August 4, 2011

Ms. Lisa Jackson, Administrator
U.S. Environmental Protection Agency
Ariel Rios Building
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460

EPA Docket Center (EPA/DC)
U.S. Environmental Protection Agency
Mailcode: 2822T
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Docket ID Nos. EPA-HQ-OAR-2011-0044; EPA-HQ-OAR-2009-0234

RE: Comments of Environmental and Public Health Groups, "National Emission Standards for Hazardous Air Pollutants From Coal- and Oil-Fired Electric Utility Generating Units and Standards of Performance for Fossil-Fuel-Fired Electric Utility, Industrial-Commercial-Institutional, and Small industrial-Commercial-Institutional Steam Generating Units; Proposed Rule, 76 Fed. Reg. 24976 (May 3, 2011)

Dear Administrator Jackson:

On behalf of our millions of members and supporters who stand to benefit from cleaner air and improved health, we wish to thank you for proposing long-overdue standards to protect communities from hazardous air emissions from coal and oil-fired power plants, including substances known to adversely affect public health, such as mercury, nickel and other toxic metals, as well as particulate matter (soot) and acid gases. Research has shown that even in small amounts these air pollutants are linked to health problems such as cancer, heart disease, brain damage, birth defects, asthma attacks and premature death.

Issuance and timely compliance by existing sources with final air toxics rules will result in many thousands of lives saved from cardiovascular and respiratory diseases, especially in lower income and ethnic neighborhoods where exposure to a mixture of these pollutants is highest. In

fact, each year, the proposed rule would prevent 6,800-17,000 premature deaths, 11,000 heart attacks, 120,000 asthma attacks, and 850,000 missed work or "sick" days. EPA's Regulatory Impact Analysis estimates the monetary benefits of this rule at well over $50 billion, a figure which does not account for significant environmental or ecosystem benefits.

We offer these comments in strong support of the rule. Where appropriate, we have also included suggestions which we believe would improve the rule. We applaud EPA's proposal of these long-overdue rules, and urge the Agency to finalize standards that will provide the public health and environmental protections communities across America deserve.

Sincerely,

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I. There Are Significant Adverse Public And Environmental Health Effects Associated With The Air Pollutants Regulated Under This Proposed Rule

A. Hazardous Air Pollutants from Power Plants Cause Wide-ranging Health Harm[1]

During the process of burning coal, power plants emit highly toxic chemicals that threaten human health through the air we breathe, the water we drink, and the food we eat. These pollutants include: corrosive substances (acid gases, such as hydrogen chloride and hydrogen fluoride); carcinogens (formaldehyde, benzene, toluene, and other compounds); organic carbon-based toxins (formaldehyde, dioxins, furans); metals (such as arsenic, nickel, and beryllium); neurotoxins (such as mercury and lead); polycyclic aromatic hydrocarbons (PAH); and radioactive materials (such as radium and uranium).[2,3]

According to the most current data in the National Emissions Inventory, coal-fired power plants produce over 386,000 tons of 84 separate hazardous air pollutants from over 440 plants in 46 states.[2] These plants produce 40 percent of all hazardous air pollutants released from domestic industrial sources, more than any other industrial source. In addition, the combustion of coal to generate electricity produces 76 percent of the total volume of acid gases, 60 percent of arsenic, and 46 percent of mercury released into the atmosphere.[2]

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[1] The studies and references cited in footnotes 2-74 are incorporated by reference, and provided (or abstracts are provided) with the comments submitted August 4: Letter to Administrator Lisa Jackson, U.S. EPA, RE: EPA-HQ-OAR-2009-0234 and EPA-HQ-OAR-2011-0044, by the American Academy of Pediatrics, American Heart Association, American Lung Association, *et al.*

[2] U.S. Environmental Protection Agency (EPA). 2007. National Emissions Inventory (NEI) 2002: Inventory Data: Point Sector Data – ALLNEI HAP Annual 01232008. Web Link: http://www.epa.gov/ttn/chief/net/2002inventory.html#inventorydata [Accessed 11 January 2011].

[3] Agency for Toxic Substances and Disease Registry (ATSDR). 2011. *Toxic Substances Portal: Toxicological Profiles*. Washington, DC, USA: ATSDR. Web Link: http://www.atsdr.cdc.gov/toxprofiles/index.asp [Accessed: 18 February 2011]. ("ATSDR, 2011a").

Research has shown that these toxins are especially dangerous because of the harm they can cause to the circulatory, respiratory, nervous, endocrine, and other essential life systems within humans. Toxic emissions can even cause developmental disorders and premature death. Pollutants such as acid gases, mercury, and sulfur dioxide, have immediate impacts on people, neighborhoods, and towns within the immediate vicinity of a power plant. However, other pollutants, such as dioxins and metals, can travel much farther from the pollution source. These pollutants, which adhere to fine particles, can remain in the air for more than a week and be carried by winds to distant locations. This makes toxic air pollution dangerous to public health and human health both near to and far from coal-fired power plants.[4]

We agree with the strong evidence that EPA provides in the proposed rule to support their decision that regulation of coal- and oil-fired power plants is both appropriate and necessary to protect public health. Not only is there clear evidence that the harm from mercury and methylmercury continues, but recognized carcinogens and other toxics that cause or increase risk of cardiovascular, respiratory, and other acute and chronic systemic damage are also emitted by power plants. The cleanup of toxic air pollution from power plants is necessary for the protection of public health, appropriate for EPA to undertake, and long overdue.

1. There is Evidence that These Toxics Pose Serious Threats to Health and Must Be Reduced

   a. Acid Gases (Including Hydrogen Chloride, Hydrogen Fluoride, Chlorine)

Strongly corrosive gases produced by coal-fired power plants include two of the largest volume toxic emissions by ton: hydrogen chloride and hydrogen fluoride.[2] Acid gas vapors can harm the respiratory tract by reacting with the moisture and tissues on the upper airways (due to their solubility in water) and bind to particles

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[4] U.S. Environmental Protection Agency (EPA), 2009. *Integrated Science Assessment for Particulate Matter*, EPA 600/R-08/139F. Available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546.

to further travel to the alveolar regions of the lung.[5] Chlorine is another toxic acid gas produced in coal combustion.[6]

Large-scale epidemiological studies have revealed a strong linkage between acid gases (bound to particles or as aerosols) and adverse respiratory effects. A study of 13,000 children in 24 cities found that the strong acid aerosols associated with episodes of bronchitis and reduced lung function and acid aerosols were associated with asthma and related symptoms in children.[7,8] Another recent study also found that acid gases and particle pollution were associated with reduced lung function.[9] Hydrogen chloride is a strong acid gas that reacts with moisture to form hydrochloric acid. Hydrogen chloride intensely irritates the mucous membranes of the respiratory system. At high concentrations, hydrogen chloride can cause swelling and spasms in the throat and suffocation. In addition, inhaled hydrogen chloride can lead to a chemical- or irritant-induced form of asthma called Reactive

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[5] U.S. Environmental Protection Agency (EPA). 1998. *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units – Final Report to Congress, Volume 2. Appendices (EPA-453/R-98-004b).* Research Triangle Park, NC, USA: EPA, Office of Air Quality Planning and Standards, available at http://www.epa.gov/ttncaaa1/t3/reports/eurtc2.pdf.

[6] U.S. Environmental Protection Agency (EPA). 2011. Regulatory Impact Analysis for proposed Air Toxics Rule, Office of Air Quality Planning and Standards, Research Triangle Park, NC. Web link: http://www.epa.gov/ttn/ecas/regdata/RIAs/ToxicsRuleRIA.pdf [Accessed 16 June 2011].

[7] Raizenne M, Neas LM, Damokosh AI, Dockery DW, Spengler JD, Koutrakis P, Ware JH, Speizer FE. 1996. Health Effects of Acid Aerosols on North American Children: Pulmonary Function. *Environmental Health Perspectives* 104(5):506-514.

