductions.

Less than 10 years ago, activated carbon injection was not typically used in coal-fired power plants, although it had been used at municipal waste combustors for several years. However, this technology has been proven at coal-fired power plants time and again over the last five to seven years, as states required mercury reductions either under the 2005 federal mercury cap and trade rule before it was overturned or under state rules. For example, the General Accounting Office reported to Congress in 2009 on the state of mercury reduction technologies for coal-fired power plants, and found of the 25 boilers that were operating activated carbon injection at the time, all had “met or surpassed their relevant regulatory mercury requirements,” with some units achieving 95 percent to 99 percent mercury removal.<sup>134</sup> According to the Institute of Clean Air Companies, as of June 2010, contracts had been granted for mercury controls at 169 coal-fired boilers, reflecting more than 62 gigawatts of electrical generating capacity.<sup>135</sup> Further, other mercury reduction methodologies have been developed as alternatives or supplements to activated carbon injection.<sup>136</sup>

## THE BENEFITS OF THE EPA’S RULES THAT WILL REDUCE MERCURY FAR OUTWEIGH THE COSTS

The EPA evaluated the social costs and benefits of its MATS, and found that the benefits greatly exceed the costs. Further, the agency has projected that the majority of these benefits will occur in the eastern United States, which would include the Great Lakes region (see the benefits box in the Executive Summary and table 12). On a nationwide basis, the EPA projects that compliance with the toxics rule will cost \$9.6 billion, but the benefits will be \$37 to \$90 billion dollars in 2016 when the MATS are fully implemented.<sup>137</sup>

The EPA projects that in 2016 the MATS would avoid the adverse health and cost impacts in the eastern United States as seen in Table 12.

Similarly, the EPA found that the benefits of the Cross-State Rule will far outweigh the costs. The EPA estimated that compliance with the Cross-State Rule will cost \$800 million annually, plus the \$1.6 billion per year of capital investments for pollution controls already underway, but the health and environmental benefits will range from \$120 to \$280 billion annually.<sup>138</sup>

The MATS will work in concert with the Cross-State Rule to reduce mercury pollution in addition to reducing other toxics, sulfur dioxide, and fine particulates from coal-fired power plants. As table 13 shows, the benefits of the two programs complement each other.



**Table 12: The U.S. Environmental Protection Agency's Estimated Reduction in Adverse Health Impacts and Resulting Economic Benefit, in the Eastern United States\*, under MATS for Coal-Fired Power Plants**

Health and Welfare Impact	Decline in Cases of Harmful Health Impacts under the MATS	Monetary Benefit of Decreased Health and Welfare Effects in 2007 Dollars (\$)
Premature deaths	4,100 – 10,000**	\$106 to \$117 billion
Chronic bronchitis	2,700	\$1.3 billion
Non-fatal heart attacks	4,600	\$0.4 to \$0.5billion
Lost work days	520,000	\$100 million
Hospital and emergency room visits	5,600	<\$50 million
Acute bronchitis	6,000	<\$10 million
Lower respiratory symptoms	77,000	<\$10 million
Aggravated asthma	130,000	<\$10 million
Number of days people must restrict activities	3,100,000	\$200 million

\* This data includes Texas and all states to the north and east.

\*\*These figures are based on data from two separate studies.

Source: From U.S. EPA's Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards; Tables ES-3 and ES-4 at pages ES-5 to ES-7. The range of monetary benefits for reduced premature deaths and reductions in non-fatal heart attacks pertains to the application of a 3% discount rate and a 7% discount rate. Values reports as "less than" or "<" are as reported by EPA.

**Table 13: Projected Reductions in Mercury Air Emissions from Coal-Fired Power Plants Due to the EPA's Cross-State Rule and MATS by 2016**

State	Percent Mercury Reduction from 2015 Levels Due to MATS*	Overall Percent Mercury Reduction Due to Cross-State, MATS and Other Requirements from 2005 Levels	Mercury that Will Not Be Emitted into the Air by 2016
Illinois	86%	94%	7,951 pounds
Indiana	56%	86%	4,961 pounds
Michigan	84%	92%	3,348 pounds
Minnesota	83%	87%	1,231 pounds
New York	65%	89%	829 pounds
Ohio	61%	88%	6,478 pounds
Pennsylvania	56%	92%	9,203 pounds
Wisconsin	85%	88%	2,024 pounds
	<b>Average -72%</b>	<b>Average - 90%</b>	<b>Total - 36,025 pounds</b>

Source This table was developed from the following data sources: EPA's 2005 mercury emission estimates for electrical generating units in U.S. EPA's March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report, Table 3-3; EPA's mercury emission projections in 2015 with the Cross-State Rule from U.S. EPA's "IPM Parsed File – 2015 Base Case," Docket ID EPA-HQ-OAR-2009-0234-19982, in the docket for EPA's MATS rule at [www.regulations.gov](http://www.regulations.gov); and EPA's mercury emission projections in 2015 with the MATS rule from U.S. EPA's "IPM Parsed File – 2015 MATS Policy Case, Docket ID EPA-HQ-OAR-2009-0234-19983, in the docket for EPA's MATS rule at [www.regulations.gov](http://www.regulations.gov).

\*These reductions include expected mercury reductions from the Cross-State rule and state mercury regulations as well as other requirements such as Clean Air Act Settlements.

Source: U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011 at 3-27; see also March 2011 Document Supplement for EPA Base Case v.4.10\_PTox—Updates for Proposed Toxics Rule for further details on what went into EPA's 2016 "Base Case" projections, available at <http://www.epa.gov/airmarkets/progsregs/epa-ipm/docs/suppdoc.pdf>.

Recently, industry groups have voiced concerns about compliance timeframes for CSAPR and MATS and the economic impact of these standards. These concerns are misplaced. Compliance timeframes are not new; owners of coal-fired power plants have known about forthcoming MATS standards since EPA issued its finding in 2000. Also, CSAPR pollution reduction requirements are largely identical to CAIR, which was finalized in 2005. Further, more than 50 percent of the coal-fired power plant fleet has already been equipped with sulfur dioxide, nitrogen oxide, and mercury controls that can be used to meet the EPA's mercury emission standards. These standards are also job creators. The Institute of Clean Air Companies estimates that pollution control retrofits from the past seven years have resulted in the creation of an estimated 200,000 jobs, and the labor requirements of the CSAPR and MATS will likely require similar levels of labor.



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## IV. CONCLUSION

Our country needs nationwide mercury guidelines. The negative neurologic, cardiovascular, immune system and reproductive impacts from this highly toxic pollutant must be addressed so that no further damage takes place. More than 11 years have passed since the EPA determined that it was appropriate and necessary to regulate mercury and other toxic air pollution from coal-fired power plants. The EPA listed the industry for regulation at that time; there should be no further delay in reducing mercury and other air toxics pollution from these facilities. Airborne mercury reductions that will improve the health of humans, fish, birds, and other wildlife in the Great Lakes region are readily achievable with available pollution control technologies and methods. In fact, many power plants have already undertaken upgrades of, or are currently in the process of upgrading, pollution controls that will lower mercury emissions. However, only a national rule will ensure that all coal-burning power plants reduce emissions to the same achievable levels. As the EPA has shown, the benefits of such national mercury and toxic guidelines—to public health, the environment, and society as a whole—far outweigh the costs of control.



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## SOURCES/ENDNOTES

- 1 See "EPA Fact Sheet, Mercury and Air Toxics Standards: Clean Air and Reliable Electricity," <http://www.epa.gov/mats/pdfs/20111221MATScleanair-reliableelectricity.pdf>.
- 2 U.S. EPA Fact Sheet, Mercury and Air Toxics Standards: Benefits and Costs of Cleaning Up Toxic Air Pollution from Power Plants, December 2011, available at <http://www.epa.gov/mats/actions.html>.
- 3 U.S. Census Bureau, National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, available at <http://www.census.gov/prod/www/abs/fishing.html>.
- 4 Evers, D.C., Wiener, J.G., Driscoll, C.T., Gay, D.A., Basu, N., Monson, B.A., Lambert, K.F., Morrison, H.A., Morgan, J.T., Williams, K.A., Soehl, A.G. et al., Great Lakes Mercury Connections: The Extent and Effects of Mercury Pollution in the Great Lakes Region, Biodiversity Research Institute, 2011, at 26.
- 5 Evers, D.C., et al. at 24-26.
- 6 Based on EPA's December 16, 2011 spreadsheet "Nationwide Emission Estimates," (Docket ID EPA-HQ-OAR-2009-0234-19918) available at <http://www.epa.gov/ttn/atw/utility/utilitypg.html>.
- 7 Cohen, Mark D., Richard S. Artz, Roland R. Draxler, National Oceanic and Atmospheric Administration, Report to Congress: Mercury Contamination in the Great Lakes, April 17, 2007, Figure 30 at p. 45 and Ohio University, Center for Air Quality, "Evaluation of Transport and Deposition of Mercury in the Great Lakes Region," presentation, October 2010, p. 9.
- 8 Cohen, Mark D., Richard S. Artz, Roland R. Draxler, National Oceanic and Atmospheric Administration, Report to Congress: Mercury Contamination in the Great Lakes, April 17, 2007, Appendix A, EPA Clean Air Mercury Rule: Air Quality Modeling and Deposition Results, at Table 5 (at 138).
- 9 Based on EPA's December 16, 2011 spreadsheet "Nationwide Current Base Inventory," (Docket ID EPA-HQ-OAR-2009-0234-19918) available at <http://www.epa.gov/ttn/atw/utility/utilitypg.html>.
- 10 U.S. EPA, "2008 Biennial National Listing of Fish Advisories," EPA-823-F-09-007, September 2009, 4-5; The increase in the amount of lakes and rivers covered by fish advisories is partially due to an increase in fish monitoring.
- 11 Evers, D.C., Wiener, J.G., Driscoll, C.T., Gay, D.A., Basu, N., Monson, B.A., Lambert, K.F., Morrison, H.A., Morgan, J.T., Williams, K.A., Soehl, A.G. et al., Great Lakes Mercury Connections: The Extent and Effects of Mercury Pollution in the Great Lakes Region, Biodiversity Research Institute, 2011.
- 12 Ibid.
- 13 Biodiversity Research Institute, Press Release, "Mercury Pollution in the Great Lakes Region – Nearly Forgotten, But Not Gone New Scientific Research Has Important Policy Implications," October 11, 2011.
- 14 Tilden J., Hanrahan L., Anderson H., et al., (1997), Health Advisories for Consumers of Great Lakes Sport Fish: Is the Message Being Received?, Environmental Health Perspectives, 105(12):1360-1365, cited in "Great Lakes Fish Consumption Advisories, The Public Health Benefits and Risks" Discussion Paper prepared by the Health Professionals Task Force for the International Joint Commission, January 2004, at 9.
- 15 As discussed in U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011, at 4-7, 4-8.
- 16 Ibid. at 4-8, 4-9.
- 17 U.S. EPA Fact Sheet, Mercury and Air Toxics Standards: Benefits and Costs of Cleaning Up Toxic Air Pollution from Power Plants.
- 18 U.S. EPA Fact Sheet, Mercury and Air Toxics Standards: Benefits and Costs of Cleaning Up Toxic Air Pollution from Power Plants
- 19 Crist, K., "Evaluation of Transport and Deposition of Mercury in the Great Lakes Region," webinar presentation to the Great Lakes Commission, Air Deposition Program, October 13, 2010, at slide 9.
- 20 U.S. EPA Memorandum, Emissions Overview: Hazardous Air Pollutants in Support of the Proposed Toxics Rule, March 15, 2011, at 2.
- 21 U.S. Food and Drug Administration, Guidance for Industry: Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed, August 2000, <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ChemicalContaminantsandPesticides/ucm077969.htm>
- 22 Based on EPA's December 16, 2011 spreadsheet "Nationwide Current Base Inventory," Docket ID EPA-HQ-OAR-2009-0234-19918.
- 23 See 65 FR 79,825 (December 20, 2000).
- 24 Evers, D.C., et al.
- 25 Based on EPA's December 16, 2011 spreadsheet "Nationwide Current Base Inventory," Docket ID EPA-HQ-OAR—2009-0234-19918.
- 26 June 9, 2011, AEP Press Release, AEP Shares Plan for Compliance with Proposed EPA Regulations.
- 27 "Aging Indiana power plant to shut down, cutting Chicago-area air pollution," Chicago Tribune, May 5, 2011; and "WC Beckjord Unit Retirement Plans," <http://www.duke-energy.com/beckjord/>.
- 28 EPA's December 16, 2011 spreadsheet "Nationwide Current Base Inventory," Docket ID EPA-HQ-OAR-2009-0234; see also EPA's Memorandum: Emissions Overview: Hazardous Air Pollutants in Support of the Final Mercury and Air Toxics Standard, EPA-454/R-11-014, November 2011. Note that the U.S. EPA's Mercury and Air Toxics Rule will only apply to those electric utility generating units with greater than 25 megawatts generating capacity. See "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, Final Rule" at 77 FR 9485 (February 16, 2012) for 40 C.F.R. § 63.10042 (definition of "electric utility steam generating unit").
- 29 EPA's proposed mercury and air toxics rule at 76 FR 25002 (May 3, 2011).
- 30 See Appendix A to this report for further details.
- 31 EPA's proposed mercury and air toxics rule at 76 FR 25002 (May 3, 2011). See also EPA's Memorandum: Emissions Overview: Hazardous Air Pollutants in Support of the Final Mercury and Air Toxics Standard, EPA-454/R-11-014, November 2011, Table 3 (fn 4) at 6.
- 32 U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011, at 1-12. EPA's December 2011 Regulatory Impact Analysis states that "The year 2016 is the compliance year for MATS, though as we explain in later chapters, we use 2015 as a proxy for compliance in 2016 for our cost analysis due to availability of modeling impacts in that year." This report also uses EPA's 2015 projections.
- 33 U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011, at 1-11 and 3-1.

