

TESTIMONY OF JOHN D. WALKE  
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HEARING ON "RECENT EPA RULEMAKINGS RELATING TO  
BOILERS, CEMENT MANUFACTURING PLANTS, AND UTILITIES"  
BEFORE THE SUBCOMMITTEE ON ENERGY AND POWER,  
COMMITTEE ON ENERGY AND COMMERCE  
U.S. HOUSE OF REPRESENTATIVES

April 15, 2011

Thank you, Chairman Whitfield and Ranking Member Rush, for the opportunity to testify today. My name is John Walke, and I am clean air director and senior attorney for the Natural Resources Defense Council (NRDC). NRDC is a nonprofit organization of scientists, lawyers, and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.2 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles, San Francisco, Chicago, and Beijing. I have worked at NRDC since 2000, and before that I was a Clean Air Act attorney in the Office of General Counsel for the U.S. Environmental Protection Agency. Over the last decade, I represented NRDC in many of the rulemakings and lawsuits concerning mercury and air toxics standards discussed in my testimony.

**Mercury and Air Toxics Standards under the Clean Air Act**

Today's hearing addresses final or proposed mercury and air toxics standards from the three largest sources of industrial mercury pollution in the United States – power plants, industrial boilers and process heaters, and cement plants. Collectively these plants are also the largest emitters of mercury and scores of other toxic air pollution that still are failing to comply

with basic Clean Air Act requirements to reduce toxic pollution, over two decades after the adoption of the 1990 amendments to this landmark statute.

Since the 1990 amendments, over 100 air toxics standards have been adopted covering many hundreds of industrial source categories, including chemical plants, oil refineries, manufacturers, steel plants and others. But with respect to power plants, cement plants, and industrial boilers and process heaters, this period has yielded instead inexcusable delay and unlawful standards, all resulting in a failure to achieve legally required reductions in these facilities' toxic air pollution.

Now that EPA finally has adopted required mercury and air toxics standards, appeals are being made to delay, weaken or block these safeguards. These appeals are fundamentally irresponsible and should be rejected.

The final and proposed health safeguards for these three industrial categories will deliver the following enormous benefits to the American people every year.

**Power plants:** EPA's proposed mercury and air toxics standards for power plants that burn coal and oil are projected to save as many as 17,000 American lives every year by 2015.<sup>1</sup> These standards also will prevent up to 11,000 cases of heart attacks, 120,000 cases of asthma attacks, 11,000 cases of acute bronchitis among children, 12,000 emergency room and hospital visits and 850,000 lost work days every year.

The proposed standards are expected to reduce mercury emissions from power plants burning coal and oil by 91%, acid gas pollution by 91%, direct particulate matter (PM) emissions

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<sup>1</sup> See generally <http://www.epa.gov/airquality/powerplanttoxics/pdfs/overviewfactsheet.pdf>.

by 30% and sulfur dioxide (SO<sub>2</sub>) emissions by 53%, down to 2.1 million tons of annual SO<sub>2</sub> emissions.

Due to these tremendous health benefits, the proposed standards are estimated to yield monetized benefits of \$59 billion to \$140 billion annually, compared to annual compliance costs of approximately \$10.9 billion. This represents \$5 to \$13 in health benefits for every \$1 spent to reduce pollution.

**Cement plants:** EPA's final mercury and air toxics standards for cement plants are estimated to save as many as 2,500 lives every year by 2013.<sup>2</sup> The standards also will prevent up to 17,000 cases of aggravated asthma, 1,500 heart attacks, 32,000 cases of upper and lower respiratory symptoms, and 130,000 days of lost work, annually by the year 2013.

The safeguards will reduce annual emissions of cement plants' mercury by 16,600 pounds (a 92% cut), acid gases by 5,800 tons (97% cut), soot pollution by 11,500 tons (92% cut) and sulfur dioxide pollution by 110,000 (78% cut).

These standards will produce benefits of \$6.7 billion to \$18 billion annually, yielding benefits that outweigh costs by a factor of 7 to 20:1.

**Boilers and process heaters:** EPA's final mercury and air toxics standards for industrial, commercial and institutional boilers and process heaters are estimated to save as many as 6,500 lives every year by 2014.<sup>3</sup> The safeguards also will prevent up to 41,000 cases of aggravated asthma, 4,000 heart attacks, 1,600 cases of chronic bronchitis, 3,700 cases of acute bronchitis, 4,300 hospital and emergency room visits, and 78,000 cases of respiratory symptoms, and 310,000 lost work or school days every year starting in 2014.

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<sup>2</sup> See generally [http://www.epa.gov/ttn/atw/pcem/pcem\\_fs\\_080910.pdf](http://www.epa.gov/ttn/atw/pcem/pcem_fs_080910.pdf).

<sup>3</sup> See generally <http://www.epa.gov/airquality/combustion/docs/20110221mboilersfs.pdf>.

The standards will reduce nationwide emissions from the covered entities by 2,800 pounds per year of mercury, 2,700 tons per year (tpy) of non-mercury metals, 30,000 tpy of HCl, 47,000 tpy of PM, 440,000 tpy of SO<sub>2</sub>, and 7,000 tpy of volatile organic compounds (which are hazardous and contribute to smog formation).

EPA estimates that the standards will provide benefits of \$22 to 54 billion in 2014, compared to compliance costs of \$1.4 billion per year, representing \$18 to \$39 in health benefits for every \$1 spent to reduce pollution.

### **Delay Would Mean More Deaths and Disease**

According to recent media reports, members of this Committee are planning legislation to weaken and/or delay one or more of the mercury and air toxics standards at issue in today's hearing. This would be deeply irresponsible. As discussed below, power plants, cement plants and boilers have escaped required reductions in mercury and dozens of other toxic air pollutants for a decade or longer, exposing Americans to dangerous and deadly air pollution.

Before we see the details of any weakening legislation, let me catalogue the potential magnitude of extreme health impacts caused by a single additional year of delay for these three sets of health standards:

- 26,000 premature deaths;
- 16,500 non-fatal heart attacks;
- 178,000 asthma attacks;
- 12,000 cases of acute or chronic bronchitis;
- 330,000 cases of upper or lower respiratory symptoms;

- 18,000 hospital admissions and emergency room visits;
- 1,290,000 days when people must miss work or school; and
- 7,750,000 days when people must restrict their activities.

I respectfully ask Members to be honest with Americans about how many people will be allowed to die due to the weakening, delay or demise of these health safeguards. How many more pregnant women, children and fetuses will be poisoned by mercury in their bodies, if Congress delays or eliminate health safeguards covering the three biggest industrial pollution sources of mercury in the country today -- power plants, industrial boilers and cement plants? How many additional hundreds of thousands of cases of asthma attacks, bronchitis, heart attacks and trips to the ER must occur?

Before Congress even considers setting the country on this destructive course, I urge you to convene legislative hearings not with lawyers, lobbyists and company executives – but with doctors, nurses and respiratory therapists. These are the dedicated professionals that devote their talents and energies to helping asthmatic children gasping for air, aiding babies whose brains have been poisoned by their mother’s mercury ingestion, and saving the lives of our elderly loved ones that suffer air pollution-induced heart attacks and strokes.

The American people deserve to know how and why their right to clean air is being restricted, after that right was promised in the 1990 Clean Air Act Amendments by overwhelming bi-partisan majorities in the House and Senate. The law was signed by a Republican President (George H. W. Bush), approved by 89 Senators (including 38 Republicans, all but 6), and 401 House members (including 154 Republicans, all but 16). And the earlier Clean Air Acts of 1977 and 1970 enjoyed equally broad bi-partisan support.

It would be a tragedy for the nation were that bi-partisan support to crumble in order to accommodate demands by polluters to increase emissions of toxic air pollution that cause cancer, neurotoxicity, heart attacks, asthma and premature deaths.