[8] Dockery DW, Cunningham J, Damokosh AI, Neas LM, Spengler JD, Koutrakis P, Ware JH, Raizenne M, Speizer FE. 1996. Health Effects of Acid Aerosols on North American Children: Respiratory Symptoms. *Environmental Health Perspectives* 104(5):500-504.

[9] Gauderman WJ, Avol E, Gilliland F, Vora H, Thomas D, Berhane K, McConnell R, Kuenzli N, Lurmann F, Rappaport E, Margolis H, Bates D. 2004. The effect of air pollution on lung function development in children aged 10 to 18 years. *New England Journal of Medicine.*351:1057-1067.

Airway Dysfunction Syndrome (RADS).[10] Both hydrogen chloride and hydrogen fluoride can irritate the eyes, nasal passages, and lungs.[11,12]

Colorless hydrogen fluoride gas poses serious health risks when inhaled, as a result of what the Agency for Toxic Substances and Disease Registry describes as the fluoride ion's "aggressive, destructive penetration of tissues."[13] Hydrogen fluoride irritates the nose, throat, and eyes, inflames the mucous membrane, causes coughing, and induces narrowing of the bronchial tubes. Acute exposures can cause the throat to swell and narrow, obstructing breathing. The reaction to inhaled hydrogen fluoride may not appear for several hours to days after exposure. As with many chemicals, hydrogen fluoride does have benefits under the right circumstances, which are not present in this case: long-term oral exposure to low-levels of fluoride prevents dental cavities and hardens the bones.[13]

At high levels of exposure, chlorine can lead to harmful health impacts. Inhalation of low concentrations can irritate the nose and throat and cause headache. Intermediate amounts of chlorine can cause immediate chest pain, nausea, vomiting, cough, and shortness of breath. Acute exposure to higher levels can lead to more severe health effects and be life threatening; inflammation of lung tissue, pulmonary edema, pneumonia, and even death may result (ATSDR, 2010c).[14]

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[10] Agency for Toxic Substances and Disease Registry (ATSDR). 2010. *Medical Management Guidelines for Hydrogen Chloride (HCl)*. Updated September 1, 2010. Accessed February 27, 2011. http://www.atsdr.cdc.gov/MHMI/mmg173.pdf.
[11] U.S. Environmental Protection Agency (EPA). 2000. *Air Toxics Web Site: Hydrochloric Acid (Hydrogen Chloride) Hazards Summary*. Web Link: http://www.epa.gov/ttn/atw/hlthef/hydrochl.html [Accessed February 18, 2011].
[12] U.S. Environmental Protection Agency (EPA). 2000. *Air Toxics Web Site: Hydrogen Fluoride Hazards Summary*. Web Link: http://www.epa.gov/ttn/atw/hlthef/hydrogen.html [Accessed February 18, 2011].
[13] Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological profile for Hydrogen Fluoride. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp11-c3.pdf [Accessed: 14 June 2011]. ("ATSDR 2003")
[14] Agency for Toxic Substances and Disease Registry (ATSDR). 2010. Toxicological profile for Chlorine. Atlanta, GA: U.S. Department of Health and Human Services,

Exposure to high concentrations of chlorine has also been linked to long-term neurological effects, such as memory loss, slow reaction time, impaired balance, hearing loss, and visual alterations.[14]

b. Dioxins and Furans (Example: 2,3,7,8-Tetrachlorodibenzo-p-dioxin, Known as TCDD)

Dioxins and furans are a family of toxic chemicals that primarily arise from the burning of fossil fuels, such as coal, and exist in the atmosphere both as a gas and particles.[15] As particles, they can remain airborne for more than ten days, traveling far from their source, and depositing in water and soil.[16] Dioxins have even been found in the U.S. food supply; in 2002-2003, the U.S. Department of Agriculture found dioxin-like substances in meat and poultry.[17] Researchers have found dioxins in the breast milk of nursing mothers. [18]

Short-term exposures can cause liver damage and skin lesions, while long-term exposures can harm the immune system, the developing nervous system, the reproductive system, and disrupt hormone function. One form of dioxin—2,3,7,8-Tetrachlorodibenzo-p-dioxin, or TCDD—is recognized as a known human

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Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp172-c3.pdf [Accessed: 14 July 2011]. ("ATSDR, 2010b")

[15] Oh JE, Choi JS, Chang YS. 2001. Gas/particle partitioning of polychlorinated dibenzo-p-dioxins and dibenzofurans in atmosphere; evaluation of predicting models. *Atmospheric Environment* 35(24): 4125-4134.

[16] Atkinson, R. 1991. Atmospheric lifetimes of dibenzo-p-dioxins and dibenzofurans. *The Science of the Total Environment* 104(1-2): 17-33.

[17] Hoffman MK, Huwe J, Deyrup CL, Lorentzsen M, Zaylskie R, Clinch NR, Saunders P, Sutton WR, USDA – ARS. 2006. Statistically Designed Survey of Polychlorinated Dibenzo-p-dioxins, Polychlorinated Dibenzofurans, and Co-Planar Polychlorinated Biphenyls in US Meat and Poultry, 2002-2003: Results, Trends, and Implications. *Environmental Science & Technology*. 40(17):5340-5346.

[18] Lorber M, Phillips L. 2002. Infant exposure to dioxin-like compounds in breast milk. *Environmental Health Perspectives* 100:A325-A332.

carcinogen.[19,20,21,22,23,24] Researchers are currently exploring the potential for dioxins to act as endocrine disrupters, by mimicking natural hormones in the body and altering their normal function.[25] Last year, the World Health Organization concluded that developing fetuses and newborn children are most vulnerable to the harmful effects of dioxin and furan exposure.[20]

c. Radioisotopes (Examples: Radium, Uranium)

Radioisotopes, or certain forms of elements that are radioactive, emit ionizing radiation that can damage cells and contribute to cancer and other illnesses. Coal combustion is the leading source of radium released into the air, according to the ATSDR.[26] Radioisotopes are known carcinogens, especially as relates to the lungs,

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[19] National Toxicology Program. 2011. *Report on Carcinogens, Twelfth Edition.* Research Triangle Park, NC: U.S. Department of Health and Human Services, Public Health Service, National Toxicology Program. 499 pp.
[20] World Health Organization (WHO). 2010. Fact Sheet: Dioxins and their effects on human health. Geneva, Switzerland: WHO. Web Link: http://www.who.int/mediacentre/factsheets/fs225/en/index.html [Accessed 3 February 2011]. ("WHO 2010")
[21] World Health Organization (WHO). 2011. *Concise International Chemical Assessment Documents*. Geneva, Switzerland: WHO: Web Link: http://www.who.int/ipcs/publications/cicad/en/. [Accessed 3 February 2011]. ("WHO 2011")
[22] Agency for Toxic Substances and Disease Registry (ATSDR). 1994. Toxicological profile for chlorodibenzofurans (CDFs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp32-c2.pdf [Accessed 14 Jun 2011].
[23] Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological profile for Chlorinated Dibenzo-p-dioxins (CDDs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp104-c2.pdf [Accessed: 14 June 2011].
[24] Agency for Toxic Substances and Disease Registry (ATSDR). 2000. Toxicological profile for Polychlorinated Biphenyls (PCBs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp17-c3.pdf [Accessed: 14 June 2011].
[25] Casals-Casas C, Desvergne B. 2011. Endocrine disruptors: from endocrine to metabolic disruption. *Annual Reviews of Physiology* 73:135-162.
[26] Agency for Toxic Substances and Disease Registry (ATSDR). 1990. Toxicological profile for radium. Atlanta, GA: U.S. Department of Health and Human Services,

bones, and lymphatic system. They can also cause kidney disease, pneumonia, anemia, and brain abscess.[26,3, 27,21]

d. Polynuclear Aromatic Hydrocarbons (PAH) (Examples: Naphthalene, Benzo-a-anthracene, Benzo-a-pyrene, Benzo-b-fluoranthene, Chrysene, Dibenzo-a-anthracene)

Polynuclear-Aromatic Hydrocarbons or PAHs are a group of over 100 chemicals formed during incomplete combustion of coal and other fuels; they include probable human carcinogens. PAHs adhere to particulate matter and deposit in the lungs.[28,3,29] New research warns that prenatal exposure to PAHs may impact the mental development of children to age 5.[28, 30,21]

e. Volatile Organic Compounds (Examples: Acetaldehyde, Benzene, Formaldehyde, Toluene, Xylene)

Volatile organic compounds take in a host of chemicals that include carcinogens and other toxins and also contribute to the formation of ozone. According to EPA's Regulatory Impact Assessment, three organic hazardous air pollutants dominate the mass from coal-fired power plants: acetaldehyde, benzene, and formaldehyde. Benzene and formaldehyde are recognized as known human

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Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp144-c2.pdf [Accessed: 13 June 2011]. ("ATSDR, 1990")

[27] Agency for Toxic Substances and Disease Registry (ATSDR). 2011. Toxicological profile for Uranium *(Draft for Public Comment)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. http://www.atsdr.cdc.gov/ToxProfiles/tp150-c3.pdf [Accessed: 13 June 2011].