- 34 U.S. EPA, Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model, August 2010, Section I. Introduction (for background on the Integrated Planning Model).
- 35 Ibid. *see also* U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, at ES-14.
- 36 U.S. EPA spreadsheet "IPM Parsed Files – 2015 Policy Case", Docket ID EPA-HQ-OAR-2009-0234-19983.
- 37 June 9, 2011, AEP Press Release, AEP Shares Plan for Compliance with Proposed EPA Regulations.
- 38 Cohen, Mark D., Richard S. Artz, Roland R. Draxler, National Oceanic and Atmospheric Administration, Report to Congress: Mercury Contamination in the Great Lakes, April 17, 2007, Figure 30 at p. 45 and Ohio University, Center for Air Quality, "Evaluation of Transport and Deposition of Mercury in the Great Lakes Region," presentation, October 2010, p. 9.
- 39 Michigan DEQ Air Quality Division, Part 15, Emission Limitations and Prohibitions – Mercury, Adopted October 16, 2009.
- 40 Wisconsin Department of Natural Resources, website on Wisconsin's Mercury Rule and Revision, available at <http://dnr.wi.gov/air/toxics/mercury/index.htm> Chapter NR 446, Wisconsin Administrative Code.
- 41 Legislation Passed - Minnesota Mercury Emissions Reduction Act of 2006, May 11, 2006.
- 42 6 NYCRR Part 246: Mercury Reduction Program for Coal-Fired Electric Utility Steam Generating Units (2007). Specifically, beginning in 2015 New York's rule requires coal-fired power plants to meet a mercury emission limit of 0.6 pounds per trillion British Thermal Unit heat input (lb/TBtu), on a 30-day average. This limit is 50% lower than the EPA's limit of 1.2 lb/TBtu under MATS.
- 43 Cohen, Mark D. et al., National Oceanic and Atmospheric Administration, Report to Congress: Mercury Contamination in the Great Lakes, April 17, 2007, inferred from Figure 9 (at p. 27).
- 44 Ibid. Figure 30 at p. 45.
- 45 Ibid. Ohio University, Center for Air Quality, "Evaluation of Transport and Deposition of Mercury in the Great Lakes Region," presentation, October 2010, p. 9.
- 46 Cohen, Mark D., et al. Figure 30 at p. 45.
- 47 Ibid.
- 48 U.S. Food and Drug Administration, Guidance for Industry: Action Levels for Poisonous or Deleterious Substances in Human Food and Animal Feed, August 2000, <http://www.fda.gov/Food/GuidanceComplianceRegulatoryInformation/GuidanceDocuments/ChemicalContaminantsandPesticides/ucm077969.htm>
- 49 U.S. EPA, Revised Technical Support Document: National-Scale Mercury Risk Assessment Supporting the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units, December 2011, at 58-9 (Figures 2-3 and 2-4).
- 50 Cohen, Mark D. et al., National Oceanic and Atmospheric Administration, Report to Congress: Mercury Contamination in the Great Lakes, April 17, 2007, at 19.
- 51 Ibid.
- 52 Ibid. Figures 46, 52, 58, 65, and 71.
- 53 Ibid. Appendix A, EPA Clean Air Mercury Rule: Air Quality Modeling and Deposition Results, at Table 5 (at 138).
- 54 Crist, Kevin Ph.D., Ohio University, Center for Air Quality, "Evaluation of Transport and Deposition of Mercury in the Great Lakes Region," webinar presentation to the Great Lakes Commission, Air Deposition Program, October 13, 2010.
- 55 Keeler G. J., Landis M. S., Norris G. A., et al., "Sources of Mercury Wet Deposition in Eastern Ohio, USA," *Environ. Sci. Technol.* 2006, 40, 5874-5881, 5874.
- 56 U.S. EPA, Technical Support Document: National-Scale Assessment of Mercury Risk Supporting the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units, December 2011, EPA-452/R-11-009, at 58 (Figure 2-3) and 65.
- 57 Ibid. at Figure 2-3 (p. 68).
- 58 Evers, D.C., et al. at 12.
- 59 Ibid.
- 60 discussion in U.S. EPA, Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report, March 2011 at 5-9, 5-33 to 5-35; *see also* U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011, at 4-25 to 4-28.
- 61 Hrabik, T.R., and C.J. Watras. 2002. Recent declines in mercury concentration in a freshwater fishery: isolating the effects of de-acidification and decreased atmospheric mercury deposition in Little Rock Lake. *Science of the Total Environment* 297:229–237.
- 62 Canfield D.E., Gorski, P.R. et al., 2007. Deposition and cycling of sulfur controls mercury accumulation in Isle Royale fish. *Environmental Science and Technology* 41(21):7266–7272.
- 63 U.S. EPA, Regulatory Impact Analysis of the Proposed Air Toxics Rule: Final Report, March 2011, at 5-9.
- 64 Ibid. at Table 3-4 (at pp. 3-11 to 3-12).
- 65 Evers, D.C., et al., at 24-26.
- 66 Ibid. at 25.
- 67 National Research Council, "Toxicological Effects of Methylmercury," 2000, at 147-232.
- 68 U.S. EPA, Regulatory Impact Analysis of the Mercury and Air Toxics Standards, at 4-4.
- 69 National Research Council, "Toxicological Effects of Methylmercury," 2000, at 42.
- 70 U.S. National Library of Medicine, Methylmercury Poisoning, available at <http://www.nlm.nih.gov/medlineplus/ency/article/001651.htm>.
- 71 Mahaffey, Kathryn R., "Mercury Exposure: Medical and Public Health Issues," *Transactions of the American Clinical and Climatological Association*, Vol, 116, 2005 at 146.
- 72 Mahaffey KR, Clickner RP, Jeffries RA. Adult women's blood mercury concentrations vary regionally in the United States: association with patterns of fish consumption (NHANES 1999-2004). *Environ Health Perspect.* 2009 Jan;117(1):47-53. Epub 2008 Aug 25. Based on national estimates in Table 1 applied to the 2009 national birth rate reported by CDC at <http://www.cdc.gov/nchs/births.htm>.
- 73 Ibid.
- 74 Minnesota Department of Health, Division of Environmental Health, "Mercury Levels in Blood from Newborns in the Lake Superior Basin", Final Report, November 30, 2011, Executive Summary, <http://www.health.state.mn.us/divs/eh/hazardous/topics/studies/newbornhg1sp.html>.