### **Clean Air Act Background**

As EPA has explained about the regulation of toxic air pollution under the Clean Air Act: Before the 1990 Clean Air Act Amendments, EPA regulated air toxics one chemical at a time. This approach did not work well. Between 1970 and 1990, EPA established regulations for only seven pollutants. The 1990 Clean Air Act Amendments took a completely different approach to reducing toxic air pollutants. The Amendments required EPA to identify categories of industrial sources for 187 listed toxic air pollutants and to take steps to reduce pollution by requiring sources to install controls or change production processes. It makes good sense to regulate by categories of industries rather than one pollutant at a time, since many individual sources release more than one toxic chemical. Developing controls and process changes for industrial source categories can result in major reductions in releases of multiple pollutants at one time.

See generally <http://www.epa.gov/air/caa/peg/toxics.html>. In enacting the 1990 Clean Air Act, Congress “requires EPA to set regulations using a technology-based or performance-based approach to reduce toxic emissions from industrial sources.” This approach is called the Maximum Achievable Control Technology (MACT) program and requires performance standards to be based upon the emissions reductions achieved by the cleanest facilities in an industrial sector, the average of the top 12% of lowest emitting plants or equipment. As the agency’s guide explains, “[i]n most cases, EPA does not prescribe a specific control technology,

but sets a performance level based on a technology or other practices already used by the better-controlled and lower emitting sources in an industry.”

Since the 1990 update to the Clean Air Act, EPA has adopted over 120 toxic air pollutant standards under the Act, covering literally hundreds of different types of industrial operations and equipment categories.<sup>4</sup> These include chemical plants, oil refineries, hazardous waste incinerators, iron and steel foundries, battery manufacturers, pharmaceutical plants, lead smelters, semiconductor manufacturers and fiberglass plants, among many others.

In 1992 EPA published a list of industrial categories for which it would develop toxic air pollution standards under the law's new MACT program. Cement plants and industrial boilers were added to the list at that time. NRDC filed suit against EPA alleging that the agency unlawfully omitted power plants from that list.

**The example of power plants.** Power plants and their toxic air pollution deserve special attention because of the lengthy history of delay since the 1990 law, and the truly extreme and irresponsible actions by the prior administration that led us to where we are today.

Under the Clean Air Act, EPA was supposed to conduct a health effects study addressing whether the agency should regulate toxic air pollution from fossil fuel-fired power plants using MACT standards. The law requires such regulation if EPA determines that it is "appropriate and necessary." As a result of the original lawsuit, NRDC and EPA entered into a settlement agreement in 1994, under which EPA was required to complete the study and report to Congress by November 1995. Following several delays, EPA submitted the report to Congress in February

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<sup>4</sup> See generally <http://www.epa.gov/ttn/atw/mactfnlalph.html>.

1998 – but still without making a determination about the appropriateness and necessity of MACT standards.<sup>5</sup>

Following notice of intent to file an "unreasonable delay" lawsuit by NRDC and the Sierra Club later in 1998, the original NRDC settlement agreement was modified twice more to require EPA to make the necessary regulatory determination by December 15, 2000. Then-EPA Administrator Carol Browner did so and determined that it was "appropriate and necessary" to reduce toxic air pollutants from fossil fuel-fired power plants using the law's protective MACT standards.

Soon after taking office, signs emerged that the Bush administration would not follow the law and issue the MACT standards for power plants required by the Clean Air Act. In a now notorious April 2001 speech that was recorded and transcribed without his awareness, a utility industry lobbyist told his coal industry audience that EPA had been planning to use the agency's existing authority under the Clean Air Act to require large and prompt reductions in toxic air pollution from coal-burning power plants, namely MACT standards.<sup>6</sup> Never fear, the lobbyist assured his colleagues, he and his friends in the Bush White House had a plan: the Administration would create what the lobbyist called the "next generation of regulatory programs" for power plants. Predicting precisely what unfolded under the Bush administration, the lobbyist boasted that "the goal here will be to gain a foothold, an irreversible foothold on the next generation of reasonable cost effective SO<sub>2</sub> and NO<sub>x</sub> reduction, plus air toxics that we can all live with and that someone else can't undo." Observing that "mercury is the killer," the

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<sup>5</sup> See <http://www.epa.gov/ttn/atw/combust/utiltox/eurtc1.pdf>.

<sup>6</sup> See <http://www.nrdc.org/media/docs/050202.pdf>.



lobbyist signaled that eliminating the obligation to comply with MACT standards to reduce mercury and toxic air pollutants would be the very highest priority for the utility industry.

And the Bush administration obliged that desire fully, developing legislation that actually would have *repealed* the MACT program to prevent its application to power plants' toxic air pollution, ignoring over six dozen different toxic air pollutants from power plants (like arsenic, lead and dioxins) and substituting much weaker and delayed standards covering mercury alone. The eventual bill that was introduced before the Senate Environment and Public Works Committee, the "Clear Skies Act of 2005", S.131, failed to be reported out of Committee following an unsuccessful vote in March 2005.

Following the Senate Committee vote, the Bush Administration set out to implement the central features of its Clear Skies legislation through a series of EPA regulations under the current Clean Air Act. The most harmful feature of the failed legislation concerning toxic air pollution – the repeal of the Act's MACT standards – was carried out *administratively* by the Bush administration in the form of two rulemakings, despite the absence of any statutory authority whatsoever for these administrative actions.

These rulemakings were proposed in 2004 and made clear immediately that the Bush administration had no intention of following the law to require MACT standards that would reduce all toxic air pollutants from power plants. Then in early 2005, the administration confirmed that fear by purporting to retract EPA's prior commitment to protect public health by requiring MACT standards for toxic pollution from power plants, issuing a so-called "rescission rule". Simultaneously, EPA issued a mercury "cap-and-trade" rule that purported to require significant reductions in power plant mercury emissions but in fact delayed *any* mercury

regulation for 13 years. That rule disclaimed any need to reduce the remaining 70 or so toxic air pollutants from power plants and left power plants' toxic air pollutants like arsenic, lead, dioxins, acid gases and heavy metals completely unregulated.

The two rules immediately were challenged by a coalition of state attorneys general from across the country, as well as public health and conservations groups, in a case called *New Jersey v. EPA*. In February 2008, the U.S. Court of Appeals for the D.C. Circuit ruled unanimously that EPA had illegally evaded the Clean Air Act's protective, required safeguards -- MACT standards -- that should have required deep and timely reductions in all toxic air pollution, including mercury, from the nation's coal-fired power plants.<sup>7</sup>

The Court further ruled that EPA had illegally substituted a mercury pollution trading scheme for the protections required by the Clean Air Act. The Court vacated the EPA rules and made clear that EPA now had a firm legal obligation to adopt MACT standards to reduce all toxic air pollutants from power plants.

The unanimous court ruling even went so far as to mock EPA's defiance of the plain language of the law. The Court compared EPA's actions to the capricious Queen of Hearts in "Alice in Wonderland," since EPA had – in the Court's words – "substituted [its] desires for the plain text" of the law. This ruling made clear that the violations were not mere legal technicalities, but instead were actions that defied the plain language of the Clean Air Act and skirted a necessary health demonstration that the Bush administration had not even attempted to make because it knew it could not.

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<sup>7</sup> See <http://pacer.cadc.uscourts.gov/docs/common/opinions/200802/05-1097a.pdf>.

The Court vacated both unlawful EPA rules in its February 2008 decision and remanded them to EPA for re-proposal and re-issuance under required Clean Air Act safeguards, the MACT standards.

### **Unlawful Standards and Illegal Delay Brought Us to Where We Are Today**

Accordingly, when the current administration took office in early 2009, it inherited the obligation to correct and re-issue mercury and air toxics standards for power plants and several other industrial categories, following numerous court decisions that overturned unlawful and un-protective standard issued by the prior administration.<sup>8</sup> These standards already were long overdue when issued, but they were grossly overdue by the time the courts remanded the illegal standards to EPA for correction. Of the three rules under discussion today, this was the case for the mercury and air toxics standards for industrial boilers and power plants, which were declared unlawful by the United States Court of Appeals for the D.C. Circuit in 2007 and early 2008, respectively.<sup>9</sup> EPA agreed voluntarily to correct and re-issue the standards for cement plants, following a string of court losses by the prior administration that made clear the cement standards would be declared unlawful as well. The Bush administration did not correct any of these legally deficient rules, but left them for the incoming Obama administration to fix.