[28] Agency for Toxic Substances and Disease Registry (ATSDR). 1995. Toxicological profile for Polycyclic Aromatic Hydrocarbons (PAHs). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp69-c2.pdf [Accessed: 14 June 2011].

[29] Vineis P and Husgfvel-Purisainen K. Air Pollution and cancer: biomarker studies in human populations. *Carcinogenesis* 2005; 26: 11: 1846-1855

[30] Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological profile for Naphthalene, 1-Methylnaphthalene, and 2-Methylnaphthalene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp67-c3.pdf [Accessed: 13 June 2011].

carcinogens, while acetaldehyde is considered a probable carcinogen.[31] Non-cancer effects associated with these organics include irritation of the skin, eyes, nose, and throat. These compounds can also cause difficulty in breathing, impaired lung function and respiratory symptoms, damage to the liver and kidneys, and stomach discomfort. They may also cause adverse effects to the nervous system, impaired memory, and slow response to visual stimuli.[32,33,34,35,36,3,21]

f. Mercury (Including Methylmercury)

Mercury is a primary metal emitted from coal-fired power plant combustion in three forms: as a vaporous gas of elemental mercury; oxidized, and bound with particles. Elemental mercury stays airborne, resulting in widespread distribution. Oxidized and particle-bound mercury deposit nearer to the sources. Once released to the atmosphere, mercury returns to the earth in rain or snowfall, and pollutes waterways and the wildlife in them.[6] Microorganisms convert mercury into

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[31] U.S. Department of Health and Human Services (HHS). National Toxicology Program. 2011. *Report on Carcinogens, Twelfth Edition.* Research Triangle Park, NC: U.S. Department of Health and Human Services.
[32] Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for Formaldehyde. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp111-c2.pdf [Accessed: 13 June 2011].
[33] Agency for Toxic Substances and Disease Registry (ATSDR). 2000a. Toxicological profile for Toluene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp56-c2.pdf [Accessed: 13 June 2011].
[34] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological profile for Benzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp3-c3.pdf [Accessed: 13 June 2011].
[35] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological profile for Xylenes. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp71-c3.pdf [Accessed: 13 June 2011].
[36] Agency for Toxic Substances and Disease Registry (ATSDR). 2010. Toxicological profile for Ethylbenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp110-c3.pdf [Accessed: 13 June 2011].

methylmercury, a highly toxic form of mercury that bioaccumulates in fish and shellfish.[37,38] Although a person can be exposed to mercury through breathing contaminated air or through skin contact, methylmercury is most easily absorbed by eating contaminated food, especially fish or shellfish. The long-term, low-level exposure to methylmercury that results from the regular consumption of contaminated fish is a primary health concern.[39]

Eating foods containing methylmercury can expose the brains of adults, children and developing fetus to harm. Critical periods are during pregnancy and in the early months after children are born.[37] Mercury exposure can lead to developmental birth defects and interfere with neurological development.[40] Pregnant women who consume fish and shellfish can transmit methylmercury to their developing fetus, and infants can ingest methylmercury in breast milk. Children can also become exposed by eating contaminated fish. [32] Each year, more than 300,000 children born in the US have levels of mercury in their blood high enough to impair performance on brain development test and permanently affect intelligence.[41,42] Additionally, mercury can damage the kidneys, liver, brain, and nervous system as a potent neurotoxin, even in adults.[37,3,21] A recent study has also

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[37] Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for Mercury. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp46-c2.pdf [Accessed: 13 June 2011].
[38] Grandjean P. 2010. Adverse effects of methylmercury: environmental health research implications. *Environmental Health Perspectives* 118: 137-1145.
[39] U.S. Environmental Protection Agency (EPA). 1997. *Mercury Study Report to Congress*, Volumes I – VIII: (EPA-452/R-97-003 through EPA-452/R-97-010). Washington, DC, USA: EPA.
[40] Bose-O'Reilly S, McCarty KM, Steckling N, Lettmeier B. 2010. Mercury Exposure and Children's Health. *Current Problems in Pediatric and Adolescent Health Care* 40(8):186-215.
[41] Trasande L, Landrigan PJ, Schechter C. 2005. Public health and economic consequences of methylmercury toxicity to the developing brain. *Environmental Health Perspectives* 113(5): 590-596.
[42] Axelrad DA, Bellinger DC, Ryan LM, Woodruff TJ. 2007. Dose-response relationship of prenatal mercury exposure and IQ: An integrative analysis of epidemiologic data. *Environmental Health Perspectives*. 115(4): 609-615.

found that methylmercury exposure may lessen the cardiovascular benefits of regular fish consumption.[43]

g. Non-Mercury Metals (Examples: Arsenic, beryllium, cadmium, chromium, lead, nickel, selenium, manganese)

Non-mercury metals and metal-like substances (e.g. arsenic and selenium) comprise a significant part of fine particulate matter (PM2.5) directly emitted from coal-fired power plants. Fine particle pollution is aggravated by the secondary particles formed as a result of chemical reactions in sulfur dioxide and nitrogen oxides emissions. Those secondary particles, notably sulfates and nitrates, pose life-threatening risks similar to those from primary particle emissions.

Inhaled particles deposit along the respiratory tract or penetrate deeply into the gas-exchange region of the lung. EPA has already concluded that exposure to fine particulate matter (PM2.5) causes cardiovascular effects and premature mortality and is likely to cause respiratory harm. The Agency concluded that the evidence suggests that long-term exposure to PM2.5 causes reproductive and developmental effects as well as cancer, mutagenicity and genotoxicity. [4] The risks of cardiovascular harm include acute myocardial infarction, congestive heart failure, cardiac arrhythmias, and strokes. Risks of respiratory harm include coughing, wheezing, difficulty breathing, asthma exacerbations, and increased hospitalization for chronic obstructive pulmonary disease (COPD).[4] Evidence has also grown to warn that long-term exposure to PM 2.5 can increase the risk of low birth weight, infant mortality, and cancer, especially lung cancer.[4]

The level of toxicity of fine particles varies and is likely impacted by the presence of metals or other pollutants.[44] Metals interact with particles to create

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[43] Domingo JL. 2007. Omega-3 fatty acids and the benefits of fish consumption: is all that glitters gold? *Environment International*. 33(7):993-8.