- 75 U.S. EPA, Regulatory Impact Analysis of the Proposed Air Toxics Rule: Final Report, March 2011, at 5, 7.
- 76 National Institutes of Health, Office of Research Facilities, "Mercury Health Hazards," available at <http://orf.od.nih.gov/Environmental+Protection/Mercury+Free/MercuryHealthHazards.htm>.
- 77 National Research Council, "Toxicological Effects of Methylmercury," 2000, at 4.
- 78 Ibid., at 230.
- 79 Ibid. 53-4.
- 80 Ibid. at 231. See also Evers, D.C., et al., at 8.
- 81 Ibid. at 4.
- 82 Ibid. at 228-9.
- 83 U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, at 4-5.
- 84 Evers, D.C., et al, at 7.
- 85 U.S. EPA, Regulatory Impact Analysis of the Proposed Toxics Rule, March 2011, at 5-18 to 5-19.
- 86 U.S. EPA, Technical Support Document: National-Scale Assessment of Mercury Risk to Populations with High Consumption of Self-caught Freshwater Fish, EPA-452/R-11-009, December 2011, at 71 (Figure 2-13) and at 73-74.
- 87 Evers, D.C., et al., at 22-23 and Fig. 12.
- 88 U.S. EPA, Technical Support Document: National-Scale Mercury Risk Assessment Supporting the Appropriate and Necessary Finding for Coal- and Oil-Fired Electric Generating Units, March 2011, at 25 (fn 27).
- 89 Grandjean, Philippe, Esben Budtz-Jorgensen, "Total Imprecision of Exposure Biomarkers: Implications for Calculating Exposure Limits," *American Journal of Industrial Medicine* 50:712-719 (2007). This study recommends that the reference dose for methylmercury be reduced by 50%.
- 90 Evers, D.C., et al., at 22
- 91 Evers, D.C., et al., at 22-23 and Fig. 12.
- 92 U.S. EPA, 2010 National Listing of Fish Advisories, "2010 Advisory Listing" presentation, available at [http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/upload/nlfa\\_slides\\_2011.pdf](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/upload/nlfa_slides_2011.pdf).
- 93 U.S. EPA Fish Consumption Advisories Website at [http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories\\_index.cfm](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories_index.cfm).
- 94 U.S. EPA, National Listing of Fish Advisories: Technical Fact Sheet 2010, EPA-820-F-11-014 November 2011, at [http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/technical\\_factsheet\\_2010.cfm](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/technical_factsheet_2010.cfm); The increase in the amount of lakes and rivers covered by fish advisories in recent years is partially due to an increase in fish monitoring.
- 95 Evers, D.C., et al., at 13-14.
- 96 "Great Lakes Fish Consumption Advisories: The Public Health Benefits and Risks," Discussion Paper Prepared by the Health Professionals Task Force for the International Joint Commission, Appendix 2, available at: <http://www.ijc.org/php/publications/pdf/ID1540.pdf>. See also Baumann Jeremiah, Julie Wolk, Jane Houlihan, and Richard Wiles, The State PIRGS and Environmental Working Group, Brain Food—What women should know about mercury contamination of fish, April 2001, at 37.
- 97 "Great Lakes Fish Consumption Advisories: The Public Health Benefits and Risks," Discussion Paper Prepared by the Health Professionals Task Force for the International Joint Commission, Appendix 2, available at: <http://www.ijc.org/php/publications/pdf/ID1540.pdf>.
- 98 Ibid. at 9.
- 99 Ibid.
- 100 U.S. Geological Survey, Commercial Fish Production Data for the Great Lakes for 2009, available at [http://www.glsc.usgs.gov/\\_files/cfreports/noaa09.txt](http://www.glsc.usgs.gov/_files/cfreports/noaa09.txt).
- 101 U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, 4-1.
- 102 U.S. EPA issues general warnings and recommendations for consumption of store-bought or restaurant fish concerning mercury, see <http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisory.cfm>.
- 103 U.S. Fish & Wildlife Service, "2006 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation," 10, available at: [http://library.fws.gov/pubs/nat\\_survey2006\\_final.pdf](http://library.fws.gov/pubs/nat_survey2006_final.pdf)
- 104 Evers, D.C., et al., at 7.
- 105 U.S. Census Bureau, National Survey of Fishing, Hunting, and Wildlife-Associated Recreation, Fact Sheets for 2001 and 2006, available at <http://www.census.gov/prod/www/abs/fishing.html>.
- 106 Morey, ER and WS Breffle. 2006. Valuing a Change in a Fishing Site Without Collecting Characteristics Data on Fishing Sites: A Complete But Minimal Model. *American Journal of Agricultural Economics* 88(1): 150-161.
- 107 MacDonald, HF and KJ Boyle. 1997. Effect of a Statewide Sport Fish Consumption Advisory on Open-Water Fishing in Maine. *North American Journal of Fisheries Management* 17(3): 687-695; Jakus, PM, M Downing, MS Bevelheimer and JM Fly. 1997. Do Sportfish Consumption Advisories Affect Reservoir Anglers' Site Choice? *Agricultural and Resource Economics Review* 26(2): 196-204; Jakus, PM, D Dadakas and JM Fly. 1998. Fish Consumption Advisories: Incorporating Angler-Specific Knowledge, Habits, and Catch Rates in a Site Choice Model. *American Journal of Agricultural Economics* 80(5): 1019-1024; and Jakus, PM and WD Shaw. 2003. Perceived Hazard and Product Choice: An Application to Recreational Site Choice. *Journal of Risk and Uncertainty* 26(1): 77-92.
- 108 Crump, Kate L., and Trudeau, Vance L. Mercury-induced reproductive impairment in fish. *Environmental Toxicology and Chemistry*, Vol. 28, No. 5, 2009.
- 109 U.S. EPA, Regulatory Impact Analysis of the Proposed Air Toxics Rule: Final Report, March 2011 at 5-9.
- 110 U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, at 55-56 and Table 4-7.
- 111 Evers, D.C., et al., at 16
- 112 Ibid. at 16-19.
- 113 Ibid. at 21.
- 114 Burgess, N.M. and M.W. Meyer. 2008, Methylmercury Exposure Associated with Reduced Productivity in Common Loons, *Ecotoxicology*, 17 (2): 83-91. Also Evers, D.C., Savoy, L., Desorbo, C. et al., Adverse effects from environmental mercury loads on breeding common loons. *Ecotoxicology*. 17:69-81, 2008; Mitro, Matthew G., Evers, David C., Meyer, Michael W., and Piper, Walter H. Common loon survival rates and mercury in New England and Wisconsin. *Journal of Wildlife Management*. 72(3): 665-673, 2008.

115 Evers, D.C., et al., at 22

116 Hoffman D., Henry C., Hill E. et al., Mercury and drought along the lower Carson River, Nevada: III. Effects on blood and organ biochemistry and histopathology of snowy egrets and black-crowned night-herons on Lahontan Reservoir, 2002-2006. *Journal of Toxicology and Environmental Health, Part A*. 72: 20, 1223-1241, 2009.

117 Yates D., Mayack D., Munney K., et al., Mercury levels in mink (*Mustela vison*) and river otter (*Lontra canadensis*) from northeastern North America. *Ecotoxicology*. 14, 263-274, 2005. *See also* Evers, D.C., et al., at 22.

118 Evers, D.C., et al., at 20

119 U.S. EPA website Cross-State Air Pollution Rule, available at <http://www.epa.gov/airtransport/actions.html#snpr>.

120 "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, Final Rule" at 77 FR 9304 (February 16, 2012). *See also* U.S. EPA's website regarding Air Toxics Standards for Utilities at <http://www.epa.gov/ttn/atw/utility/utilitypg.html>.

121 U.S. EPA, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress, EPA-453/R-98-004a, February 1998.

122 U.S. EPA, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Final Report to Congress, February 1998. *See also* U.S. EPA's "Necessary and Appropriate Finding" at 65 Fed.Reg. 79825 (December 20, 2000).

123 Clean Air Mercury Rule at 70 FR 28606 (May 18, 2005).

124 *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008).

125 The proposed rule was made available by the U.S. EPA in March of 2011 on its "Air Toxics Standards for Utilities" website (at <http://www.epa.gov/ttn/atw/utility/utilitypg.html>). That proposed rulemaking was not formally published in the *Federal Register* until May 3, 2011 (at 76 FR 24976).

126 "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, Final Rule" at 77 FR 9304 (February 16, 2012). *Also* EPA Fact Sheet: Mercury and Air Toxic Standards Clean Air and Reliable Electricity at 2, available at <http://www.epa.gov/airquality/powerplanttoxics/pdfs/20111221MATScleanair-reliableelectricity.pdf>.

127 *Ibid.*

128 Although it was recently reported that the Obama Administration would delay the U.S. EPA's planned lowering of the ozone air quality standards until 2013 (see "Obama Administration Abandons Stricter Air-Quality Rules," *New York Times*, September 2, 2011), the U.S. EPA's revisions to the ozone air quality standard that were adopted in 2008 remain in effect and states will be required to adopt plans to attain and maintain the 2008 ozone standards.

129 70 Fed.Reg. 25162 (May 12, 2005).

130 U.S. EPA's CAIR website at <http://www.epa.gov/cair/>.

131 The U.S. EPA announced final adoption of the Cross-State Air Pollution Rule, which is intended to replace the Clean Air Interstate Rule, on July 6, 2011. See <http://www.epa.gov/crossstaterule/basic.html>.

132 *EME Homer City Generation, L.P. v. Environmental Protection Agency*, Case No. 11-1302, D.C. Circuit Court of Appeals, December 30, 2011 Order.

133 *Ibid.* at 2.

134 statement of John B. Stephenson, U.S. Government Accounting Office (GAO), Testimony Before the Subcommittee on Clean Air and Nuclear Safety, Committee on Environment and Public Works, U.S. Senate, entitled "Clean Air Act Preliminary Observations on the Effectiveness and Costs of Mercury Control Technologies at Coal-Fired Power Plants," July 9, 2009 at 6.

135 See [http://www.icac.com/files/members/Commercial\\_Hg\\_Bookings\\_060410.pdf](http://www.icac.com/files/members/Commercial_Hg_Bookings_060410.pdf).

136 *Ibid.* at Appendix I.

137 U.S. EPA's March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report at 1-1, 6-2.

138 U.S. EPA's discussion of the benefits of the Cross-State Air Pollution Rule at <http://www.epa.gov/crossstaterule/>.

### DISCUSSION OF METHODOLOGY AND SOURCES OF DATA FOR 2010 MERCURY EMISSIONS AND THE EPA'S PROJECTED MERCURY EMISSIONS UNDER EPA'S MERCURY AND AIR TOXIC STANDARDS FOR COAL-FIRED POWER PLANTS IN THE GREAT LAKES STATES.

#### Source of Current Mercury Emissions Data

The mercury emission estimates in this report that are labeled as either “2010” or “current” emissions are based on the EPA's National Current Base Inventory made available with the EPA's Mercury and Air Toxics Standards (MATS) that was signed by EPA on December 16, 2011.<sup>1</sup> The EPA developed these mercury emission estimates based on actual emissions data that it collected in 2010 for roughly 15 percent of the coal-fired power plant units in the U.S. over the last few years.<sup>2</sup> Based on the actual emissions data that the EPA collected, EPA developed emission factors reflective of the various types of coal and types of pollution controls used at coal-fired power plants in the U.S., and then EPA estimated emissions for 2010 based on the recent installation of mercury controls to comply with state rules, voluntary reductions from power plants, and mercury reduction co-benefits expected with control equipment used to reduce sulfur dioxide and nitrogen oxides implemented as a result of the Clean Air Interstate Rule (CAIR) as well as under Clean Air Act settlements.<sup>3</sup>

However, EPA cautioned that the mercury emissions in its 2010 estimates are likely underestimated because “the emission factors may not accurately account for larger emissions from units with more poorly performing emission controls.”<sup>4</sup>

Because there were no national rules in place to require power plants to reduce mercury (until December of 2011) and very few state rules, most power plants do not currently monitor for mercury emissions. Thus, one has to estimate mercury emissions for most coal-fired power plants. Aside from the EPA's recent projections of mercury emissions, the other main data source available for current mercury emissions are the emissions reported by power plant owners to the EPA's Toxic Release Inventory. Owners of industrial facilities including coal-fired power plants are required under Section 313 of the Emergency Planning and Community Right to Know Act (EPCRA) and under the Pollution Prevention Act (PPA) to report to EPA on an annual basis about releases of toxic pollutants to the air and water. The Toxic Release Inventory is the database where the EPA maintains this data.<sup>5</sup> Under the applicable requirements for reporting air emissions to the Toxic Release Inventory, companies can use monitoring data or, if such data is not available as is the case for mercury at most coal-fired power

plants, “reasonable estimates” of the amount of mercury and other toxics released to the air must be provided. Such reasonable estimates could be based on published emission factors, material balances, or engineering calculations.<sup>6</sup> Thus, while the Toxic Release Inventory is a source for mercury emissions information for power plants, it was not used in this report.