And that is why these standards are being re-proposed or adopted only now by the Obama administration, some 21 years after the 1990 Clean Air Act Amendments.

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<sup>8</sup> See, e.g., *Mossville v. EPA*, 370 F. 3d 1232 (D.C. Cir. 2004) (Polyvinyl Chloride MACT Rule); *Sierra Club v. EPA*, No. 05-1441 (Hazardous Waste Combustor MACT); *Sierra Club v. EPA*, 479 F.3d 875 (D.C. Cir. 2007) (Brick and Structural Clay Products and Clay Ceramics MACT rules); *NRDC et al. v. EPA*, 489 F.3d 1250 (D.C. Cir. 2007) (Boiler MACT and CISWI Definitions rule); *Sierra Club v. EPA*, No. 06-1066 (Standards of Performance for New Stationary Sources and Emission Guidelines for Existing Sources: Other Solid Waste Incineration Units); *NRDC v. EPA*, 489 F.3d 1364 (D.C. Cir. 2007) (MACT for Plywood and Composite Wood Products Facilities); *State of New Jersey et al. v. EPA*, No. 05-1097, (D.C. Cir. Feb. 8, 2008) (Section 112(n) Revision Rule and Clean Air Mercury Rule).

<sup>9</sup> See *NRDC v. EPA*, *supra* (overturning air toxics standards for industrial boilers and solid waste incinerators); *State of New Jersey v. EPA*, *supra* (overturning mercury standards for power plants).

## **The Clean Air Act Works and Enjoys Overwhelming Public Support**

The Clean Air Act is one of our country's most successful public health and environmental laws in the past 40 years marking the modern environmental era. The EPA recently released a report on the health and economic health benefits of the 1990 Clean Air Act amendments, assessed from 1990 to 2020.<sup>10</sup> The agency found that the Clean Air Act has saved over 160,000 lives every year by the year 2010, and the law will save over 230,000 lives every year by the year 2020.

NRDC analyzed the EPA report beyond the two target years of 2010 and 2020 in order to arrive at a cumulative assessment of the lives saved by the 1990 Clean Air Act Amendments by the year 2020. As summarized by my colleague, Christina Angelides:

NRDC's own analysis of EPA's report shows that the 1990 amendments will have cumulatively saved **4.2 million lives** and avoided millions of cases of pollution-related illness by 2020 — including **43.8 million cases of asthma exacerbation, 3.3 million heart attacks, 2.1 million hospital admissions and 2.2 million emergency room visits, and 313 million lost work days**. For comparative purposes, 4.2 million is about the population of the city of Los Angeles.

A more detailed break-down of the avoided healthy impacts is presented in the following table (the blue portion is from the EPA report, while the green reflects NRDC's additional analysis)<sup>11</sup>:

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<sup>10</sup> See generally <http://www.epa.gov/air/sect812/prospective2.html>.

<sup>11</sup> See generally [http://switchboard.nrdc.org/blogs/cangelides/the\\_1990\\_clean\\_air\\_act\\_will\\_sa.html](http://switchboard.nrdc.org/blogs/cangelides/the_1990_clean_air_act_will_sa.html).

Avoided Health Impacts (PM2.5 & Ozone Only)*	Pollutants*	Year 2000*	Year 2010*	Year 2020*	Estimated Cumulative Benefits 1990-2020 (NRDC)**
PM 2.5 Adult Mortality	PM	110,000	160,000	230,000	4,105,000
PM 2.5 Infant Mortality	PM	160	230	280	5,645
Ozone Mortality	Ozone	1,400	4,300	7,100	96,700
Chronic Bronchitis	PM	34,000	54,000	75,000	1,333,500
Acute Bronchitis	PM	96,000	130,000	180,000	3,377,000
Non-Fatal Myocardial Infarction	PM	79,000	130,000	200,000	3,301,000
Asthma Exacerbation	PM	1,200,000	1,700,000	2,400,000	43,750,000
Hospital Admissions	PM, Ozone	46,000	86,000	135,000	2,111,500
Emergency Room Visits	PM, Ozone	58,000	86,000	120,000	2,173,000
Restricted Activity Days	PM, Ozone	49,000,000	84,000,000	110,000,000	1,991,000,000
Lost School Days	Ozone	1,200,000	3,200,000	5,400,000	74,500,000
Lost Work Days	PM	8,000,000	13,000,000	17,000,000	313,000,000

\*Data from Table 5-6, Environmental Protection Agency, The Benefits and Costs of the Clean Air Act: 1990 to 2020, February 2011, p.5-25.  
\*\*To estimate the cumulative life savings and health benefits of the 1990 amendments from 1990 to 2020, NRDC assumed a roughly linear growth rate to interpolate benefit estimates for each year from 1995--when EPA's Acid Rain Program Phase I began to secure the first benefits under the amendments--through 2010, and benefit estimates for each year from 2010 to 2020. These annual benefit estimates were then aggregated across the entire period.

The Clean Air Act – and its toxic air pollution measures in particular – continue to enjoy tremendous support from the American people, as well as our nation’s health and medical professionals. A nationwide poll conducted by Public Policy Polling and released by the NRDC reports how registered voters feel about U.S. House Members’ actions to block public health safeguards.

- 66% of Americans – including 54% of Republicans and 61% of Independents – support “requiring stricter limits on the amount of toxic chemicals such as mercury, lead, and arsenic that coal power plants and other industrial facilities release.”
- 64% favor “requiring stricter limits on the amount of smog that vehicles and industrial facilities release.”

In a recent CNN poll conducted by the Opinion Research Corporation from April 9-10, 71% of adult Americans polled responded that the federal government should continue to provide funding to the EPA to enforce regulations on greenhouse gases and other environmental issues. This included 80% of respondents from the Midwest and 71% from the South.

I am attaching to my testimony letters from health professionals attesting to the need to fully implement and enforce the Clean Air Act to protect public health. In a February 9, 2011 letter, 1,882 physicians, nurses, respiratory therapists, certified asthma educators and other health

and medical professionals from all 50 states and the District of Columbia urged members of Congress to “[s]upport full implementation of the Clean Air Act and resist any efforts to weaken, delay or block progress toward a healthier future for all Americans.”

On February 15, 2011, health organizations ranging from the American Lung Association to the American College of Preventive Medicine wrote in strong opposition to H.J. Res. 9. This pending resolution under the Congressional Review Act would overturn the health standards limiting mercury and air toxic air pollution from cement plants. The groups wrote: “As the American Academy of Pediatrics notes, ‘mercury in all of its forms is toxic to the fetus and children, and efforts should be made to reduce exposure to the extent possible to pregnant women and children as well as the general population.’ Cement plants are the third-largest source of human-caused mercury emissions; rolling back mercury standards for such plants would be a step in exactly the wrong direction.”

Finally, an April 4, 2011 letter from nearly 500 public health, medical, faith, consumer, community, conservation, and other groups urged Congress “to uphold the Clean Air Act and to reject any measure that would block or delay the U.S. Environmental Protection Agency from doing its job to protect all Americans from life-threatening air pollution.” These organizations urged full Congressional support for EPA fulfilling its statutory responsibilities to reduce smog, soot and toxic air pollution – which is exactly what the power plant, boiler and cement mercury and air toxics standards will do.

These letters and polling data make clear that any efforts to weaken or delay these clean air safeguards will face strong public opposition, above all from the health and medical organizations and individuals who devote their lives to helping the public lead healthy lives.