"reactive oxygen species" which limit the body's ability to repair damage to its cells and contribute to tissue inflammation.[45,46,47] Research has shown that sulfate, selenium, iron, nitrate, and organic carbon affect immune cell response and heart variability.[48,49] Elevated presence of chromium, lead, and other metals in PM has been associated with greater effects on hospital admissions for cardiovascular disease, according to a study of Medicare recipients in 26 communities.[50] Zanobetti et al. found that admissions for heart attacks were higher where the PM was enriched in arsenic, chromium, manganese, nickel, and organic carbon. The same study found that showing up in high levels of arsenic, organic carbon, and sulfate in PM—potential indicators of coal combustion—were associated with increased hospital admissions for diabetics.[50] A large study of 25 U.S. communities found increased mortality rates when the fraction of aluminum, sulfate, and nickel in

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[44] Bell ML, Dominici F, Ebisu K, Zeger SL, Samet JM. 2007. Spatial and temporal variation in PM2.5 chemical composition in the United States for health effects studies. *Environmental Health Perspectives* 115(7):989-995.
[45] Carter JD, Ghio AJ, Samet JM, Devlin RB. 1997. Cytokine Production by Human Airway Epithelial Cells after Exposure to an Air Pollution Particle Is Metal-Dependent. *Toxicology and Applied Pharmacology*. 146(2):180-188.
[46] Gurgueira SA, Lawrence J, Coull B, Krishna Murthy GG, Gonzalez-Flecha B. 2002. Rapid increases in the steady-state concentration of reactive oxygen species in the lungs and heart after particulate air pollution inhalation. *Environmental Health Perspectives* 110(8): 749-765.
[47] Wilson MR, Lightbody JH, Donaldson K, Sles J, Stone V. 2002. Interactions between Ultrafine Particles and Transition Metals *in Vivo* and *in Vitro*. *Toxicology and Applied Pharmacology* 184(3): 172-179.
[48] Huang, Y.-CT, Ghio AJ, Stonehuerner J, McGee J, Carter JD, Grambow SC, and Devlin RB. 2003. The role of soluble components in ambient fine particles-induced changes in human lungs and blood. *Inhalation Toxicology*. 15:327-342.
[49] Chuang KJ, Chan CC, Su TC, Lin LY, Lee CT. 2007. Associations between particulate sulfate and organic carbon exposures and heart rate variability in patients with or at risk for cardiovascular diseases. *Journal of Occupational and Environmental Medicine* 49(6):610-617.
[50] Zanobetti A, Franklin M, Koutrakis P, Schwartz J. 2009. Fine particulate air pollution and its components in association with cause-specific emergency admissions. *Environmental Health* 8:58.

particulate matter was highest.[51] This study found additional evidence warning that the combination of metals in particles, a common occurrence, may increase their toxicity.

Arsenic exposure can occur through the dermal, oral, and inhalation routes. As a known carcinogen, inhalation of arsenic has been strongly associated with lung cancer.[31] Short-term inhalation can harm the gastrointestinal tract, cause nausea and diarrhea, and even adversely affect the nervous system. Long-term inhalation has been associated with irritation of the skin and mucous membranes. Exposure can lead to respiratory tract irritation, conjunctivitis, and damage nasal tissue.[52] Similar to effects of inhaling arsenic, arsenic in drinking water has also been linked to skin, bladder, lung, and liver cancer.[31] Long-term exposure through ingestion can result in anemia, lesions, liver, kidney, and nerve damage, and affect the digestive system.[53]

Beryllium is a known carcinogenic metal.[31] Inhaled beryllium has been found to increase the risk of lung cancer.[54,55] Breathing large amounts of beryllium compounds can damage the lungs and cause the lungs to resemble pneumonia with reddening and swelling. Long-term exposure may cause chronic beryllium disease. People with chronic beryllium disease may experience weakness, fatigue, difficulty

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[51] Franklin M, Koutrakis P, Schwartz J. 2008. The Role of Particle Composition on the Association Between PM2.5 and Mortality. *Epidemiology*. 19: 680-698.
[52] Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Medical Management Guidelines for Arsenic. Atlanta, GA: U.S. Department of Health and Human Services. Web link: http://www.atsdr.cdc.gov/mhmi/mmg168.html#bookmark02. [Accessed June 16, 2011].
[53] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological profile for Arsenic. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp2-c3.pdf [Accessed: 13 June 2011].
[54] Steenland K, Ward E. 1991. Lung cancer incidence among patients with beryllium disease: a cohort mortality study. *J Natl Cancer Inst* 83(19): 1380-1385.
[55] Ward E, Okun A, Ruder A, Fingerhut M, Steenland K. 1992. A mortality study of workers at seven beryllium processing plants. *Am J Ind Med* 22(6): 885-904.

breathing, anorexia, weight loss, and blueness of the hands and feet. The disease can lead to heart enlargement, heart disease, and even death.[56]

Cadmium is another known carcinogenic metal.[31] Exposure to airborne cadmium causes lung cancer, as the International Agency for Research on Cancer reaffirmed in 2009.[57] Prolonged inhalation of cadmium can also lead to gradual accumulation of the metal in the kidneys, resulting in kidney disease.[58]

Chromium occurs in three main forms, one of which, chromium (IV), is a known carcinogen that can increase the risk of lung cancer.[59,31] The metal primarily affects the respiratory system, although chromium (VI) can also impact the gastrointestinal, immunological, hematological, reproductive and developmental systems, particularly if ingested. Inhaling chromium (VI) can cause coughing and wheezing, shortness of breath, bronchitis, pneumonia, decreased lung function, and other respiratory conditions. In workers, inhaled chromium (VI) has been linked develop asthma development and asthma attacks.[59]

The most common health effects associated with lead exposure impact the nervous system and damage its functions. Lead may also cause joint weakness,

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[56] Agency for Toxic Substances and Disease Registry (ATSDR). 2002. Toxicological profile for Beryllium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp4-c3.pdf [Accessed: 13 June 2011].
[57] Straif K, Benbrahim-Tallaa L, Baan R, Grosse Y, Secretan B, El Ghissassi F, et al. 2009. A review of human carcinogens—Part C: metals, arsenic, dusts, and fibres. *Lancet Oncol* 10(5):453-454.
[58] Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological profile for Cadmium *(Draft for Public Comment)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp5-c3.pdf [Accessed: 13 June 2011].
[59] Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological profile for Chromium *(Draft for Public Comment)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp7-c3.pdf [Accessed: 13 June 2011].

anemia, and increased blood pressure.[60] Although lead is harmful to both adults and children, children are most susceptible to its effects. Lead can cause developmental disorders whose effects can persist beyond childhood.[61] Exposure can affect a child's physical and mental growth, resulting in slower mental development and lower levels of intelligence. Lead is also a probable carcinogen.[31]

Similar to lead, manganese mostly affects the nervous system. For example, adverse effects to hand-eye coordination, hand steadiness, and visual reaction time were observed in humans exposed to manganese.[62] High exposure levels may result in feelings of lethargy and weakness, psychological impacts, and tremors.

Compounds containing nickel have been determined to be carcinogenic.[31] A known health effect of nickel exposure is the increased risk of lung and nasal cancers from nickel dust.[63]

Selenium exposure can result in adversely affect the respiratory system by irritating mucous membranes and causing pneumonia, bronchitis, and pulmonary

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[60] Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp13-c3.pdf [Accessed: 14 June 2011].
[61] Agency for Toxic Substances and Disease Registry (ATSDR). 2007e. Public Health Statement for Lead. CAS#: 7439-92-1. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/phs13.html [Accessed: 16 June 2011].
[62] Agency for Toxic Substances and Disease Registry (ATSDR). 2008c. Toxicological profile for Manganese *(Draft for Public Comment)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp151-c3.pdf [Accessed: 13 June 2011].
[63] Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological profile for Nickel. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp15-c3.pdf [Accessed: 13 June 2011].

edema.[64] One selenium compound, selenium sulfide, is also considered to be a probable human carcinogen.[31]

h. Secondary Particles

Meeting the limits for toxic air emissions set under the Mercury and Air Toxics standard provides a crucial collateral benefit: reduction in secondary PM 2.5, especially sulfates and nitrates. Reductions to sulfur dioxide and nitrogen oxide emissions are anticipated to occur as a result of the actions undertaken to meet the requirements of this rule. The reductions will also decrease secondary particle formation. Measures that reduce acid gases will reduce sulfur dioxide and consequently, reduce the burden of sulfate particles across the nation. EPA projects that combined pollution control technologies to meet the limits on mercury will also reduce oxides of nitrogen. In addition, fuel switching and retirements are also expected to reduce nitrogen oxide emissions, and consequently nitrate particles. Sulfates formed from sulfur dioxide comprise the majority of fine particulate matter in much of the United States, especially during the summer months. Nitrogen oxides form nitrates, the third largest source of PM 2.5.[65] As discussed earlier, there is evidence showing that PM 2.5 causes cardiovascular harm and premature mortality, and is likely associated with respiratory disease. Additional studies suggest that long-term exposure to PM2.5 may lead to reproductive and developmental effects, as well as cancer, mutagenicity, and genotoxicity.[4]

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[64] Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological profile for Selenium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. Web link: http://www.atsdr.cdc.gov/ToxProfiles/tp92-c3.pdf [Accessed: 13 June 2011].