Despite the potential underestimates of mercury emissions that the EPA acknowledged may exist in its 2010 National Base Case Inventory, the EPA's mercury estimates were used in this report for the following reasons: First, the purpose of this report is to explain how the EPA's Mercury and Air Toxics Standards will benefit the Great Lakes States, and thus it made most sense to use EPA's estimates of mercury emissions data. Second, the EPA's mercury estimates were based on emission factors developed by EPA that were consistently applied among similar sources, whereas the Toxic Release Inventory data is self-reported by the industry and can be based on various emission factors, engineering assumptions, or mass balance calculations.

In July 2011, NRDC issued a report entitled “Toxic Top 20,” in which Toxic Release Inventory data was used to identify the 20 states with the highest toxic emissions to the air, including mercury.<sup>7</sup> The purpose of that report was, in part, to compare emissions of air toxics for the electric power industry to toxic air pollution reported by other industrial categories. The Toxic Release Inventory provided the most readily available dataset to use for that report, because the dataset includes toxic emissions reported by companies for various types of industrial facilities.

Several Great Lakes states made it into the Toxic Top 20 state list, including Ohio, Pennsylvania, Indiana, Michigan, Illinois, and Wisconsin.<sup>8</sup> The Toxic Top 20 report identifies mercury emissions from the electric power sector for those states that are, for the most part, higher than the statewide emissions from coal-fired power plants provided in this report.<sup>9</sup> There are several likely reasons for this. First, EPA's emission estimates reflect pollution controls installed in 2010, whereas the Toxic Top 20 report is based on 2009 emissions. In recent years, several power plant units have been installing pollution controls that could reduce mercury that may not be reflected in the Toxic Release Inventory. Second, the EPA's estimates only include those power plant units which will be subject to the MATS rule—that is, only those coal-fired units with generating capacity above 25 megawatts. In this report on the Great Lakes, the statewide emission estimates also only include those power plant units that will be subject to EPA's Mercury and Air Toxics rule. The Toxic Release Inventory may include the emissions from these smaller units. Third, as stated above, EPA has acknowledged its 2010 estimates may underestimate mercury emissions from larger poorly controlled units.



Given that companies can use a variety of emission estimation techniques for the Toxic Release Inventory, there are likely other reasons for differences between the EPA's mercury emission estimates for 2010 and the emission estimates in the Toxic Release Inventory.

For all of these reasons, this report on mercury in the Great Lakes was based on the EPA's 2010 mercury emission estimates for coal-fired power plants with generating capacity over 25 megawatts.

### Statewide Totals of Mercury Emissions

The statewide totals of mercury emissions from coal-fired power plants in this report only include those coal-fired power plants that will be subject to the EPA's proposed mercury and air toxics rule. That is, the statewide totals only include coal-fired power plant units that produce more than 25 megawatts of electricity and that supply more than one-third of its potential electric output capacity and more than 25 megawatts to a utility power distribution system.<sup>10</sup> The statewide totals are based on the EPA's 2010 National Base Case Inventory with no changes. Thus, if a company has installed new pollution controls that reduce mercury after 2010, those mercury reductions are not reflected in any estimates of current mercury emissions from coal-fired power plants.

### Projected Mercury Emissions under the MATS

The EPA has projected mercury and other air toxics emissions from coal-fired power units in 2015 under its MATS, which have been provided for the coal-fired power plant units in the Great Lakes region in this report. To develop these emission estimates, the EPA used the Integrated Planning Model. According to EPA,

[The Integrated Planning Model] is a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector. It provides forecasts of least cost capacity expansion, electricity dispatch, and emission control strategies while meeting energy demand and environmental, transmission, dispatch, and reliability constraints. IPM can be used to evaluate the cost and emissions impacts of proposed policies to limit emissions of sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), carbon dioxide (CO<sub>2</sub>), and mercury (Hg) from the electric power sector.

See U.S. EPA, Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model, August 2010, Section I. Introduction (for background on the Integrated Planning Model) at 1-1.

The planning model projected mercury and other air toxic emission levels for each electric generating unit in 2015,<sup>11</sup> which are relied upon in this report as reflective of EPA's projections of mercury emissions under its Mercury

and Air Toxics Standards. The EPA used the results of the planning model to determine the economic impacts of the costs of control and to evaluate the environmental and economic benefits of its Mercury and Air Toxics Rule.<sup>12</sup> The EPA also took into account the requirements of the Cross State Air Pollution Rule (CSAPR) that was issued in July 2011.<sup>13</sup> Documentation on the assumptions, inputs and methodology of the Integrated Planning Model runs for the Mercury and Air Toxics Rule is available at the EPA's internet site at <http://www.epa.gov/airmarkets/progsregs/epa-ipm/BaseCasev410.html#documentation> and is also in the docket for the EPA's Mercury and Air Toxics Standard rulemaking.<sup>14</sup>

This report only provides the EPA's 2015 mercury emission projections for those coal-fired electrical generating units for which 2010 mercury emission estimates were provided by the EPA in its National Base Case Inventory.

1 See 12/16/11 "National Current Base Inventory," Docket ID EPA-HQ-OAR-2009-0234-19918, available in the docket for the U.S. EPA's Mercury and Air Toxics Standards at [www.regulations.gov](http://www.regulations.gov).

2 See 76 Fed.Reg. 25002, 25021 to 25023 (regarding Information Collection Request) (May 3, 2011).

3 See 76 Fed.Reg. 25002 (May 3, 2011).

4 *Id.*

5 See <http://tri.supportportal.com/link/portal/23002/23021/Article/23159/What-is-the-Toxics-Release-Inventory>.

6 See Instructions for Completing Part II of EPA Form R, Section 5, available at <http://www.epa.gov/tri/report/rfi/ry2009rfi121709.pdf>.

7 See NRDC, Toxic Power How Power Plants Contaminate Our Air and States, available at [http://docs.nrdc.org/air/files/air\\_11072001a.pdf](http://docs.nrdc.org/air/files/air_11072001a.pdf).

8 *Id.* at 3 (Table entitled "The Toxic Twenty").

9 *Id.* at 5, 6, 10, 11, 21, and 22 (Toxic Industrial Pollution in Ohio, Pennsylvania, Indiana, Michigan, Illinois, Wisconsin).

10 The U.S. EPA's Mercury and Air Toxics Rule will only apply to those electric utility generating units with greater than 25 megawatts generating capacity. See Final MATS rule at 40 C.F.R. § 63.10042 (definition of "electric utility steam generating unit").

11 The EPA's mercury and other toxic pollutant emission projections for each electric utility steam generating unit in 2015 under its Mercury and Air Toxics Standards ("IPM Parsed Files – 2015 MATS Policy Case") are available in docket for EPA's Mercury and Air Toxics rule at [www.regulations.gov](http://www.regulations.gov) under docket ID number EPA-HQ-OAR-2009-0234-19983.

12 *Id.*, see also U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011 .

13 See U.S. EPA, Regulatory Impact Analysis of the Final Mercury and Air Toxics Standards, December 2011, EPA-452/R-11-0011, at 1-11 and 3-1.

14 See U.S. EPA Base Case v410 Documentation, Docket ID # EPA-HQ-OAR-2009-0234-3049, and Documentation Supplement for U.S. EPA Base Case v.4.10\_PTox – Updates for Proposed Toxics Rule, Docket ID # EPA-HQ-OAR-2009-0234-3048, both available at [www.regulations.gov](http://www.regulations.gov).

## APPENDIX B

I. Illinois State Coal-Fired Power Plants									
Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>±a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>±a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>	
1	Newton	Ameren Energy Generating Company (Parent: Ameren Corporation)	294	1	1977	617	ACI, ESP	159	17
				2	1982	617	ACI, ESP	135	21
2	Joppa Steam	Electric Energy (Ameren), Central Illinois Public Service Co., Illinois Power Co' (Ameren), Kentucky Utilities Co. (Parent: PPL Corp.), Union Electric Co.(Ameren)	173	1	1953	183	ACI, ESP	30	7
				2	1953	183	ACI, ESP	29	7
				3	1954	183	ACI, ESP	27	7
				4	1954	183	ACI, ESP	29	7
				5	1955	183	ACI, ESP	29	7
				6	1955	183	ACI, ESP	29	7
3	Baldwin Energy Complex	Dynergy Midwest Generation Inc. (Parent: Dynergy, Inc.)	167	1	1970	625	ACI, ESP	56	28
				2	1973	635	ACI, ESP	55	30
				3	1975	635	ACI, ESP	56	29
4	Powerton	Midwest Generations EME LLC (Parent Company - Edison International)	129	51			ACI, ESP	34	0
				52	1972	893	ACI, ESP	35	7
				61	1975	893	ACI, ESP	30	0
				62			ACI, ESP	30	7
5	Duck Creek	Ameren Energy Resources Generating Company (Parent: Ameren Corporation)	89	1	1976	441	ESP, WFGD	89	16
6	Kincaid Generation LLC	Dominion Energy Services Co. (Parent: Dominion Resources)	87	1	1967	660	ACI, ESP	46	13
				2	1968	660	ACI, ESP	42	13
7	Joliet 29	Midwest Generations EME LLC (Parent Company - Edison International)	79	71			ACI, ESP	29	10
				72	1965	660	ACI, ESP	27	9
				81	1966	660	ACI, ESP	28	9
				82			ACI, ESP	27	9
8	Coffeen	Ameren Energy Resources Generating Company (Parent: Ameren Corporation)	72	1	1965	389	ESP, WFGD	31	19
				2	1972	617	ESP, WFGD	41	30
9	ED Edwards	Ameren Energy Resources Generating Company (Parent: Ameren Corporation)	68	1	1960	136	ACI, ESP	11	3
				2	1968	281	ACI, ESP	23	6
				3	1972	364	ACI, ESP	34	9
10	Wood River	Dynergy Midwest Generation Inc. (Parent: Dynergy, Inc.)	65	4	1954	113	ESP	28	5
				5	1964	388	ACI, ESP	37	15
11	Will County	Midwest Generations EME LLC (Parent Company - Edison International)	47	1	1955	188	ESP	0	0
				2	1955	184	ESP	0	0
				3	1957	299	ACI, ESP	15	7
				4	1963	598	ACI, ESP	32	11