## **Recent Congressional Attacks on Clean Air Safeguards Are Failing the Public**

Today's hearing *follows* a vote in which a majority of the House approved an amendment to H.R. 1's budget bill to block implementation and enforcement of the mercury and air toxics standards for cement plants. That blocking vote occurred despite no legislative hearings, no expert witnesses, no factual record, and fewer than 40 minutes of debate by nine members of Congress.

Today's hearing rightly will be seen by the American people as an after-the-fact trial for clean air protections that already have been convicted by a majority of the House of Representatives. That's not putting the cart before the horse; that's killing the horse, then using a cart to haul away the carcass.

The American people deserve better. The cement vote on H.R.1 marked the first time in the forty-year history of the Clean Air Act that a majority of the House of Representatives had voted to block EPA from implementing and enforcing standards to sharply reduce mercury and other toxic air emissions from a polluting industry. That legislative rider was dropped from the final budget agreement last week following opposition from the Senate, White House and hundreds of health, medical and other organizations. See *supra*.

The American people deserve better than to see these political favors for polluting interests renewed and extended to multiple mercury and air toxics standards that save lives, stop mercury poisoning and protect the public.

## **The Myth of EPA as “Rogue” Agency**

Some critics of EPA regulations – such as the mercury and air toxics standards for cement plants, boilers and power plants – have charged EPA with being a “rogue” agency. This

overheated rhetorical indictment should be dismissed simply because it is leveled invariably when there is a disagreement over the agency's legal or policy decisions. But to examine the charge more fully, it's fair to say that it has been based upon two other claims that bear examination in the context of today's hearing: (1) that EPA is acting outside the scope of statutory authority conferred by Congress; and (2) that EPA is acting precipitously and the current administration is regulating at a much higher regulatory pace than prior administrations. Both of these claims are false.

First, EPA has acted within plain statutory authority in adopting final mercury and air toxics standards for cement plants and industrial boilers, and proposing such standards for power plants that burn coal and oil. Section 112 of the Clean Air Act confers clear authority to adopt such MACT standards for all hazardous air pollutants from listed stationary source categories, including the three identified industrial categories. Indeed, the EPA is following the instructions and legal precedents in a series of D.C. Circuit court decisions that overturned a string of Bush administration EPA rulemakings for violating the plain language of the Clean Air Act.

Industry attorneys have yet to identify any instances in which EPA's recent final or proposed mercury and air toxics standards are similarly violating the plain language of the Act. I invite Committee members to examine whether any of the other witnesses for today's hearing make such demonstrations of EPA unlawfulness in their testimony. But even if industry representatives believe the final or proposed standards to be unlawful in some respect, they have the same legal recourse as the state attorneys general and public health and conservation groups that successfully challenged a host of unlawful Bush EPA rules: (1) to file administrative comments criticizing EPA's proposed standards; and (2) to file lawsuits challenging final standards. If the industry challenges are meritorious, the courts will remand the standards to EPA



for correction in order to deliver on the statutory promise of clean air to the public. If the industry challenges lack merit, the American people will enjoy the benefits of standards with enormous public health and environmental benefits.

EPA critics also have attacked the mercury and air toxics standards and similar health safeguards by arguing that the current administration is regulating at a much faster, heavier regulatory pace than prior administrations. For example, a November 22, 2010 editorial in the Wall Street Journal charged that the Obama EPA's regulatory output has outpaced the entire first term of the Clinton Administration implementing the just-enacted 1990 Clean Air Act Amendments. This charge and similar ones are demonstrably false.

EPA Administrator Lisa Jackson has already specifically refuted such charges in an October 14, 2010 letter to Congressmen Barton and Burgess:

The pace of EPA's Clean Air Act regulatory work under this administration is actually not faster than the pace under either of the two previous administrations. In fact, EPA has finalized or proposed fewer Clean Air Act rules (87) over the past 21 months than in the first two years of either President George W. Bush's administration (146) or President Clinton's administration (115).

Indeed, as discussed above, even this slower regulatory pace under the current administration has been a function of re-proposing and re-issuing numerous air pollution standards by the prior administration that were found unlawful. Those earlier unlawful standards and illegal delays brought us to where we are today.

### **Responses to Cement Industry Claims About the Mercury and Air Toxics Standards**

The Portland Cement Association (PCA) has claimed that EPA's standards to reduce mercury and other toxic air pollution from cement kilns will overly burden their cement

companies with compliance costs, close down plants and force U.S. cement production overseas, and threaten industry jobs. In a March 2011 analysis of Clean Air Standards, PCA even goes so far as to assert that the standards' toxic air pollution reductions are of "questionable environmental value."<sup>12</sup>

But the facts tell a very different story—despite EPA's strong regulatory impact analysis and PCA's own projections of cement industry growth released *after* the final standards, the Association is grossly overestimating the cost and economic impact of cleaning up its act and ignoring significant health, environmental, and economic benefits that will result from the standards.

EPA estimates that the standards will produce benefits of \$6.7 billion to \$18 billion annually, yielding benefits that far outweigh costs by a factor of 7 to 20:1.<sup>13</sup> The cement industry has available and cost-effective technologies to reduce pollution from their kilns and resources do so. As the organization Earthjustice notes in a recent January 2011 report, much of the cement industry — up to 80% of it — is dominated by major multinational corporations that are foreign-owned and have available resources to pay for emissions controls. In fact, some of these companies make more profits in six months than what EPA's rule would cost the entire industry in a year and are already complying with similar emissions standards in other countries in Europe.<sup>14</sup> Only 4 of the 40 cement parent companies are smaller entities, and, among them, two of the companies would have compliance costs less than 1% of sales and the other two

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<sup>12</sup> PCA, "Impact of Existing and Proposed EPA Standards on the U.S. Cement Industry," via [http://www.cement.org/newsroom/Media\\_1pgr.pdf](http://www.cement.org/newsroom/Media_1pgr.pdf), (accessed 4-12-2011), p.1

<sup>13</sup> EPA, "Fact Sheet: Final Amendments to National Air Toxic Emission Standards and New Source Performance Standards for Portland Cement Manufacturing," via [http://www.epa.gov/ttn/atw/pcem/pcem\\_fs\\_080910.pdf](http://www.epa.gov/ttn/atw/pcem/pcem_fs_080910.pdf), (accessed 4-12-2011), p.4.

<sup>14</sup> Earthjustice, "Dirty Air is Not the Key to Economic Growth," via <http://earthjustice.org/sites/default/files/cementkilnmythvsfact.pdf>, (accessed 4-12-2011), p. 2.

companies no more than 3% of sales.<sup>15</sup> In one of its many devices to overestimate the costs of compliance, PCA assumes in its analysis that investments in pollution control equipment must be paid up front, rather than annualized over expected equipment lifetime, which is 20 years for most devices.

PCA also overestimates plant closures and impacts on domestic production capacity, resulting in production moving overseas and increased imports. In fact, PCA fails to include a basic incidence analysis of key factors — such as the price of imported versus domestic cements, demand response to any price increases in domestic cement — to support their assumptions. While EPA has identified up to 10 plants that could be idled under the standards until market conditions improve, rapid expansion reported by the industry in recent years, projections of future growth by PCA and company proposals to add new production lines show that the industry's capacity is strong and growing.<sup>16 17</sup> PCA's own November 2010 forecast estimates that domestic production will increase by more than 25 percent by 2013, while imports will increase only gradually and remain below more recent averages.<sup>18</sup>

Contrary to PCA's extreme claims of job loss, EPA projects that employment impacts on the industry will be minimal, ranging from a potential loss of 600 to a gain of 1,300 jobs.<sup>19</sup> This

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<sup>15</sup> EPA, "Regulatory Impact Analysis: Amendments to the National Emission Standards for Hazardous Air Pollutants and New Source Performance Standards (NSPS) for the Portland Cement Manufacturing Industry," via <http://www.epa.gov/ttn/ecas/regdata/RIAs/portlandcementfinalria.pdf>, (accessed 4-12-2011), p. 1-3.