[65] U.S. Environmental Protection Agency (EPA). 2011. Regulatory Impact Analysis for proposed Air Toxics Rule, Office of Air Quality Planning and Standards, Research Triangle Park, NC. Web link: http://www.epa.gov/ttn/ecas/regdata/RIAs/ToxicsRuleRIA.pdf [Accessed 16 June 2011].

2. Millions of People Face Higher Risk

Many individuals face greater risk because of their age, health conditions, or rate of exposure to the pollutants. Individuals at greater risk include: infants, children and teenagers; seniors; pregnant women; individuals with asthma and other lung diseases; people with cardiovascular diseases; diabetics; low-income communities; and those who work or exercise outdoors.[4,39] The discussion below highlights special concerns for several of these groups.

Children are more vulnerable to the adverse health effects of acid gases (and to all air pollution) than adults. Children grow 80 percent of their lungs between birth and adolescence. During the early postnatal period these delicate, growing tissues are at greatest risk. Children also breathe more rapidly and tend to spend more time outdoors than adults, leading to higher pollutant exposures.[66]

Even before birth children confront increased risk. As noted earlier, fetuses, infants, and children face impaired neurological development and cognitive abilities, memory, language skills because of the toxic effects of methylmercury exposure. Dioxins and furans threaten their developing systems, including the nervous system, and these toxics and others may increase the risk of cancer in children. Furthermore, estimates for children may understate the risks from toxics because of limited monitoring, incomplete information on toxicity and use of models that do not consider the potential for increased risk in children.[66]

People with chronic diseases, including cardiovascular diseases, respiratory diseases and diabetes, face higher risk regardless of age. Current estimates of this group include:

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[66] American Academy of Pediatrics, Committee on Environmental Health. 2004. Ambient Air Pollution: Health Hazards to Children. *Pediatrics*; 114: 1699-1707. Reaffirmed in 2010.

- Asthma - 24.6 million people, including 7.0 million under age 18.[67]
- Cardiovascular diseases – 82.6 million people.[68]
- Diabetes – 25.8 million people.[69]
- Chronic Obstructive Pulmonary Disease (COPD)—12.1 million adults age 18 and older.[70]

As adults age, physiological process naturally decline. This places even healthy individuals advanced in age at risk from airborne pollutants. In addition, many adults also have one or more chronic diseases, increasing their susceptibility to the effects of toxic air emissions.[4]

Individuals with low incomes or that are members of racial and ethnic minorities bear a disproportionate burden of the health effects of air pollution. Since they are more likely to live close to industrial facilities and high traffic areas, low-income and minority populations are at much higher risk of exposure to the most harmful pollutants.[71,72] One study found that 68 percent of African Americans lived within 30 miles of a coal-fired power plant.[73] Another study of five power

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[67] American Lung Association. 2011. Trends in Asthma Morbidity and Mortality. Weblink: http://www.lungusa.org/finding-cures/our-research/trend-reports/asthma-trend-report.pdf.
[68] Roger VL, Go AS, Lloyd-Jones DM, et al. 2011. Heart disease and stroke statistics: 2011 update: a report from the American Heart Association. *Circulation.* 123(4):e18–e209
[69] Centers for Disease Control and Prevention. (CDC) 2011. National Diabetes Fact Sheet: National Estimates and General Information on Diabetes and Prediabetes in the United States, 2011. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.
[70] American Lung Association. 2010. Trends in COPD (Chronic Bronchitis and Emphysema): Morbidity and Mortality. Weblink: http://www.lungusa.org/finding-cures/our-research/trend-reports/copd-trend-report.pdf.
[71] Levy JI, Greco SL, Spengler JD. 2002. The importance of population susceptibility for air pollution risk assessment: a case study of power plants near Washington, DC. *Environmental Health Perspectives.* 110(12):1253-60.
[72] O'Neill MS, Jerrett M, Kawachi I, Levy JI, Cohen AJ, Gouveia N, et al. 2003. Health, Wealth, and Air Pollution: Advancing Theory and Methods. *Environmental Health Perspectives* 111:1861-1870.
[73] Georgia Coalition for the Peoples' Agenda, Black Leadership Forum, the Southern Organizing Committee for Economic and Social Justice and Clear the Air. 2002. *Air*

plants in the Washington, DC area found that African Americans and individuals without a high school education were among the groups hardest hit by pollution from the plants. Almost half of the risks for premature death due to power plant pollution-related exposures were borne by the 25 percent of the population without a high school education.[71]

B. The HAPs Emitted by EGUs are Associated with Adverse Environmental Effects

We strongly support EPA's assessment that Mercury and the other Hazardous Air Pollutants covered by this proposed regulation have adverse impacts on wildlife, including endangered species, and ecosystem health. The body of scientific evidence referenced in the proposed rule clearly supports the Agency's assessment, however it is important to note that there is more to the story. We offer a set of additional studies that demonstrate how much more serious, and widespread, the mercury contamination problem is in the U.S. Additionally, we provide brief mention of environmental impacts from some of the additional hazardous air pollutants covered by the proposed rule. New research presented here is intended to build on the scientific information accurately presented by EPA in this proposed rulemaking.

1. Mercury

Mercury is a highly toxic heavy metal that affects the function and development of the central nervous system in wildlife, resulting in a broad range of adverse impacts such as reproductive problems, behavioral abnormalities, and compromised immune systems.[74,75,76,77] Historically, scientists have focused on fish-

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of Injustice. Access at http://www.catf.us/resources/publications/files/Air_of_Injustice.pdf.

[74] Tan, S.W, J.C. Miller, and K.R. Mahaffey. 2009. "The endocrine effects of mercury in humans and wildlife." *Critical Reviews in Toxicology* 39(3):228-269.

[75] Hawley, D.M., K.K. Hallinger, D.A. Cristol. 2009. "Compromised immune competence in free-living tree swallows exposed to mercury." *Ecotoxicology* (2009) 18:499-503

eating wildlife as those most at risk of exposure to mercury. However, over the last few years has been a growing awareness among the scientific community that mercury is accumulating in far more habitats, and therefore far more species, than previously thought.[78,79,80] Scientists are also gaining a greater understanding about the impacts of high levels of mercury accumulation on the health of specific species. It has become clearer in recent years that significant exposure to mercury can actually lead to wildlife population declines.