I. Illinois State Coal-Fired Power Plants									
Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>	
12	Hutsonville	Ameren Energy Generating Company (Parent: Ameren Corporation)	38	5	1953	75	ESP	17	2
				6	1954	75	ESP	21	0
13	Meredosia	Ameren Energy Generating Company (Parent: Ameren Corporation)	35	1	1948	58	ESP	4	0
				2			ESP	5	0
				3	1949	58	ESP	5	0
				4			ESP	5	0
				5	1960	239	ACI, ESP	16	1
14	Crawford <sup>c</sup>	Midwest Generations EME LLC (Parent Company - Edison International)	34	7	1958	239	ACI, ESP	14	7
				8	1961	358	ACI, ESP	20	9
15	Dallman	City of Springfield	27	31	1968	90	ESP, WFGD	5	3
				32	1972	90	ESP, WFGD	6	3
				33	1978	207	ESP, WFGD	14	7
				34	2009	280	FF, WFGD	2	8
16	Fisk <sup>c</sup>	Midwest Generations EME LLC (Parent Company - Edison International)	22	19	1968	374	ACI, ESP	22	10
17	Marion Generating Station	Southern Illinois Power Coop	16	4	1963	173	ESP, WFGD	0	0
				123	1978	99	FF	16	5
18	Joliet 9	Midwest Generations EME LLC (Parent Company - Edison International)	15	5	1959	360	ACI, ESP	15	11
19	Waukegan	Midwest Generations EME LLC (Parent Company - Edison International)	15	7	1958	326	ACI, ESP	7	11
				8	1962	355	ACI, ESP	8	13
20	Havana	Dynegy Midwest Generation Inc. (Parent: Dynegy, Inc.)	5	9	1978	488	ACI, ESP	5	18
21	Hennepin Power Station	Dynegy Midwest Generation Inc. (Parent: Dynegy, Inc.)	4	1	1953	75	ACI, ESP	1	2
				2	1959	231	ACI, ESP	3	6
22	Vermilion	Dynegy Midwest Generation Inc. (Parent: Dynegy, Inc.)	3	1	1955	74	ACI, ESP	1	2
				2	19556	109	ACI, ESP	2	6
<b>STATEWIDE TOTALS</b>							<b>1,484</b>	<b>487</b>	

## II. Indiana State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Wabash River	Duke Energy Indiana, LLC (Parent: Duke Energy), Wabash Valley Power Association, Inc.	2	1953	113	ESP	34	2
			3	1954	123	ESP	31	0
			4	1955	113	ESP	47	2
			5	1956	125	ESP	33	0
			6	1968	387	ESP	150	16
2	Clifty Creek	Indiana Kentucky Electric Corp (Owner/Operator) (Parent: Ohio Valley Electric Corp - AEP)	1	1955	217	ESP	37	13
			2	1955	217	ESP	37	12
			3	1955	217	ESP	41	12
			4	1955	217	ESP	45	12
			5	1955	217	ESP	45	12
			6	1956	217	ESP	69	9
3	Rockport	Indiana Michigan Power Co. (Parent: American Electric Power (AEP)), Kentucky Power Co. (Parent: AEP), AEP Generating Company	MB1	1984	1,300	ACI, ESP	118	66
			MB2	1989	1,300	ACI, ESP	107	67
4	State Line <sup>d</sup>	State Line Energy LLC (Parent: Dominion Resources)	3	1955	225	FF	102	13
			4	1962	389	ESP	105	20
5	Tanners Creek	Indiana Michigan Power Co. (Parent: American Electric Power (AEP))	1	1951	153	ESP	41	0
			2	1952	153	ESP	48	0
			3	1954	215	ESP	72	0
			4	1964	580	ESP	17	11
6	Gibson	Indiana Municipal Agency, Duke Energy Indiana Inc. (Parent: Duke Energy), Wabash Valley Power Association Inc.	1	1976	668	ESP, WFGD	32	24
			2	1975	668	ESP, WFGD	37	24
			3	1978	668	ESP, WFGD	40	24
			4	1979	668	ESP, WFGD	35	34
			5	1982	668	ESP, WFGD	22	25
7	AES Petersburg	Indianapolis Power & Light Co. (AES)	1	1967	253	ESP, WFGD	19	10
			2	1969	471	ESP, WFGD	35	19
			3	1977	574	ESP, WFGD	51	27
			4	1986	574	ESP, WFGD	49	38
8	R.M. Schahfer	Northern Indiana Public Service Co. (Parent: NiSource, Inc.)	14	1976	540	ESP	23	16
			15	1979	556	ESP	29	5
			17	1983	424	ESP	26	24
			18	1986	424	ESP, WFGD	34	23
9	Merom	Hoosier Energy R.E.C. Inc.	1SG1	1983	540	ESP, WFGD	45	18
			2SG1	1982	540	ESP, WFGD	40	20

## II. Indiana State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>	
10	Michigan City	Northern Indiana Public Service Co. (Parent: NiSource, Inc.)	84	12	1974	540	ESP	84	8
11	Frank E. Ratts	Hoosier Energy R.E.C. Inc.	83	1SG1	1970	117	ESP	43	2
				2SG1	1970	117	ESP	40	2
12	Cayuga	Duke Energy Indiana, LLC (Parent: Duke Energy)	79	1	1970	531	ESP, WFGD	41	16
				2	1972	531	ESP, WFGD	38	16
13	Harding Street	Indianapolis Power & Light Co.	68	50	1958	114	ESP	26	5
				60	1961	114	ESP	21	5
				70	1973	471	ESP, WFGD	21	18
14	Eagle Valley	Indianapolis Power & Light Co.	47	3	1951	50	ESP	5	0
				4	1953	69	ESP	12	0
				5	1953	69	ESP	11	3
				6	1956	114	ESP	19	4
15	Bailly	Northern Indiana Public Service Co. (Parent: NiSource, Inc.)	32	7	1962	190	ESP, WFGD	15	6
				8	1968	413	ESP, WFGD	17	11
16	Warrick Power	AGC Division of AEP (Parent: Alcoa) and Southern Indiana Gas & Electric Co.	30	4	1970	323	ESP, WFGD, SCR	30	11
17	F. B. Culley	Southern Indiana Gas & Electric Co.	19	2	1966	104	FF, WFGD	3	5
				3	1973	265	FF, WFGD	16	13
18	Edwardsport	Duke Energy Indiana Inc. (Parent: Duke Energy Corporation)	18	7-1	1949	40	ESP	6	0
				7-2	1949		ESP	6	0
				8-1	1951	69	ESP	6	0
19	A. B. Brown Generating Station	Southern Indiana Gas & Electric Co.	18	1	1979	265	FF, WFGD	3	12
				2	1986	265	ESP, WFGD	15	12
20	R. Gallagher	Duke Energy Indiana Inc. (Parent: Duke Energy Corporation)	0	1	1959	150	FF	0	0
				2	1958	150	FF	0	3
				3	1960	150	FF	0	0
				4	1961	150	FF	0	3
21	Whitewater Valley	City of Richmond	0	1	1955	33	FF	0	2
				2	1973	61	FF	0	3
<b>STATEWIDE TOTALS</b>							<b>2,174</b>	<b>754</b>	

### III. Michigan State Coal-Fired Power Plants

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Monroe Power Plant	Detroit Edison Company (Owner/Operator) (Parent: DTE Energy)	614	1	1971	817	ESP	157	25
				2	1973	823	ESP	106	25
				3	1973	823	WFGD	173	25
				4	1974	817	WFGD	178	24
2	Belle River	Detroit Edison Company (Parent: DTE Energy), Michigan Public Power Agency	278	1	1984	698	ESP	144	19
				2	1985	698	ESP	134	20
3	St Clair Power Plant	Detroit Edison Co. (Parent DTE Energy Co.)	233	1	1953	169	ESP	28	3
				2	1953	156	ESP	29	3
				3	1954	156	ESP	27	3
				4	1954	169	ESP	30	3
				6	1961	353	ESP	56	6
				7	1969	545	ESP	63	9
4	Trenton Channel Power Plant	Detroit Edison Co (Parent: DTE Energy)	143	16			ESP	12	1
				17	1949	120	ESP	18	1
				18	1950	120	ESP	16	1
				19	1968	536	ESP	20	1
				9A			ESP	77	13
5	River Rouge Power Plant	Detroit Edison Co. (DTE Energies)	115	2	1957	293	ESP	60	5
				3	1958	358	ESP	55	5
6	D.E. Karn	Consumers Energy Co. (Parent: CMS Energy)	96	1	1959	272	ESP	47	4
				2	1961	272	ESP	49	5
7	J.R Whiting	Consumers Energy Co. (Parent: CMS Energy)	73	1	1952	106	ESP	21	3
				2	1952	106	ESP	23	3
				3	1953	133	ESP	29	3
8	B.C. Cobb	Consumers Energy Co. (Parent: CMS Energy)	67	4	1956	156	ESP	36	4
				5	1957	156	ESP	31	3
9	Consumers Energy - J.H. Campbell	Consumers Energy Co. (Parent: CMS Energy); Wolverine Power Supply Coop, Inc., Michigan Public Power Agency	64	Unit 1	1962	265	ESP	12	6
				Unit 2	1967	404	ESP	14	9
				Unit 3	1980	917	ESP	38	19

### III. Michigan State Coal-Fired Power Plants

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
10	Otto E. Eckert Station	Lansing Board of Water and Light	60	1	1954	44	ESP	7	2
				2	1958	44	ESP	6	2
				3	1960	47	ESP	6	2
				4	1964	80	ESP	14	3
				5	1968	80	ESP	13	3
				6	1970	80	ESP	14	3
11	Presque Isle	Wisconsin Electric Power Co. (Parent: We Energies)	59	3					
				4					
				5	1974	90	FF	0	5
				6	1975	90	FF	0	4
				7	1978	90	FF	19	3
				8	1978	90	FF	22	3
12	J.C. Weadock	Consumers Energy Co. (Parent: CMS Energy)	52	7	1955	156	ESP	26	3
				8	1958	156	ESP	26	3
13	Erickson Station	Lansing Board of Water and Light	26	EU001	1973	155	ESP	26	7
14	Shiras	City of Marquette	16	3	1983	44	FF, DFGD	16	1
15	Harbor Beach Power Plant	Detroit Edison Co. (Parent: DTE Energy Company)	12	1	1968	121	ESP	12	2
16	James De Young	City of Holland	7	5	1969	29	ESP	7	0
17	Endicott Station	Michigan South Central Power Agency	5	1	1982	55	ESP, WFGD	5	0
18	Grand Haven City of J.B. Sims	City of Grand Haven	4	3	1983	80	ESP, WFGD	4	3
<b>STATEWIDE TOTALS</b>								<b>1,924</b>	<b>301</b>