<sup>16</sup> EPA, "Regulatory Impact Analysis," p. 1-2.

<sup>17</sup> Earthjustice, "Dirty Air is Not the Key to Economic Growth," p.3.

<sup>18</sup> Earthjustice, "Dirty Air is Not the Key to Economic Growth," p.1.

<sup>19</sup> EPA, "Regulatory Impact Analysis," p. 1-2. Any potential job losses obviously are very real and distressing to the individuals whose jobs could be lost, and neither EPA nor any party is seeking that outcome. That unwelcome potential outcome, however, must be compared to an outcome in which up to 25,000 premature deaths will be avoided over the next decade as a result of the mercury and air toxics standards for cement plants.

does not include additional jobs that will be created from the production, distribution, installation, and maintenance of pollution control equipment.

The cement industry is one of the biggest toxic air polluters in the industrial sector and, for many decades has failed to reduce mercury and toxic air pollution to levels long required by the Clean Air Act, allowing this industry to escape standards that many other industrial sectors have been required to meet and are meeting.

For many communities concerned about the pollution that cement plants put in our air and water, the EPA standards are the only backstop to ensure adequate protection of our public health and environment. For example, in North Carolina, Titan America has proposed to build one of the largest cement plants in the country in Castle Hayne, near Wilmington, NC. Local North Carolina residents are fighting the project as the plant would be one of the largest emitters of mercury in the county; emit other toxic pollutants, including particular matter, nitrogen dioxide and sulfur dioxide; and expose an estimated 8,500 students enrolled within 5 miles of Titan's property to pollutants that cause asthma and other respiratory illnesses.<sup>20</sup> Local residents are pushing for a comprehensive environmental review before an air permit is issued by the state, to account for all the facility's health and environmental impacts.<sup>21</sup> Should the plant move forward despite the community's public health concerns, EPA's mercury and air toxic standards for cement plants will ensure that some critical safeguards will be in place, capping mercury emissions at 60 pounds per year instead of more than 400 pounds per year.

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<sup>20</sup> Stop Titan, "Why Stop Titan America?" via <http://stoptitan.com/the-fight/why-stop-titan.asp>, (accessed 4-12-2011).

<sup>21</sup> Gareth McGrath, "Judge says Titan's air quality permit application can proceed," Star News, 1/4/2011, via <http://www.starnewsonline.com/article/20110104/ARTICLES/110109931/1155?p=1&tc=pg>, (accessed 4-12-2011).

## **Industry Economic Studies Concerning the Cement and Boiler Standards**

Despite the clear and overwhelming public health, economic and environmental benefits of these standards, industry trade associations have predictably released a number of studies over the past six months projecting grossly exaggerated economic impacts and job losses as part of their effort to weaken and block these critical safeguards. These analyses, including the American Forest Paper Association's (AFPA) and the Council of Industrial Boiler Owners' (CIBO) studies on the air toxic standards for industrial, commercial, and institutional boilers, and the PCA study on the air toxics standards for cement plants, fail to meet fundamental standards of economic methodology and analysis.

There are basic tricks these studies use to inflate the impact of these standards. All three studies fail to conduct a basic incidence analysis that assesses key factors, such as consumer response to any increased prices and the percentage of costs that producers are able to pass on to consumers, to determine the real effect of the standards on output and employment in a consistent way. For example, in its study of the air toxic standards for industrial, institutional and commercial boilers, CIBO mistakenly assumed that output from the industrial sector would be reduced by an amount equal to the capital investment required for compliance; however, without a proper analysis to determine how consumers and companies would respond, there is no basis for this assumption.<sup>22</sup> As noted earlier in this testimony, PCA's study also fails to look at basic incident components, including the price of imported versus domestic cement and how the price of imports will affect economic behavior.

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<sup>22</sup> Laurie Johnson, "Congressional Research Service: CIBO boiler study used flawed economics," NRDC Switchboard, 2-16-2011, via [http://switchboard.nrdc.org/blogs/ljohnson/congressional\\_research\\_service.html](http://switchboard.nrdc.org/blogs/ljohnson/congressional_research_service.html), (accessed 4-13-2011) ("Congressional Research Service").

All of the studies also jack up the cost of compliance by modeling exorbitant cost estimates for pollution control equipment and assuming that this equipment must be paid for up front, rather than annualized over the life of the equipment, which is 20 years for most devices. AFPA's study projects compliance costs for the pulp and paper sector almost double that of EPA's analysis.<sup>23</sup> Likewise CIBO's cost estimates for pollution controls were far higher than EPA's, resulting in a total capital cost more than twice what EPA projects (CIBO's estimate was \$20.7 billion compared to EPA's \$9.5 billion). The Congressional Research Service also notes that CIBO grossly exaggerated compliance costs.<sup>24</sup>

These studies also ignore job gains from the production, distribution, installation and maintenance of pollution control equipment. The U.S. environmental technology industry generated \$282 billion in revenues and \$40 billion in exports and supported 1.6 million American jobs in 2007.<sup>25</sup> Typically, environmental standards result in a net gain in jobs as result of this industry's work, as well as the labor-intensive nature of these jobs.<sup>26</sup>

In what is likely one of the most egregious oversights, the studies completely disregard the significant health and environmental benefits of the standards. None of the studies assess these benefits in their reports. As noted earlier in my testimony, PCA's analysis goes so far as to

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<sup>23</sup> Laurie Johnson, "Pulp and paper industry's junk economic analysis of proposed EPA toxic emission standards for industrial boilers," NRDC Switchboard, 10-1-2010, via [http://switchboard.nrdc.org/blogs/ljohnson/pulp\\_and\\_paper\\_industrys\\_junk.html](http://switchboard.nrdc.org/blogs/ljohnson/pulp_and_paper_industrys_junk.html), (accessed 4-13-2011).

<sup>24</sup> Laurie Johnson, "Congressional Research Service."

<sup>25</sup> Administrator Lisa P. Jackson, Remarks on the 40th Anniversary of the Clean Air Act, As Prepared, September 14, 2010, via <http://yosemite.epa.gov/opa/admpress.nsf/12a744ff56dbff8585257590004750b6/7769a6b1f0a5bc9a8525779e005ade13!OpenDocument>, (accessed 2/27/2011).

<sup>26</sup> Laurie Johnson, "Congressional Research Service."

question the inherent environmental value of the standards, despite never examining or quantifying these benefits in their analysis.<sup>27</sup>

NRDC asked three respected academic economics professors to evaluate and grade a few industry reports, including CIBO's and AFPA's studies, as if they had been submitted to the professors as assignments in their undergraduate courses. The reports did not pass muster, earning grades of "D/F" and "F" respectively. As Professor Charles D. Kolstad of the University of California, Santa Barbara noted of the AFPA study, "If I were grading this, I would give it an F. The economics are all wrong (lack of incidence analysis or acknowledgement of its importance; failure to draw on the relevant literature)." Professor Jason Shogren of the University of Wyoming had a similar perspective on the CIBO study—"Overall grade: Application—D (lack of a serious accounting of economic behavior—no attempt to account for the behavioral elasticities of demand, a high end cost estimation, one-to-one mapping of upgrade costs to demand reduction, not addressing impacts in non-sector gainers within the economy, no accounting for R&D and new technology innovations and entrepreneurship). Transparency—F (Weak discussion on the basic economic role of responsiveness and substitution possibilities, multiplier justification is unclear, abatement cost assumptions incomplete, unclear, and inadequately justified)."<sup>28</sup>

## **Health Overview: Power Plants, Boilers and Cement Plants**

Fossil fuel power plants, boilers and cement plants all pose a major health hazard not only to the people living around them, but also regionally and across the nation, as the pollutants

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<sup>27</sup> PCA, "Impact of Existing and Proposed EPA Standards on the U.S. Cement Industry," via [http://www.cement.org/newsroom/Media\\_1pgr.pdf](http://www.cement.org/newsroom/Media_1pgr.pdf), (accessed 4-12-2011), p.1

<sup>28</sup> Laurie Johnson, "Industry Reports Attacking Clean Air Rules Earn Poor Grades from Professors," NRDC Switchboard, 10-28-2010, via [http://switchboard.nrdc.org/blogs/ljohnson/industry\\_reports\\_attacking\\_cle.html](http://switchboard.nrdc.org/blogs/ljohnson/industry_reports_attacking_cle.html), (accessed 4-13-2011).

emitted by these facilities contaminate communities, waterways and ecosystems across the United States and beyond. These industrial facilities emit vast quantities of deadly particulate matter or soot, smog-forming pollutants, and hazardous air pollutants such as acid gases, heavy metals like mercury, chromium, and lead, dangerous aromatics like benzene, and dioxins — a veritable toxic brew.