In National Wildlife Federation's September, 2006 report *Poisoning Wildlife*, the full range of species at risk from mercury contamination was highlighted.[81] The report covered scientific data finding elevated levels of mercury in fish, aquatic birds, forest birds, mammals, reptiles, amphibians, and invertebrates, demonstrating that there is literally no corner of the food web untouched by mercury. Recent studies continue to show high levels of mercury accumulation in our environment. For example, a 2007 study that looked at mercury levels in four

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[76] Hallinger, K.K., D.A. Cristol. 2011. "The role of weather in mediating the effect of mercury exposure on reproductivie success in tree swallows." *Ecotoxicology*. Published online 5/8/11.
[77] Scheuhammer, A. M., M. W. Meyer, M.B. Sandheinrich, M.W. Murray. 2007. "Effects of Environmental Methylmercury on the Health of Wild Birds, Mammals, and Fish." *Ambio* Vol. 36, No. 1. p. 12
[78] Evers, David C. 2005. *Mercury Connections: The extent and effects of mercury pollution in northeastern North America*. BioDiversity Research Institute. Gorham, Maine. Online at : http://www.briloon.org/old_site/about/staff/documents/BRIMercury.pdf
[79] Wada, H., D. Yates, D. Evers, R. Taylor, W. Hopkins. 2010. "Tissue mercury concentrations and adrenocotical responses of female big brown bats near a contaminated river." *Ecotoxicology* 19: 1277-1284.
[80] Sleeman, J.M., D.A. Cristol, A.E. White, D.C. Evers, R.W. Gerhold. 2010. "Mercury Poisoning in a Free-Living Northern River Otter." *Journal of Wildlife Diseases* 46(3) 1035-1039.
[81] National Wildlife Federation. 2006. *Poisoning Wildlife: The Reality of Mercury Pollution*. Online at: www.nwf.org/mercury

turtle species from a Virginia river found the highest levels of mercury ever recorded in reptiles.[82]

New studies connecting high levels of mercury with adverse impacts on wildlife populations are perhaps of greatest concern. It is clear that mercury levels in the environment have increased to levels posing risks to ecological and human health.

In a recent study of the Common loon in Maine and New Hampshire, adverse impacts on behavior, physiology, reproductive success, and survival were associated with high mercury levels. Specifically, higher levels of mercury lead to reduced number of chicks fledged per year. The study attributed high mercury levels as the driving stressor for declines in local breeding populations of loons in these areas.[83] Similar impacts were seen in a study of Avocet & Black-necked Stilt, where higher mercury levels were documented in dead chicks than in randomly selected live chicks of similar age.[84]

A recent study of American Kestrals also found that mercury bioavailability could have population level impacts. The research found that high levels of mercury lead to marked decrease in egg production, incubation performance, number of eggs hatched, and number successful fledglings. In cases where mercury levels were highest, total fledgling failure was observed.[85]

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[82] Bergeron, Christine M. et al. 2007. "Influence of Feeding Ecology on Blood Mercury Concentrations in Four Species of Turtles." *Environmental Toxicology and Chemistry*, Vol. 26. No. 8. p. 1733-1741.
[83] Evers, David C. et al. 2008. "Adverse Effects from Environmental mercury loads on breeding common loons." *Ecotoxicology* 17:69-81.
[84] Ackerman, J.T., J.Y. Takekawa, C.A. Eagles-Smith, S.A. Iverson. 2008. "Mercury contamination and effects on survival of American avocet and black-necked stilt chicks in San Francisco Bay. *Ecotoxicology* (2008) 17:103-116.
[85] Albers, Peter H. et al. 2007. "Effects of Methylmercury on Reproduction in American Kestrals." *Environmental Toxicology and Chemistry* Vol 26, No. 9, p.1856-1866.

Mercury contamination has also recently been linked to population declines for songbirds and species that forage in wetlands.[86] New research has lead to greater understanding of mercury level thresholds where impacts on nesting success can be predicted. Specifically, species including the Traill's Flycatcher, Yellow-throated Vireo, Seaside Sparrow, Red-winged Blackbird, Eastern Wood Pewee, Yellow Palm Warbler, Indigo Bunting, and Nelson's Sparrow have all been found with mercury levels above this threshold, indicating they are at risk of reduced nesting success.[87] Additionally, species including Carolina Wren, House Wren, and Song Sparrow in mercury-contaminated habitats have been found to have a lower diversity of song note types and lower tonal frequencies than those in areas with lower mercury levels.[88] This kind of behavioral abnormality can adversely affect bird's ability to perform functions critical to survival and reproduction.

In addition to birds, a recent study found adverse effects of elevated mercury levels in Salamanders. Specifically, high levels of mercury were linked to reduced speed and responsiveness, and as well as inability to successfully execute tasks critical for survival such as hunting.[89]

2. Acid Gases

We strongly support the proposed regulation's reduction of acid gas emissions, given the devastating impact that acid rain has on our forests, lakes, and

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[86] Edmonds, Samuel T. et al. 2010. "Geographic and Seasonal Variation in Mercury Exposure of the Declining Rusty Blackbird." *The Condor* 112(4): 789-799.
[87] Evers et al. 2011 (DRAFT). Hidden Risk – Mercury in Terrestrial Ecosystems. BioDiversity Research Institute . Gorham, Maine. p.11. Draft report, due to be released August 2011. Online at: www.briloon.org
[88] Hallinger, K.K. 2010. "Birdsong Differs Between Mercury-Polluted and Reference Sites" *The Auk* 127(1):156-161.
[89] Burke, J.N., C.M. Bergeron, B.D. Todd, W.A. Hopkins. 2010. "Effects of mercury on behavior and performance of northern two-lined salamanders. *Environmental Pollution* 158(2010):3546-3551

streams.[90] Acidified ecosystems leach calcium and magnesium from soil, which reduces the availability of invertebrates, a critical prey source for many species, and adversely impacts birds breeding success.[91] Acidification has also been linked to fish[92] and bird[93] species declines, and a range of impacts on other wildlife.[94]

It is also important to note that acidified ecosystems also exacerbate mercury contamination problems. Studies have shown that highly acidic environments facilitate greater methylation of mercury, which leads to more significant uptake into the food web.[95,96,97]

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[90] Driscoll, Charles T et al. 2001. *Acid Rain Revisited*. Hubbard Brook Research Foundation. Science Links Publication. Vol. 1 No. 1. Online at: http://www.hubbardbrook.org/6-12_education/Glossary/AcidRain.pdf

[91] Likens, G.E., C.T. Driscoll, and D.C.Buso. 1996. "Long term effects of acid rain: response and recovery of a forest ecosystem." *Science* 272:2444-246.

[92] Dana R. Warren, Gene E. Likens, Donald C. Buso and Clifford E. Kraft. "Status and Distribution of Fish in an Acid-Impacted Watershed of the Northeastern United States (Hubbard Brook, NH)." *Northeastern Naturalist* Vol. 15, No. 3 (2008), p. 375-390.

[93] Ralph S. Hames, Kenneth V. Rosenberg, James D. Lowe, Sara E. Barker and André A. Dhondt. "Adverse Effects of Acid Rain on the Distribution of the Wood Thrush Hylocichla mustelina in North America." *Proceedings of the National Academy of Sciences of the United States of America*. Vol. 99, No. 17 (Aug. 20, 2002), p. 11235-11240.

[94] R. Kent Schreiber and James R. Newman. "Acid Precipitation Effects on Forest Habitats: Implications for Wildlife." *Conservation Biology* Vol. 2, No. 3 (Sep., 1988), pp. 249-259.

[95] Driscoll, Charles T., et al. 2007. "Mercury Contamination in Forest and Freshwater Ecosystems in the Northeastern United States." *Bioscience* Vol. 57 No. 1. p. 17.

[96] Gilmour, Cynthia. "The Effect of the Sulfur Cycle on Methylmercury Production." *2003 Everglades Consolidated Report*. Appendix 2B-2: Status Report on the Effect of Water Quantity and Quality on Methylmercury Production. A-2B-2-1. Online at: http://www.dep.state.fl.us/water/wqssp/everglades/consol_rpt.htm

[97] Cristol, Daniel A. et al. 2008. "The Movement of Aquatic Mercury Through Terrestrial Food Webs." *Science* Vol. 320. p. 335

3. Other Hazardous Air Pollutants

This proposed regulation seeks to reduce a large range of toxic emissions, many of which we know have devastating impacts on wildlife health. A recent publication from the Society of Environmental Toxicology and Chemistry (SETAC)[98] provides a comprehensive look at the impacts of toxic exposure to a variety of wildlife.[99] A selection of key findings from this research and others are summarized in this subsection.