#### IV. Minnesota State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>	
1	Sherburne County	Northern States Power Co. (Parent: Xcel Energy), Southern Minnesota Municipal Power Agency	1	1976	765	ESP, WFGD	156	25	
			2	1977	765	ESP, WFGD	130	26	
			3	1987	900	ACI, FF, DFGD	72	33	
2	Boswell Energy Center	Minnesota Power Inc. (Parent: ALLETE Inc.), Wisconsin Public Power Inc. Systems	1	1958	75	FF	16	7	
			2	1960	75	FF	17	7	
			3	1973	365	ACI, FF, WFGD	35	14	
			4	1980	558	WFGD	107	26	
3	Allen S King	Northern States Power Co. (Parent: Xcel Energy)	103	1	1958	598	FF, DFGD	103	16
4	Taconite Harbor Energy Center	Minnesota Power Inc. (Parent: ALLETE Inc.)	1	1957	84	WFGD	24	2	
			2	1957	84	ESP	23	2	
			3	1967	84	ESP	53	2	
5	Hoot Lake	Otter Tail Power Co.	002	1959	54	ESP	29	2	
			003	1964	75	ESP	40	2	
6	Black Dog	Northern States Power Co. (Parent: Xcel Energy Inc.)	3	1955	114	ESP	14	3	
			4	1960	180	ESP	30	5	
7	Laskin Energy Center	Minnesota Power Inc. (Parent: ALLETE Inc.)	1	1953	58	WFGD	12	3	
			2	1953	58	WFGD	12	3	
8	Silver Lake	Rochester Public Utilities	0	4	1969	54	FF, DFGD	0	1
<b>STATEWIDE TOTALS</b>							<b>873</b>	<b>178</b>	



## V. New York State Coal-Fired Power Plants

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Danskammer Generating Station	Dynergy Danskammer LLC (Parent: Dynergy, Inc.)	97	3	1959	147	ESP	39	2
				4	1967	239	ESP	58	4
2	AES Somerset LLC	AES Somerset LLC (Parent: AES Corporation)	54	1	1984	655	ESP, WFGD	54	36
3	CR Huntley Generating Station	NRG Huntley Operations Inc. (Parent: NRG Energy Inc.)	28	67	1957	218	ACI, DFGD	13	6
				68	1958	218	ACI, DFGD	15	6
4	Dunkirk Generating Plant	NRG Energy, Inc.	26	1	1950	96	FF	4	3
				2	1950	96	FF	4	3
				3	1959	218	FF	10	7
				4	1960	218	FF	8	7
5	AES Cayuga, LLC	AES Eastern Energy LP (Parent: AES Corporation)	23	1	1955	155	ESP, WFGD	11	9
				2	1955	167	ESP, WFGD	12	8
6	AES Greenidge	AES Greenidge (Parent: AES Corporation)	11	4	1950	113	ESP	0	0
				5			ESP	0	0
				6	1953		ACI, DFGD	11	5
7	AES Westover, LLC	AES Westover LLC (Parent: AES Corporation)	0	13	1951	75	FF, DFGD	0	3
<b>STATEWIDE TOTALS</b>								<b>368</b>	<b>89</b>

**VI. Ohio State Coal-Fired Power Plants**

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Cardinal	Buckeye Power Inc, Ohio Power Co (Parent: American Electric Power (AEP))	363	1	1967	615	ESP, WFGD	42	30
				2	1967	615	ESP, WFGD	31	32
				3	1977	650	ESP	290	36
2	Muskingum River	Ohio Power Company (Owner/Operator) (Parent: American Electric Power (AEP))	353	1	1953	220	ESP	41	0
				2	1954	220	ESP	37	0
				3	1957	238	ESP	48	0
				4	1958	238	ESP	54	0
				5	1968	615	ESP	173	21
3	Walter C Beckjord*	Duke Energy Ohio Inc (Parent: Duke Energy Corporation), Columbus Southern Power Co. (Parent: AEP), Dayton Power & Light Co.	304	1	1952	115	ESP	21	0
				2	1953	113	ESP	21	0
				3	1954	125	ESP	27	7
				4	1958	163	ESP	34	8
				5	1962	245	ESP	67	11
				6	1969	461	ESP	134	17
4	General James M. Gavin	Ohio Power Company (Owner/Operator) (Parent: American Electric Power (AEP))	220	1	1974	1,300	ESP, WFGD	105	64
				2	1975	1,300	ESP, WFGD	115	64
5	Kyger Creek	Ohio Valley Electric Corp (AEP)	214	1	1955	217	ESP	43	12
				2	1955	217	ESP	45	12
				3	1955	217	ESP	37	12
				4	1955	217	ESP	45	12
				5	1955	217	ESP	44	12
6	J M Stuart	Duke Energy Ohio, Inc. (Parent: Duke Energy), Columbus Southern Power Co. (Parent: AEP), Dayton Power&Light Co.	187	B001	1971	610	ESP, WFGD	48	25
				B002	1970	610	ESP, WFGD	45	24
				B003	1972	610	ESP, WFGD	48	20
				B004	1974	610	ESP, WFGD	46	14
7	Avon Lake	Orion Power Midwest LP (Parent: GenOn Energy)	145	10	1949	86	ESP	4	0
				12	1970	680	ESP	141	16
8	Conesville	Duke Energy Ohio Inc (Parent: Duke Energy), Columbus Southern Power Co (Parent: AEP), Dayton Power & Light Co.	144	3	1962	162	ESP	67	8
				4	1973	842	ESP, WFGD	31	23
				5	1976	444	ESP, WFGD	22	6
				6	1978	444	ESP, WFGD	24	6

## VI. Ohio State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>	
9	W. H. Sammis	FirstEnergy Generation Corp	137	1	1959	190	FF, WFGD	9	10
				2	1960	190	FF, WFGD	9	10
				3	1961	190	FF, WFGD	8	11
				4	1962	190	FF, WFGD	8	10
				5	1967	334	ESP, WFGD	21	15
				6	1969	680	ESP, WFGD	41	33
				7	1971	680	ESP, WFGD	41	33
10	Eastlake <sup>f</sup>	FirstEnergy Generation Corp	135	1	1953	123	ESP	22	4
				2	1953	123	ESP	13	4
				3	1954	123	ESP	8	0
				4	1956	208	ESP	23	7
				5	1972	680	ESP	69	25
11	Miami Fort	Duke Energy Ohio, Inc. (Parent: Duke Energy), Dayton Power&Light Co.	127	6	1960	163	ESP	47	10
				7	1975	557	ESP, WFGD	39	27
				8	1978	558	ESP, WFGD	41	25
12	Richard Gorsuch	American Municipal Power-Ohio, Inc.	105	1	1988	50	ESP	22	0
				2	1988	50	ESP	31	0
				3	1988	50	ESP	29	0
				4	1988	50	ESP	23	0
13	W H Zimmer	Duke Energy Ohio Inc. (Parent: Duke Energy Corp.), Columbus Southern Power Co. (Parent: American Electric Power (AEP)), Dayton Power&Light	102	1	1991	1426	ESP, WFGD	102	60
14	Bay Shore <sup>f</sup>	FirstEnergy Generation Corp	86	1	1955	141	FF	2	2
				2	1959	141	ESP	20	5
				3	1963	141	ESP	26	5
				4	1968	218	ESP	38	8
15	R. E. Burger	FirstEnergy Generation Corp	69	5	1955		ESP	0	0
				6			ESP	0	0
				7	1955	156	ESP	30	0
				8	1955	156	ESP	39	0
16	Killen Station	Duke Energy Ohio Inc. (Parent: Duke Energy Corp.), Dayton Power&Light	54	2	1982	661	ESP, WFGD	54	33

## VI. Ohio State Coal-Fired Power Plants

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
17	Ashtabula <sup>f</sup>	FirstEnergy Generation Corp	36	7	1958	256	ESP	36	10
18	O H Hutchings	Dayton Power & Light Co.	27	H-1	1948	69	ESP	1	0
				H-2	1949	69	ESP	1	0
				H-3	1950	69	ESP	7	0
				H-4	1951	69	ESP	3	0
				H-5	1952	69	ESP	8	0
				H-6	1953	69	ESP	7	0
19	Niles Plant	Orion Power Midwest LP (Parent: GenOn Energy)	27	1	1954	133	ESP	13	5
				2	1954	133	ESP	14	0
20	Lake Shore <sup>f</sup>	FirstEnergy Generation Corp	25	18	1962	256	ESP	25	8
21	Picway	Columbus Southern Power Co. (Parent: AEP)	5	9	1955	106	ESP	5	0
22	Hamilton	City of Hamilton	0	9	1975	51	FF, DFGD	0	0
<b>STATEWIDE TOTALS</b>								<b>2,865</b>	<b>846</b>

**VII. Pennsylvania State Coal-Fired Power Plants**

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Shawville	Shawville Lessor Genco, LLC (Parent: GenOn Energy)	785	1	1954	125	ESP, WFGD	148	4
				2	1954	125	ESP	162	6
				3	1959	188	ESP	224	10
				4	1960	188	ESP	251	10
2	Homer City Station	Midwest Generations EME LLC (Parent Company - Edison International)	459	1	1969	660	ESP	202	20
				2	1969	660	ESP	213	20
				3	1977	692	ESP, WFGD	44	37
3	Hatfield's Ferry Power Station	Allegheny Energy Supply Co (Parent: Allegheny Energy)	314	1	1969	576	ESP, WFGD	106	23
				2	1970	576	ESP, WFGD	100	24
				3	1971	576	ESP, WFGD	108	24
4	Bruce Mansfield	FirstEnergy Generation Corp	219	1	1976	914	ESP, WFGD	75	39
				2	1977	914	ESP, WFGD	63	39
				3	1980	914	ESP, WFGD	81	38
5	Keystone	Constellation Operating Service Link, Delmarva Power (Parent: PEPCO), Exelon Power, PSEG Fossil (Parent: PSEG Inc.), LLC, PPL Montour LLC (Parent: PPL Corporation), Reliant Energy Mid-Atlantic PH LLC (GenOn Energy), Duquense Keystone LLC, Keystone Power LLC	163	1	1967	936	ESP, WFGD	82	47
				2	1968	936	ESP, WFGD	81	46
6	Conemaugh	Conemaugh Hydro Station, Constellation Power Source Generation (Parent: Constellation Energy Group), Exelon Power, PSEG Fossil (Parent: PSEG Inc.), LLC, PPL Montour LLC (Parent: PPL Corporation), Reliant Energy Mid-Atlantic PH LLC (GenOn Energy), UGI Utilities, Inc. (Parent: UGI Corp.), Duquense Conemaugh LLC.	146	1	1970	936	ESP, WFGD	78	9
				2	1971	936	ESP, WFGD	68	9
7	PPL Brunner Island	PPL Brunner Island LLC (Parent: PPL Corporation)	114	1	1961	363	FF, WFGD	25	19
				2	1965	405	ESP, WFGD	31	21
				3	1969	790	ESP, WFGD	58	40