### **Health impacts of mercury**

Mercury is a highly neurotoxic contaminant that is pervasive throughout watersheds where it accumulates in fish, other wildlife, and ultimately in humans.<sup>29</sup> Mercury contamination of fish stocks is widespread in the United States, with nearly every state (48 out of 50) posting health advisories for mercury in fish.<sup>30</sup> A recent study of mercury levels in fish in streams across the United States found toxic methyl-mercury levels exceeding the level for human health concern at nearly 30% of the sites sampled.<sup>31</sup> For example, there are 1,039 advisories for mercury contamination in fish in Minnesota alone; 120 advisories for mercury contamination in Michigan waterways; 113 such advisories in Ohio; and 11 in Kentucky.<sup>32</sup>

Newly deposited mercury has been shown to be more bioavailable and more rapidly converted to methylmercury and represents a greater fraction of the methylmercury that is

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<sup>29</sup> US EPA 2009. Human Exposure to Methylmercury. <http://www.epa.gov/mercury/exposure.htm>.

<sup>30</sup> USGS. 2009. Recent findings from the National Water-Quality Assessment (NAWQA) and Toxic Substances Hydrology Programs (as presented to the NAWQA National Liaison Committee, August 21, 2009). US EPA 2007. National Listing of Fish Advisories Technical Fact Sheet: 2005/06 National Listing Fact Sheet; EPA-823-F-07-003; July 2007.

US Department of Health and Human Services and Environmental Protection Agency. 2009. What You Need to Know About Mercury in Fish and Shellfish. Available at <http://www.fda.gov/Food/FoodSafety/Product-SpecificInformation/Seafood/FoodbornePathogensContaminants/Methylmercury/ucm115662.htm>.

<sup>31</sup> USGS. 2009. Mercury in Fish, Bed Sediment, and Water from Streams Across the United States, 1998-2005.

<sup>32</sup> [http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories\\_index.cfm](http://water.epa.gov/scitech/swguidance/fishshellfish/fishadvisories/advisories_index.cfm).



incorporated into food chains and ultimately fish.<sup>33</sup> Local sources have been implicated in elevated levels of mercury measured in ambient air,<sup>34</sup> precipitation,<sup>35</sup> soils,<sup>36</sup> and methylmercury levels in biota including fish.<sup>37</sup> Reductions in local mercury emissions levels have been tied to decreasing levels measured in the environment and biota.<sup>38</sup>

Therefore, in order to achieve the National Academy of Sciences public health goal to reduce mercury concentration in fish,<sup>39</sup> current mercury emissions must be ratcheted down to decrease the amount of mercury cycling through aquatic systems and reduce contamination of fish and people. Coal-fired power plants, boilers and cement plants contribute to half of all the mercury air emissions in the United States.

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<sup>33</sup> USGS. 2009. Mercury in Fish, Bed Sediment, and Water from Streams Across the United States, 1998-2005. Hintelmann H, Harris R, Heyes A, Hurley JP, Kelly CA, Krabbenhoft DP, et al. Reactivity and mobility of new and old mercury deposition in a boreal forest ecosystem during the first year of the METAALICUS study. *Environ. Sci. Technol.* 36(23):5034-40, 2002.

<sup>34</sup> Manolopoulos H, Snyder DC, Schauer JJ, Hill JS, Turner JT, Olson ML, et al. Sources of speciated atmospheric mercury at a residential neighborhood impacted by industrial sources. *Environ. Sci. Technol.* 41(16):5626-33, 2007.

<sup>35</sup> Dvonch JT, Graney JR, Keeler GJ, Stevens RK. Use of elemental tracers to source apportion mercury in south Florida precipitation. *Environ. Sci. Technol.* 33(24):4522-27, 1999.

White EM, Keeler GJ, Landis MS. Spatial variability of mercury wet deposition in eastern Ohio: summertime meteorological case study analysis of local source influences. *Environ. Sci. Technol.* 43(13):4946-53, 2009.

<sup>36</sup> Biester H, Müller G, Schöler HF. Estimating distribution and retention of mercury in three different soils contaminated by emissions from chlor-alkali plants: part I. *Sci. of the Tot. Environ.* 284:177-89, 2002.

<sup>37</sup> Evers DC, Han Y, Driscoll CT, Kamman NC, Goodale MW, Lambert KT, et al. Biological mercury hotspots in the northeastern United States and southwestern Canada. *Biosci.* 57(1):29-43, 2007.

<sup>38</sup> Frederick PC, Hylton B, Heath JA, Spalding MA. A historical records of mercury contamination in southern Florida (USA) as inferred from avian feather tissue. *Environ. Toxicol. and Chem.* 23(6):1474-78, 2004. Driscoll CT, Han Y, Chen CY, Evers DC, Lambert KF, Holsen TM, et al. Mercury contamination in forest and freshwater ecosystems in the northeastern United States. *Biosci.* 57(1):17-28, 2007. USGS. 2009. Mercury in Fish, Bed Sediment, and Water from Streams Across the United States, 1998-2005.

<sup>39</sup> National Research Council. 2000, Toxicological Effects of Methylmercury. National Academy Press. Washington DC.

A significant fraction of the U.S. population already has elevated levels of mercury in their bodies, with an estimated 8% of women having mercury levels considered unsafe.<sup>40</sup> Further, *more than 300,000 newborns each year in the U.S. may have been over exposed to mercury in utero increasing their risk of neuro-developmental effects.*<sup>41</sup> Asians, Pacific Islanders, and Native Americans are all more likely to have elevated blood mercury levels, as are women living in the Northeast and other coastal areas, or consuming a lot of fish.<sup>42</sup> Researchers have estimated that in the U.S. methyl mercury toxicity is associated with between 115 and 2,675 excess cases per year of a level of cognitive impairment that would be considered mental retardation.<sup>43</sup> The cost of caring for these children has been estimated at between \$28 million and \$3.3 billion, a cost the researchers point out is accrued annually until mercury emissions are reduced.<sup>44</sup>

Methyl-mercury readily crosses the placenta and the blood brain barrier and is known to be neurotoxic, especially to the developing brain.<sup>45</sup> Several very large studies have shown solid associations between intrauterine methylmercury exposure and impaired neurobehavioral

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<sup>40</sup> Schober SE, Sinks TH, Jones RL, Bolger PM, McDowell M, Osterloh J, et al. Blood mercury levels in US children and women of childbearing age, 1999-2000. *JAMA*. 289(13):1667-74, 2003.

<sup>41</sup> Mahaffey KR, Clickner RP, Bodurow CC. Blood organic mercury and dietary mercury intake: National Health and Nutrition Examination Survey, 1999 and 2000. *Environ Health Perspect*. 112(5):562-70, 2004.

<sup>42</sup> Hightower JM, O'Hare A, Hernandez GT. Blood mercury reporting in NHANES: identifying Asian, Pacific Islander, Native American, and multiracial groups. *Environ Health Perspect*. 114(2):173-5, 2006. 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*. 117(1):47-53, 2009.

<sup>43</sup> Trasande, Leonardo, Schechter, Clyde, Haynes, Karla A., and Landrigan Phillip. Mental Retardation and Prenatal Methylmercury Toxicity. 2006 *Am Journal of Industrial Medicine*. 49:153-158.