Arsenic has long been recognized for its toxic properties. Studies have linked arsenic exposure, even at very low doses, with severely adverse impacts on cell growth.[100] At higher doses, arsenic exposure can lead to cancer and death.[101] Arsenic in soils has also been linked reduced root growth[102] and loss of vegetative

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[98] http://www.setac.org/node/1

[99] W. Nelson Beyer, James P. Meador, eds. *Environmental Contaminants in Biota: Interpreting Tissue Concentrations*. 2011. CRC Press, Boca Raton, FL. Online at: http://www.amazon.com/Environmental-Contaminants-Biota-Interpreting-Concentrations/dp/1420084054/ref=sr_1_1?ie=UTF8&qid=1312391692&sr=8-1

[100] Fritzie T. Celino, Sonoko Yamaguchi, Chiemi Miura, Takeshi Miura. "Arsenic inhibits *in vitro* spermatogenesis and induces germ cell apoptosis in Japanese eel (*Anguilla japonica*)." *Reproduction* August 1, 2009. 138 279-287. Online at: www.reproduction-online.org/content/138/2/279.abstract?related-urls=yes&legid=reprod;138/2/279

[101] Gomez-Caminero, P. Howe, M. Hughes, E. Kenyon, D.R. Lewis, M. Moore, J. Ng, and by A. Aitio and G. Becking. "Environmental Health Criteria 224: Arsenic and Arsenic Compounds." Published under the joint sponsorship of the United Nations Environment Programme, the International Labour Organization, and the World Health Organization, and produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals, 2001. Online at: http://whqlibdoc.who.int/ehc/WHO_EHC_224.pdf

[102] Kapustka, L. A., Lipton, J., Galbraith, H., Cacela, D. and Lejeune, K. 1995. "Metal and arsenic impacts to soils, vegetation communities and wildlife habitat in southwest montana uplands contaminated by smelter emissions: II. Laboratory phytotoxicity studies." *Environmental Toxicology and Chemistry* 14: 1905–1912. Online at: http://onlinelibrary.wiley.com/doi/10.1002/etc.5620141112/abstract

cover, which was also accompanied by a reduction in capacity to support indigenous wildlife populations.[103]

Dioxin is a highly toxic compound that is linked to cancer and adverse reproductive impacts in humans. Scientists have also found that high levels of dioxin in fish (rainbow trout and minnows) have severe effects, including reduced reproductive success, slower growth rates, abnormal physiology, lesions, and mortality.[104]

Studies have found that small mammals with high levels of cadmium had adverse health effects that affect survival and fitness, and also experienced kidney damage.[105]

High levels of lead in mammals and birds have been linked to neurotoxic effects, reproductive problems, nephrotoxic and hematological changes, loss of body weight, kidney and brain damage, and death.[106,107]

High levels of selenium have been found to have extremely toxic effects on wildlife. Specifically, studies of birds with high selenium have found reduced egg hatchability, deformities in embryos/chicks, and other reproductive problems.[108,109]

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[103] Galbraith, H.; LeJeune, K.; Lipton, J. "Metal and arsenic impacts to soils, vegetation communities and wildlife habitat in southwest Montana uplands contaminated by smelter emissions: I Field evaluation." Environmental Toxicology and Chemistry, 14, 1895-1903. 1995. Online at: http://onlinelibrary.wiley.com/doi/10.1002/etc.5620141111/abstract

[104] Beyer & Meador, 2011. Chapter 3. "Dioxins, PCBs, and PBDEs in Aquatic Organisms." Richard J. Wenning, Linda Martello, and Anne Prusak-Daniel. p. 103 – 168.

[105] Beyer & Meador, 2011. Chapter 19. "Cadmium in Small Mammals." John. A. Cooke. p. 627-644.

[106] Beyer & Meador, 2011. Chapter 17. "Lead in Mammals." Wei-Chun Ma. p. 595-608.

[107] Beyer & Meador, 2011. Chapter 16. "Lead in Birds." J. Christian Franson and Deborah J. Pain. p. 563-594.

[108] Beyer & Meador, 2011. Chapter 21, "Selenium in Birds". Harry M. Ohlendorf and Gary H. Heinz. 669-702

Similar studies of fish linked high levels of selenium with reproductive failure and mortality.[110]

4. Reducing Mercury Emissions Will Benefit Local Environments

Recent research has confirmed that local sources of mercury emissions contribute the most to local contamination problems. In fact, a 2007 study confirmed the presence of mercury "hot spots" downwind from coal-fired power plants.[111] It is clear reducing mercury emissions from these stacks will greatly benefit downwind waters.

The 2007 hotspot study builds on previous studies confirming that coal-fired power plants within the United States are the primary source of mercury to the Great Lakes and the Chesapeake Bay.[112,113] It is also consistent with a major mercury deposition study conducted by EPA and the University of Michigan that concluded that approximately 70 percent of mercury wet deposition resulted from local fossil fuel emissions in the region.[114]

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[109] Fred L. Paveglio, Christine M. Bunck and Gary H. Heinz. "Selenium and Boron in Aquatic Birds from Central California." *The Journal of Wildlife Management* Vol. 56, No. 1 (Jan., 1992), pp. 31-42 Online at: http://www.jstor.org/pss/3808788
[110] Beyer & Meador, 2011. Chapter 5. "Selenium Accumulation and Toxicity in Freshwater Fishes." David K. DeForest and William J. Adams. P. 193-230.
[111] Evers, David C. et al. 2007. Biological Mercury Hotspots in the Northeastern United States and Southeastern Canada, Bioscience. Vol. 57 No. 1. p. 29
[112] M. Cohen, et al., *Modeling the Atmospheric Transport and Deposition of Mercury to the Great Lakes*, Environmental Research 95, 2004 (247-265).
[113] Mark Cohen, NOAA, *Modeling the Fate and Transport of Atmospheric Mercury in the Chesapeake Bay Region* (May 17, 2004), slide 34. Online at: http://www.arl.noaa.gov/data/web/reports/cohen/20_Ches_Bay_talk.pdf (visited November 20, 2006).
[114] Keeler, G., *et al.* 2006. "Sources of Mercury Wet Deposition in Eastern Ohio, USA," *Environmental Science & Technology*.

5. Economic Benefits of Reducing Environmental Effects of Air Toxics

Numerous studies have indicated that substantial economic benefits would be achieved by reducing environmental exposure to mercury and other HAP. Some of the findings from these studies are listed below:

- The Environmental Protection Agency underestimated by $10.5 billion the annual net benefits of a proposal to set standards for mercury and other air toxics from power plants, according to a Navigant Consulting Inc. report released July 14, 2011.[115] In total, the annual net benefits of the rule would be $52.5 billion to $139.5 billion, said the report, which was sponsored by the Clean Air Council and other organizations.
- The Minnesota Pollution Control Agency and the Legislative Commission on Minnesota Resources estimate the economic benefits of reduced mercury pollution at $212 million. This is based on a 50 percent reduction in regional Midwest emissions, which is projected to reduce mercury deposition in Minnesota by approximately 12 percent.[116] This study clearly understates the total economic benefits of reduced mercury pollution, because it takes into account only Minnesota residents' willingness to pay, and not economic benefits due to factors such as improved public health.
- Researchers from the Harvard School of Public Health estimate the health-related economic impact of mercury pollution at over $5.5 billion. The study estimates the costs of lost productivity due to reduced IQs resulting from mercury pollution at $1.625 billion, the costs of excess mental retardation cases from mercury emissions at approximately $361 million, and the costs of

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[115] *Why EPA's Mercury and Air Toxics Rule is Good for the Economy and America's Workforce*, is available at http://www.cleanair.org/sites/default/files/MercuryRuleEconomicsReport.pdf.