**VII. Pennsylvania State Coal-Fired Power Plants**

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
8	Cheswick Power Plant	Orion Power Midwest LP (Parent: GenOn Energy)	107	1	1970	637	ESP	107	24
9	Armstrong Power Station <sup>9</sup>	Allegheny Energy Supply Co (Parent: Allegheny Energy)	95	1	1958	163	ESP	46	5
				2	1959	163	ESP	49	5
10	Portland	Reliant Energy Mid-Atlantic PH LLC (Parent: GenOn Energy)	93	1	1958	172	ESP	37	4
				2	1962	255	ESP	56	6
11	Titus	Reliant Energy Mid-Atlantic PH LLC (Parent: GenOn Energy)	45	1	1951	75	ESP	15	2
				2	1951	75	ESP	14	2
				3	1953	75	ESP	16	2
12	New Castle Plant	Orion Power Midwest LP (Parent: GenOn Energy)	45	3	1952	98	ESP	13	0
				4	1958	114	ESP	14	0
				5	1964	136	ESP	18	0
13	Sunbury Generation LP	Sunbury Generation LP	37	3	1951	104	ESP	0	0
				4	1953	156	ESP	0	5
				1A	1949	89	FF	0	2
				1B			FF	0	2
				2A	1949	89	FF	17	0
14	PPL Montour	PPL Montour LLC (Parent: PPL Corporation)	31	1	1972	806	ESP, WFGD	14	45
				2	1973	819	ESP, WFGD	17	44
15	AES Beaver Valley	AES Beaver Valley (Parent: AES Corporation)	18	2	1987	35	ESP, WFGD	5	3
				3	1987	114	ESP, WFGD	5	3
				4			ESP, WFGD	5	3
				5			ESP, WFGD	3	0
16	Eddystone Generating Station	Exelon Power	17	1	1960	354	ESP, WFGD	Retired May 2011	0
				2	1960	354	ESP, WFGD	17	0
17	Mitchell Power Station	Allegheny Energy Supply Co (Parent: Allegheny Energy)	13	33	1963	299	ESP, WFGD	13	12
18	Elrama Power Plant	Orion Power Midwest LP (Parent: GenOn Energy)	8	1	1952	100	ESP, WFGD	0	5
				2	1953	100	ESP, WFGD	2	5
				3	1954	125	ESP, WFGD	1	5
				4	1960	185	ESP, WFGD	5	8

## VII. Pennsylvania State Coal-Fired Power Plants

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
19	John B Rich Memorial Power Station	Gilberton Power Co., North Star Electric Coop, Inc.	2	CFB1	1988	88	FF	1	2
				CFB2			FF	1	2
20	Cambria Cogen	Cambria CoGen Co. (Parent: Northern Star Generating Services Co. LLC)	2	B1	1991	98	FF	1	3
				B2			FF	1	3
21	St. Nicholas Cogen Project	Schuylkill Energy Resources Inc. (Parent: The Rich Family of Companies)	2	1	1990	99	FF	2	5
22	Colver Power Project	TIFD VIII-W Inc.	1	AAB01	1995	118	FF	1	5
23	Foster Wheeler Mt Carmel Cogen	Mount Carmel Cogen Inc.	1	SG101	1990	47	FF	1	3
24	Kline Township Cogen Facility	Suez Energy Generation NA, Inc.	1	001	1989	58	FF	1	3
25	WPS Westwood Generation, LLC	WPS Power Development (Parent: Integrys Energy Services, Inc.)	1	031	1987	36	FF	1	2
26	Wheelabrator Frackville Energy Co.	Wheelabrator Environmental Systems (Parent: Waste Management Inc.)	1	50879	1988	48	FF	1	3
27	Seward	Reliant Energy Wholesale Generation LLC (Parent: GenOn Energy)	0	1	2004	585	FF	0	10
				2			FF	0	11
28	Ebensburg Power Company	Babcock&Wilcox Ebensburg P Inc., Ebensburg Investors LP	0	031	1990	58	FF	0	3
29	Panther Creek Energy Facility	Panther Creek Partners (Parent: Constellation Energy Group)	0	BLR1	1992	94	FF	0	2
				BLR2			FF	0	2
30	Northampton Generating Company, L.P.	Northampton Generating Co LP	0	BLR1	1995	114	FF	0	7

## VII. Pennsylvania State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
31	Scrubgrass Generating Company L.P.	0	#1	1993	95	FF, DFGD	0	3
			#2			FF, DFGD	0	2
32	Piney Creek Project	0	BRBR1	1992	33	FF	0	2
33	Cromby Generating Station	0	1	1954	188	FF, WFGD	0	0
<b>STATEWIDE TOTALS</b>							<b>2,720</b>	<b>746</b>



**VIII. Wisconsin State Coal-Fired Power Plants**

Plant Name		Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls#	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
1	Pleasant Prairie	Wisconsin Electric Power Co. (Parent: We Energies)	281	1	1980	617	ESP, WFGD	130	28
				2	1985	617	ESP, WFGD	151	28
2	Columbia	Madison Gas & Electric Co (Parent MGE Energy), Wisconsin Power & Light, Wisconsin Public Service Corp(Parent: Integrys Energy Services Inc.)	264	1	1975	512	ESP	214	23
				2	1978	511	ACI, ESP	50	23
3	South Oak Creek	Wisconsin Electric Power Co. (Parent: We Energies)	215	5	1959	275	ESP	37	6
				6	1961	275	ESP	53	9
				7	1965	318	ESP	74	10
				8	1967	324	ESP	51	10
4	Edgewater	Wisconsin Electric Power Co. (Parent: We Energies), Wisconsin Power & Light Co., Wisconsin Public Service Corp. (Parent: Integrys Energy Services, Inc.)	99	3	1951	60	ESP	1	2
				4	1969	330	ESP	66	10
				5	1985	380	ACI, ESP	32	13
5	Pulliam	Wisconsin Public Service Corp. (Parent: Integrys Energy Services, Inc.)	92	5	1949	50	ESP	6	0
				6	1951	69	ESP	10	2
				7	1958	82	ESP	16	2
				8	1964	150	ACI, ESP	60	3
6	Weston	Dairyland Power Cooperative, Wisconsin Public Service Corp. (Parent: Integrys Energy Services, Inc.)	90	1	1954	60	ESP	11	2
				2	1960	82	ESP	19	2
				3	1981	351	ACI, FF	25	13
				4	2008	595	ACI, FF	35	20
7	Genoa	Dairyland Power Cooperative	79	1	1969	346	FF, DFGD	79	12
8	John P. Madgett	Dairyland Power Cooperative	71	B1	1979	387	FF	71	15
9	Nelson Dewey	Wisconsin Power & Light Co.	49	1	1959	100	ESP	25	2
				2	1962	100	ESP	24	3
10	Alma	Dairyland Power Coop	20	B4	1957	52	ESP	7	2
				B5	1960	82	ESP	13	3

## VIII. Wisconsin State Coal-Fired Power Plants

Plant Name	Owner(s)*	Current Plantwide Mercury Emissions, lb/yr <sup>+a</sup>	Boiler ID	Operating Year*	Nameplate Capacity, MW*	Mercury Controls <sup>#</sup>	Current Unit Mercury Emissions, lb/yr <sup>+a</sup>	U.S. EPA's Projected Mercury Emissions in 2015 Under EPA's Mercury and Air Toxics Standards, lb/yr <sup>-b</sup>
11 Bay Front	Northern States Power Co. (Parent: Xcel Energy Inc.)	5	5	1957	27	ESP, WFGD	5	0
12 Manitowoc	Manitowoc Public Utilities	2	9	2007	63	FF	4	0
13 Elm Road Generating Station	Wisconsin Electric Power Co. (Parent: We Energies)	2	1	2010	615	FF, WFGD	1	13
			2	2010	615	FF, WFGD	1	13
14 Valley	Wisconsin Electric Power Co. (Parent: We Energies)	0	1	1968	136	FF	0	0
			2	1969	136	FF	0	0
			3	1969	3	FF	0	0
			4			FF	0	0
<b>STATEWIDE TOTALS</b>							<b>1,269</b>	<b>270</b>

## SOURCES

\* EIA Form 860 (2009)

+ Mercury emissions estimates from EPA's National Current Base Inventory (identified by Docket ID EPA-HQ-OAR-2009-19918 in docket for final Mercury and Air Toxics Standards (MATS) that were announced by EPA on December 21, 2011 (see <http://www.epa.gov/airquality/powerplanttoxics/actions.html>).

# Mercury controls from EPA's proposed Utility Air Toxics Rule (76 Fed. Reg. 24976, May 3, 2011). Abbreviations: Activated Carbon Injection (ACI), Electrostatic Precipitator (ESP), Wet Flue Gas Desulfurization (WFGD), Dry Flue Gas Desulfurization (DFGD), Fabric Filter (FF)

~ U.S. EPA's "IPM Parsed Files—2015 MATS Policy Case," available in docket for EPA's Final Mercury and Air Toxics Standard (MATS) at docket ID EPA-HQ-OAR-2009-0234-19983.

## NOTES

a EPA did not include small units (typically less than 25 MW) presumably because the air standards will not apply to these units.

b For those units that are in the U.S. EPA's current emission estimates but are not listed in EPA's 2015 MATS Policy Case Parsed Files—Policy Case, it was assumed that the units would be shut down and mercury emissions would thus be zero.

c Midwest Generation has announced that the Crawford Power Plant will shut down by the end of 2014 and the Fisk Power Plant will shut down by the end of 2012. Thus, emissions for this plant and this state will be lower than projected by EPA under MATS.

d Dominion plans to close the State Line Generating Station during 2012. Thus, emissions for this plant and this state will be lower than projected by EPA under MATS.

e Duke Energy has announced that the Walter C. Beckjord Station will close in 2015. Thus, emissions for this plant and this state will be lower than projected by EPA under MATS.

f FirstEnergy Corporation has announced that the Eastlake, Ashtabula and Lake Shore Power Plants, along with units 2, 3 and 4 at its Bay Shore Power Plant are shutting down between 2012–2015. Thus, emissions for this plant and this state will be lower than projected by EPA under MATS.

g FirstEnergy Corporation has announced that the Armstrong Power Plant will close during 2012. Thus, emissions for this plant and this state will be lower than projected by EPA under MATS.