<sup>44</sup> Trasande, Leonardo, Schechter, Clyde, Haynes, Karla A., and Landrigan Phillip. 2006. Applying Cost Analyses to Drive Policy that Protects Children Mercury as a Case Study. *Ann. N.Y. Acad.Sci*. 1076:911-923.

<sup>45</sup> Myers GJ, Davidson PW. Prenatal mercury exposure and children: Neurologic, developmental, and behavioral research. *Environ Health Perspect* 106(Suppl 3): 841-847, 1998.

performance.<sup>46</sup> Neurological effects in children can also occur from early life exposures to mercury at low doses resulting in diminished visual recognition memory (VRM)<sup>47</sup> and other neurological impairments such as decreased visual motor development and receptive vocabulary.<sup>48</sup> Postnatal mercury exposure is also associated with ADHD as well as impacts to motor functions and IQ.<sup>49</sup> Some neurobehavioral deficits related to mercury exposure may take many years to manifest.<sup>50</sup>

Recent research has revealed that elevated levels of mercury in adults can trigger neurological deficits impacting fine motor speed, dexterity, concentration, verbal learning, and memory.<sup>51</sup> Cardiovascular effects have also been reported in adults at environmentally-relevant exposure levels, indicating increased risks of myocardial infarction (e.g. heart attacks), increased blood pressure, and thickening of the carotid artery (a measurement of atherosclerosis) associated with elevated mercury levels.<sup>52</sup>

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<sup>46</sup> Grandjean P, White RF, Weihe P, Jorgensen PJ. Neurotoxic risk caused by stable and variable exposure to methylmercury from seafood. *Ambul Pediatr.* 3(1):18-23, 2003.

Debes F, Budtz-Jørgensen E, Weihe P, White RF, Grandjean P. Impact of prenatal methylmercury exposure on neurobehavioral function at age 14 years. *Neurotoxicol Teratol.* 28(5):536-47, 2006.

<sup>47</sup> Oken E, Wright RO, Kleinman KP, Bellinger D, Amarasiwardena CJ, Hu H, Rich-Edwards JW, Gillman MW. Maternal fish consumption, hair mercury, and infant cognition in a U.S. Cohort. *Environ Health Perspect.* 113(10):1376-80, 2005.

<sup>48</sup> Oken E, Radesky JS, Wright RO, Bellinger DC, Amarasiwardena CJ, Kleinman KP, Hu H, Gillman MW. Maternal fish intake during pregnancy, blood mercury levels, and child cognition at age 3 years in a US cohort. *Am J Epidemiol.* 167(10):1171-81, 2008.

Davidson PW, Myers GJ, Weiss B. Mercury exposure and child development outcomes. *Pediatrics.* 113(4 Suppl):1023-9, 2004. Oken E, Bellinger DC. Fish consumption, methylmercury and child neurodevelopment. *Curr Opin Pediatr.* 20(2):178-83, 2008.

<sup>49</sup> Myers GJ, Thurston SW, Pearson AT, Davidson PW, Cox C, Shamlaye CF, Cernichiari E, Clarkson TW. Postnatal exposure to methyl mercury from fish consumption: a review and new data from the Seychelles Child Development Study. *Neurotoxicol.* 30(3):338-49, 2009.

<sup>50</sup> Yoshida M, Shimizu N, Suzuki M, Watanabe C, Satoh M, Mori K, Yasutake A. Emergence of delayed methylmercury toxicity after perinatal exposure in metallothionein-null and wild-type C57BL mice. *Environ Health Perspect.* 116(6):746-51, 2008.

<sup>51</sup> Yokoo EM, Valente JG, Grattan L, Schmidt SL, Platt I, Silbergeld EK. Low level methylmercury exposure affects neuropsychological function in adults. *Environ Health.* 2(1):8, 2003.

<sup>52</sup> Guallar E, Sanz-Gallardo MI, van't Veer P, Bode P, Aro A, Gomez-Aracena J, et al. Mercury, fish oils, and the risk of myocardial infarction. *N Engl J Med.* 347(22):1747-54, 2002.

## Health impacts of other toxic heavy metals<sup>53</sup>

Clean up standards for power plants, boilers and cement plants not only would make substantial reductions in mercury pollution, but also reduce other toxic heavy metals, including antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel and selenium. Due to the low volatility of these metals, the majority of emissions occur as particles. The public is exposed through direct inhalation of metal containing particles and soil contamination resulting from aerial deposition of metals.

Hexavalent chromium, for example, is a known human carcinogen, primarily affecting the lungs, but tumors in the stomach and intestinal tract have also been reported.<sup>54</sup> Exposure to hexavalent chromium is also associated with respiratory effects (*e.g.*, nasal and lung irritation, altered pulmonary function), gastrointestinal effects (*e.g.*, irritation, ulceration and non-neoplastic lesions of the stomach and small intestine), hematological effects (*e.g.*, microcytic, hypochromic anemia), and reproductive effects (*e.g.*, effects on male reproductive organs, including decreased sperm count and histopathological change to the epididymis). Bronchitis, decreases in pulmonary function, pneumonia, and other respiratory effects have been noted from chronic high dose exposure of hexavalent chromium in occupational settings. Hexavalent

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Salonen JT, Seppanen K, Nyyssonen K, Korpela H, Kauhanen J, Kantola M, et al. Intake of mercury from fish, lipid peroxidation, and the risk of myocardial infarction and coronary, cardiovascular, and any death in eastern Finnish men. *Circulation* 91(3):645-55, 1995.

Choi AL, Weihe P, Budtz-Jørgensen E, Jørgensen PJ, Salonen JT, Tuomainen TP, Murata K, Nielsen HP, Petersen MS, Askham J, Grandjean P. Methylmercury exposure and adverse cardiovascular effects in Faroese whaling men. *Environ. Health Perspect.* 117(3):367-72, 2009.

Jacob-Ferreira AL, Passos CJ, Jordão AA, Fillion M, Mergler D, Lemire M, Gerlach RF, Barbosa Jr F, Tanus-Santos JE. Mercury Exposure Increases Circulating Net Matrix Metalloproteinase (MMP)-2 and MMP-9 Activities. *Basic Clin. Pharmacol. Toxicol.* 1-8, 2009 [Epub ahead of print] PMID: 19594729.

<sup>53</sup> 70 Fed. Reg. 59402, 59406-08 (Oct. 12, 2005), Agency for toxic substances and Disease Registry, Public Health Statements, <http://www.atsdr.cdc.gov/>.

<sup>54</sup> US DHHS, ATSDR. 2008. Draft Toxicological Profile For Chromium.

chromium inhalation exposure may be associated with complications during pregnancy and childbirth.

Another notoriously toxic heavy metal, lead, exerts “a broad array of deleterious effects on multiple organ systems via widely diverse mechanisms of action,” including effects on heme biosynthesis and related functions; neurological development and function; reproduction and physical development; kidney function; cardiovascular function; and immune function.<sup>55</sup> In particular, lead is associated with neurological, hematological, and immune effects on children, and hematological, cardiovascular and renal effects on adults. Children are particularly sensitive to the effects of lead. Functional manifestations of lead neurotoxicity during childhood include sensory, motor, cognitive and behavioral impacts. Cognitive effects of special concern include decrements in IQ scores and academic achievement, as well as attention deficit problems. Children in poverty and black, non-Hispanic children face higher exposures to lead and are consequently more susceptible to lead’s health impacts. Reproductive effects, such as decreased sperm count in men and spontaneous abortions in women, have been associated with lead exposure. There is also some evidence of lead carcinogenicity, primarily from animal studies, together with limited human evidence of suggestive associations. EPA has classified lead as a probable human carcinogen.

### **Health impacts of acid gases<sup>56</sup>**

Hydrogen chloride (HCl) is irritating and corrosive to any tissue it contacts. Brief exposure to low levels causes throat irritation. Long-term exposure to low levels can cause respiratory problems, eye and skin irritation, and discoloration of the teeth. Exposure to higher

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<sup>55</sup> National Ambient Air Quality Standards for Lead, 73 Fed. Reg. 66964, 66975-76 (Nov. 12, 2008).

<sup>56</sup> Agency of Toxic Substances and Disease Registry, ToxFAQs, <http://www.atsdr.cdc.gov/toxfaqs/TF.asp?id=759&tid=147>, ATSDR, Medical Management Guidelines for Hydrogen Fluoride, <http://www.atsdr.cdc.gov/MMG/MMG.asp?id=1142&tid=250>

levels can result in rapid breathing, narrowing of the bronchioles, blue coloring of the skin, severe burns of the eyes and skin, accumulation of fluid in the lungs, and even death. Some people may develop reactive airways dysfunction syndrome (RADS), a type of asthma caused by some irritating or corrosive substances. Children may be more vulnerable than adults to corrosive agents, such as HCl, because of their relatively narrower airways, relatively greater exposure due to greater breathing volume per pound of body weight and relatively longer potential exposure durations. Hydrogen fluoride or Hydrofluoric acid (HF) is a serious systemic poison that is highly corrosive; exposure to it can be fatal.

### **Health impacts of organic chemicals<sup>57</sup>**

Organic compounds emitted by coal boilers include but are not limited to acetaldehyde, benzene, formaldehyde, dioxin and furan, polycyclic aromatic hydrocarbons (PAHs), toluene, and xylenes. Each of these organic compounds is associated with a range of potential health effects. Several of the health effects from short-term inhalation exposure to these pollutants are similar: they include irritation of the eyes, skin, and respiratory tract in humans; central nervous system effects (e.g., drowsiness, dizziness, headaches, depression, nausea, irregular heartbeat); reproductive and developmental effects; and, neurological effects. Exposure to benzene at extremely high concentrations may lead to respiratory paralysis, coma, or death. Long-term inhalation exposure in humans produces health effects that range from mild to serious. Mild symptoms may include nausea, headache, weakness, insomnia, intestinal pain, and burning eyes. Long-term exposure also has effects on the central nervous system, can be toxic to the immune system, and can produce disorders of the blood, lead to reproductive disorders in women (e.g., increased risk of spontaneous abortion), and is associated with developmental effects, gastrointestinal irritation, liver injury, and muscular effects. In addition, some of the organic

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<sup>57</sup> ATSDR, Public Health Statements, <http://www.atsdr.cdc.gov/>.

HAPs are either known human carcinogens, such as benzene, or probable carcinogens, such as formaldehyde and dioxins.

Polycyclic aromatic hydrocarbons (PAHs) are known human mutagens, carcinogens, and/or developmental toxicants.<sup>58</sup> Infants and children are *especially* sensitive and susceptible to the hazards of PAHs. Greater lifetime cancer risks result from early exposure to carcinogens (*i.e.*, at a young age), and many carcinogens can have a long latency period. These substances are known to cross the placenta to harm the unborn fetus; in addition to contributing to fetal mortality they have been shown to increase the cancer risk, and produce tumors as well as birth defects in offspring.<sup>59</sup> There is also evidence that exposure of children to PAHs at ambient levels in polluted areas can adversely affect IQ.<sup>60</sup> Further evidence suggests that prenatal exposure to PAHs may be a risk factor for the early development of asthma-related symptoms and can adversely affect children's cognitive development, with implications for diminished school performance.<sup>61</sup> Thus the adverse health impacts of PAH exposure to infants and children are significantly greater.

### **Health impacts of particulate matter.**

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<sup>58</sup> Salmon A.G. and Meehan T. Potential Impact of Environmental Exposures to Polycyclic Organic Material (POM) on Children's Health, California Office of Environmental Health Hazard Assessment (OEHHA).

[http://www.oehha.ca.gov/public\\_info/public/kids/pdf/PAHs%20on%20Children's%20Health.pdf](http://www.oehha.ca.gov/public_info/public/kids/pdf/PAHs%20on%20Children's%20Health.pdf)  
Agency for Toxic Substances and Disease Registry, Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs). August 1995. <http://www.atsdr.cdc.gov/PHS/PHS.asp?id=120&tid=25>

<sup>59</sup> Perera FP. DNA Damage from Polycyclic Aromatic Hydrocarbons Measured by Benzo[a]pyrene-DNA Adducts in Mothers and Newborns from Northern Manhattan, The World Trade Center Area, Poland, and China, *Cancer Epidemiol Biomarkers Prev* 2005;14(3):709–14.

<sup>60</sup> Perera, FP et. al. Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years. *Pediatrics* 2009;124:e195–e202.

<sup>61</sup> Perera FP, Rauh V, Tsai WY, Kinney P, Camann D, et al. (2003) Effects of transplacental exposure to environmental pollutants on birth outcomes in a multiethnic population. *Environ Health Perspect* 111: 201–205. Perera FP et. al., Effect of Prenatal Exposure to Airborne Polycyclic Aromatic Hydrocarbons on Neurodevelopment in the First 3 Years of Life among Inner-City Children, *Environ Health Perspect* 114:1287–1292 (2006).

In addition to the toxic constituents and associated health impacts above, these sources constitute a major public health hazard through fine particulate matter (PM) emissions.

Numerous studies have documented a wide range of adverse health impacts from exposure to fine particulate matter, including increased risk for cardiovascular disease such as atherosclerosis, increased heart attacks, increased respiratory illness, increased emergency room visits for acute health events, birth defects, low birth weights, premature births, and increased rates of death.<sup>62</sup>

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<sup>62</sup> Kuenzli N, Jerrett M, Mack WJ, Beckerman B, LaBree L, Gilliland F, Thomas D, Hodis HN. "Ambient Air Pollution and Atherosclerosis in Los Angeles," *Environ Health Perspect*, 2005 Feb;113(2):201-6. Miller KA, Siscovick DS, Sheppard L, Shepherd K, Sullivan JH, Anderson GL, Kaufman JD. "Long-term Exposure to Air Pollution and Incidence of Cardiovascular Events in Women." *N Engl J Med*, 2007 Feb 1;356(5):447-58. Hoffman B, Moebus S, Mohlenkamp S, Stang A, Lehman N, Dragano D, Schmermund A, Memmesheimer M, Mann K, Erbel R, Jockel K-H. "Residential Exposure to Traffic Is Associated With Coronary Atherosclerosis." *Circulation*, published online July 16, 2007, DOI:10.1161 / CIRCULATIONAHA.107693622. Pope CA, Muhlestein JB, May HT, Renlund DG, Anderson JL, Horne BD. "Ischemic Heart Disease Events Triggered by Short-term Exposure to Fine Particulate Air Pollution." *Circulation* 2006 Dec 5;114(23):2443-8. Schwartz J, Slater D, Larson TV, Person WE, Koenig JQ. "Particulate Air Pollution and Hospital Emergency Room Visits for Asthma in Seattle." *Am Rev Respir Dis*, 1993 Apr; 147(4):826-31. Ritz B, Wilhelm M, Zhao Y. "Air Pollution and Infant Death in Southern California, 1989–2000." *Pediatrics*, 2000 Aug;118(2):493-502. Wilhelm M, Ritz B. "Residential Proximity to Traffic and Adverse Birth Outcomes in Los Angeles County, California, 1994–1996." *Environ Health Perspect*, 2003 Feb; 111(2):207-16. Wilhelm M, Ritz B. "Local Variations in CO and Particulate Air Pollution and Adverse Birth outcomes in Los Angeles County, California, USA." *Environ Health Perspect*, 2005 Sep;113(9):1212-21. Jerrett M, Burnett RT, Ma R, Pope CA, Krewski D, Newbold KB, Thurston G, Shi Y, Finkelstein N, Calle EE, Thun MJ. "Spatial Analysis of Air Pollution and Mortality in Los Angeles." *Epidemiology*, 2005 Nov;16(6):727-36.