## APPENDIX C

Statewide Mercury Control Programs in the Great Lakes States			
State	Mercury Control Program	Rule adoption	Rule number
Illinois	Beginning July 2009 EGUs had to meet either a 90 percent reduction of input mercury or an emission standard of 0.0080 lb mercury/GWh gross electrical output.	March 14, 2006	TITLE 35: Environmental Protection SUBTITLE B: Air Pollution  CHAPTER I: Pollution Control Board SUBCHAPTER c: Emission Standards and Limitations for Stationary Sources  PART 225 Control of Emissions from Large Combustion Sources  SUBPART B: CONTROL OF MERCURY EMISSIONS FROM COAL-FIRED ELECTRIC GENERATING UNITS
Indiana	None  The Indiana Air Pollution Control Board voted to adopt a mercury control program for EGUs under the Clean Air Mercury Rule (CAMR) but the rule was never made effective and the D.C. Circuit Court vacated CAMR in 2008.	The Indiana CAMR (LSA #05-116) was adopted by the air pollution control board on October 3, 2007, but never made effective	
Michigan	90 percent control required by 2015 for existing EGUs with a nameplate capacity about 25 MW (above a 9 lb per rolling 12-month threshold) or the EGUs must meet 75 percent reductions with a multi-pollutant plan.  New EGUs must achieve 90 percent control.	October 16, 2009	Michigan DEQ Air Quality Division, Part 15, Emission Limitations and Prohibitions—Mercury
Minnesota	Minnesota Mercury Emissions Reduction Act of 2006.  The act, when fully implemented, will result in a 90 percent reduction of emissions from six generating units at Minnesota's three largest coal-fired power plants: Xcel Energy's Sherco and Allen S. King plants and Minnesota Power's Clay-Boswell plant.  These reductions are occurring in two phases, depending on the type of emissions control equipment in use at the plants. Units with dry scrubbers (for which mercury-control technology is more advanced) were required to be modified to capture more mercury by the end of 2009. Units with wet scrubbers will have until 2014 to reduce emissions.	May 11, 2006	Legislation Passed— Minnesota Mercury Emissions Reduction Act of 2006
New York	Mercury reduction program established an emission cap on facility-wide mercury emissions for the years 2010 through 2014 and establishes a facility-wide emission limit (0.6 lb mercury/TBtu on a 30-day rolling average) for each applicable facility beginning in 2015.	2007	6 NYCRR Part 246: Mercury Reduction Program for Coal-Fired Electric Utility Steam Generating Units
Ohio	None		
Pennsylvania	In 2006, a rule to cut mercury emissions by 80 percent (from 1999 levels) by 2010 and 90 percent (from 1999 levels) by 2015 was adopted, but that rule was denied in 2009. Some of the plants may have already implemented controls.	Adopted in 2006, but denied by Pennsylvania Supreme Court in 2009	
Wisconsin	Required the state's four major utilities to reduce their mercury emissions by 40 percent by 2010  Required large (150 MW and greater) coal-fired power plants to use one of two approaches: <ul style="list-style-type: none"> <li>• Achieve a 90 percent reduction in mercury emissions from coal by the year 2015 or,</li> <li>• Reduce multiple pollutants, including nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>), and achieve 90 percent reduction in mercury emissions six years later.</li> </ul>	2008	AM-32-05, proposed rules revising Chapters NR 439, 446 and 484 reducing mercury air emission from coal-fired electric generating units

## APPENDIX D

Great Lakes Fish Consumption Advisories Due to Mercury			
State/Province Issuing Advisory	Lake	Fish	Advisory
Illinois <sup>1</sup>	Statewide Advisory	Predator fish (all species of Black Bass, Striped Bass, Hybrid Striped Bass, White Bass, Walleye, Sauger, Saugeye, Flathead Catfish, Muskellunge, and Northern Pike)	1 meal/week—Sensitive populations <sup>2</sup>
Indiana <sup>3</sup>	Any waters	Any fish not listed in the advisory	1 meal/week—General population; 1 meal/month—Sensitive populations
	Lake Michigan and most tributaries	Bluegill ≥ 8"	1 meal/month—General population
	Any waters	Smallmouth Bass ≥ 16"	1 meal/month—General population; Do not eat—Sensitive Population
	Any waters	White Sucker 15–23"	1 meal/month—General population
	All Great Lakes	Walleye	1 meal/month—General population; Do not eat—Sensitive population
Michigan <sup>4</sup>	Lake Erie	Carp	Do not eat—everyone
	Lake Huron, Saginaw Bay	Walleye ≥ 18"	One meal/week—General population; Do not eat—Sensitive population
	Lake Michigan, North and South of Frankfort	Walleye ≥ 22"	1 meal/week—General population;
	Lake Michigan, North and South of Frankfort	Walleye ≥ 14"	Increasing restrictions based on size of fish— Sensitive populations
	Lake Michigan, Green Bay	Smallmouth Bass 18-30"	1 meal/week General population
	Lake Michigan, Green Bay	Smallmouth Bass 14-30"	1 meal/month Sensitive populations
	Lake Michigan, Green Bay	Walleye ≥ 18"	1 meal/week General population;
	Lake Michigan, Green Bay	Walleye 14-22"	Increasing restrictions based on size of fish ending with "Do not eat" for the largest size— Sensitive population
	Lake Michigan, Little Bay de Noc	Smallmouth Bass 18-30"	1 meal/week—General population
	Lake Michigan, Little Bay de Noc	Smallmouth Bass 14-30"	Increasing restrictions based on size of fish— Sensitive populations
	Lake Superior	Burbot ≥ 22"	1 meal/week—General population; 1 meal/month—Sensitive population
	Lake Superior	Lake Trout ≥ 30"	1 meal/week—General population
	Lake Superior	Lake Trout ≥ 14"	Increasing restrictions based on size of fish ending with "Do not eat" for the largest size— Sensitive population
Lake Superior	Walleye ≥ 22"	1 meal/week—General population; 1 meal/month—Sensitive population	

## Great Lakes Fish Consumption Advisories Due to Mercury

State/Province Issuing Advisory	Lake	Fish	Advisory
Minnesota <sup>5</sup>	Lake Superior		No fish consumption advisories for any fish in Lake Superior due to mercury
	General guideline for entire state	Sunfish, Crappie, Yellow Perch, Bullheads	1 meal/week—Sensitive population
	General guideline for entire state	Bass, Catfish, Walleye < 20", northern pike < 30", and other MN gamefish	1 meal/month—Sensitive population
	General guideline for entire state	Walleye > 20", Northern Pike > 30", Muskellunge	Do not eat—Sensitive population
	General guideline for entire state	Walleyes, Northern Pike, Smallmouth Bass, Largemouth Bass, Channel Catfish, Flathead Catfish, White Sucker, Drum, Burbot, Sauger, Carp, Lake Trout, White Bass, Rock Bass, White Fish, other species	1 meal/week—General population
Province of Ontario <sup>6</sup>		Walleye > 22"	No Consumption—General population (in certain areas, up to 26" can be consumed on a restricted basis in other areas)
		Walleye 12"–22"	Restricted Consumption—General population
		Yellow Perch > 14"	Restricted Consumption—General population
		Northern Pike > 30"	Restricted Consumption—General population
		Longnose Sucker 14-18"	Restricted Consumption—General population
		Longnose Sucker > 18"	No Consumption—General population
		White Sucker 18"–22"	Restricted Consumption—General population
New York	Lake Ontario		Women of childbearing age and children under 15 are advised not to eat any fish.
	General guideline for entire state <sup>7</sup>	Largemouth and Smallmouth Bass, Northern Pike, Pickerel, Walleye and larger Yellow Perch (for example, longer than 10 inches)	Avoid or eat less—General advisory
Ohio <sup>8</sup>	Applies to any body of water in the state	All fish species except where specific advisories list a different recommendation	1 meal/week—General population
	General advisory for state	Yellow Perch	2 meals/week—General population
	General advisory for state	Sunfish (e.g. bluegill, green, longear, redear)	2 meals/week—General population
	General advisory for state	Flathead catfish ≥ 23"	1 meal/month—General population
	General advisory for state	Northern Pike ≥ 23"	1 meal/month—General population
	Lake Erie and tributaries	Steelhead Trout	1 meal/month—General population
	Lake Erie	Brown Bullhead	1 meal/month—General population
Pennsylvania <sup>9</sup>	General guideline for entire state	Statewide advisory for sport fish caught in Pennsylvania	1 meal/week (1/2 lb)—General advisory
Wisconsin <sup>10</sup>			No advisories issued for the Great Lakes due to mercury

## ENDNOTES

- 1 Illinois Department of Public Health, Environmental Health Fact Sheet, <http://www.idph.state.il.us/envhealth/factsheets/fishadv.htm> and 2011 Illinois Fish Advisory, <http://www.idph.state.il.us/envhealth/fishadvisory/index.htm>.
- 2 “Sensitive population” means women of childbearing age, pregnant or nursing women and children under 15.
- 3 “2010 Indiana Fish Consumption Advisory,” <http://www.in.gov/isdh/23650.htm>.
- 4 “2010 Michigan Fish Advisory: A Family Guide to Eating Michigan Fish,” [http://www.michigan.gov/mdch/0,1607,7-132-54783\\_54784\\_54785—,00.html](http://www.michigan.gov/mdch/0,1607,7-132-54783_54784_54785—,00.html).
- 5 Minnesota Department of Health website, <http://www.health.state.mn.us/divs/eh/fish/eating/safeeating.html>.
- 6 “Guide to Eating Ontario Sport Fish,” 2011-2012, [www.ontario.ca/fishguide](http://www.ontario.ca/fishguide).
- 7 New York State Department of Health, “Chemicals in Sportfish and Game: 2010-2011 Health Advisories,” 2.
- 8 Ohio Environmental Protection Agency, 2011 Ohio Sport Fish Consumption Advisory, February 2011.
- 9 Pennsylvania Department of Environmental Protection, “Commonwealth of Pennsylvania Public Health Advisory: 2011 Fish Consumption,” [http://www.portal.state.pa.us/portal/server.pt/community/fish\\_consumption/10560](http://www.portal.state.pa.us/portal/server.pt/community/fish_consumption/10560).
- 10 Wisconsin has issued general restricted consumption guidelines for all inland (non-Great Lakes) waters; it is not clear why the Great Lakes are not included, see <http://dnr.wi.gov/fish/consumption/>.