[116] Daniel A. Hagen, et al, *Economic Benefits of Reducing Mercury Deposition in Minnesota* (June 1999), Minnesota Pollution Control Agency report, available at http://www.pca.state.mn.us/index.php/component/option,com_docman/task,doc_view/gid,313.

excess cardiovascular disease from mercury emissions at approximately $3.54 billion.[117]

- In Minnesota, a long-term decline in angling of just 25 percent due to the lake- and stream-fouling effects of mercury could cost the state's economy $706 million per year and jeopardize a portion of the estimated 25,955 jobs in Minnesota that depend on fishing.[118]
- In Wisconsin, a long-term decline in angling of just 25 percent due to the lake- and stream-fouling effects of mercury could cost the state's economy $516 million per year and jeopardize a portion of the estimated 21,459 jobs in Wisconsin that depend on fishing.[119]

Based on these and other similar studies, we urge you to recognize that the pollution emitted by EGUs results in a cost that is being unfairly borne by others. Reducing and in some cases eliminating pollution is therefore an appropriate and necessary shift of the cost back to where it belongs—on the polluting source and unit itself. In addition, the cost-benefit analysis provided by EPA is welcome but insufficient. It includes an important focus on human health but fails to include sufficient assessment and valuation of impacts on wildlife and ecosystems. Not only is it the duty of EPA to prepare such estimates for alternative sources as part of the Biological Assessment EPA must bring to its consultation with the wildlife agencies under the ESA, but the Clean Air Act also requires EPA in general to address the needs of wildlife and ecosystems, in setting secondary standards, for example. Costs and benefits of pollution reductions for wildlife are harder to assess since more research is needed on levels of pollutants in many wildlife species and in assessing

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[117] Paul R. Epstein, et al, *Full cost accounting for the life cycle of coal*, ANNALS OF THE NEW YORK ACADEMY OF SCIENCES, 1219:73-98 (2011), available at http://onlinelibrary.wiley.com/doi/10.1111/j.1749-6632.2010.05890.x/full.
[118] Minnesota Environmental Partnership, Mercury Pollution Threatens Minnesota's Fishing Industry, Press Release, Aug. 17, 2004, available at http://www.mepartnership.org/mep_newsroom.asp?new_id=787.
[119] Clean Wisconsin, 25% Drop in Wisconsin Fishing Due to Mercury Would Cost $516M Annually, Press Release, Aug. 16, 2004, available at http://www.cleanwisconsin.com/index.php?module=cms&page=323.

the full range of the pollutants' impacts on ecosystems. But there has also been much progress in such research, and in recognition of the economic role that ecosystems play. We therefore urge that in this instance, and indeed in all instances where cost-benefit analyses of rules and regulations are involved, such analysis be broadened to include valuation of impacts on wildlife and ecosystems, however incomplete it may be.

6. Duty to Formally Consult with the Fish and Wildlife Service and the National Marine Fisheries Service (NMFS) Regarding Impacts on Endangered and Threatened Species, and the Level at Which Standards Must Be Set to Protect Them

Since endangered, threatened and other protected species such as the Indiana bat, Florida panther, bald eagle, and polar bear have been documented with high levels of mercury, and since the livelihood and reproductive success of these creatures can be affected by this and other hazardous pollutants, EPA is required to consult with the appropriate agencies (FWS and NMFS) to determine the levels at which emissions need to be set not only to ensure that the levels allowed by EPA will not be likely to jeopardize the continued existence and recovery in the wild of these species, as required under Section 7(a)(2) but also to meet EPA's Section 7(a)(1) duty to determine how EPA can use its authority to enhance the recovery of these listed species. In addition, the funding for the research that is needed in this area should come from operating and proposed fossil power plant operators.

C. EPA's new technical analyses reaffirm that it is appropriate and necessary to regulate U.S. Hazardous Air Pollutants ("HAP") from coal- and oil-fired electric utility steam generating units ("EGUs")

EPA's determination in 2000 that it was appropriate and necessary to regulate HAP from U.S. EGU required that the Agency set toxic air pollution standards for these facilities (see *infra*, chapter II). Nonetheless, EPA has conducted new and extensive technical analyses prior to publication of the 2011 proposed rule. These analyses, although not required, reaffirm the 2000 finding that regulation of toxic

air pollution from EGUs under section 112 is appropriate and necessary. Additionally, the new technical analyses incorporate present and future projections of HAP emissions, modern air pollution modeling tools, current control technologies, and updated pollutant emissions regulations. The results clearly demonstrate that not only was the 2000 decision justified at the time, but that 11 years later, the science shows that it is even more critical to regulate HAP emissions from U.S. EGUs.

1. HAP Emissions from U.S. EGUs Continue to Pose Health and Environment Hazards

In the 2011 proposal, three distinct quantitative and qualitative technical analyses were conducted by EPA that determined HAP emissions from U.S. EGUs contributed to the risk of adverse effects to public health or the environment. These were: (i) EPA's national-scale mercury risk assessment; (ii) EPA's case studies of cancer and non-cancer inhalation risks for non-Hg HAP; and (iii) EPA's qualitative assessment of potential environmental risks from deposition of HAP. The results from all three risk analyses conducted indicate that HAP from U.S. EGUs pose hazards to public health and the environment.

a. EPA's National-Scale Mercury ("Hg") Risk Assessment Demonstrates that U.S. EGU Hg Emissions Pose a Hazard to Public Health

First, EPA conducted a comprehensive technical analysis that quantified the potential risk to public health posed by U.S. EGU Hg emissions. The results of the assessment clearly indicate that Hg emitted by U.S. EGUs currently poses a hazard to public health and will continue to do so in the future. This assessment analyzes human exposure to methylmercury ("MeHg") through ingestion of fish from U.S. freshwater lakes and streams and does not quantify adverse effects from the ingestion of MeHg in seafood. Were EPA to take into account consumption of seafood, MeHg consumption in the U.S. is of even greater concern. A recent study focused on estuarine and marine fish consumption in the U.S. finds that seafood

significantly contributes to national exposure to MeHg.[120] This study considers differences in fish intake and geographic variability of seafood. The results indicate that seafood consumption under certain conditions can cause exposures to women of child-bearing age above EPA's reference dose (RfD) for MeHg.[121] Subpopulations with heavy intakes of regional seafood may also be at risk. For example, one study on recreational anglers finds that these subpopulations have high levels of exposure to MeHg, which the study largely attributed to recreationally caught seafood.[122] Results from a different study indicate that women of child-bearing age living in coastal areas are at considerably higher risk of having blood Hg concentrations exceeding acceptable health-based levels due to higher consumption of fish and shellfish.[123] Although a much smaller effect on seafood MeHg levels is anticipated from this rule compared to that in freshwater fish, emissions from U.S. EGUs nevertheless contribute to the global problem of marine MeHg bioaccumulation. Ingestion of seafood could further increase the impact of Hg emissions from EGUs on public health beyond that estimated from an analysis based exclusively on consumption of freshwater fish.

EPA's determination that Hg emissions pose a risk to public health is based on a MeHg reference dose (RfD) of 0.1 μg/kg per day. 76 Fed. Reg. at 25,000. The Rfd for MeHg is the daily amount of MeHg ingestion expected not to produce adverse health effects to the most sensitive subpopulations over a lifetime. The

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[120] Elsie M. Sunderland, *Mercury Exposure from Domestic and Imported Estuarine and Marine Fish in the U.S. Seafood Market*, 115 Envtl. Health Persp. 239 (2007), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1817718/.
[121] *Id.* at 241.
[122] Rebecca A. Lincoln et al., *Fish Consumption and Mercury Exposure among Louisiana Recreational Anglers*, 119 Envtl. Health Persp. 248-249 (2011), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3040613/.
[123] Kathryn R. Mahaffey et al., *Adult Women's Blood Mercury Concentrations Vary Regionally in the United States: Association with Patterns of Fish Consumption (NHANES 1999–2004)*, 117 Envtl. Health Persp. 51 (2009), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2627864/.

utility industry has argued that this RfD is too conservative.[124] Rather than being too conservative, this RfD is based on sound science. Further, Section 112 of the Clean Air Act acknowledges the particular danger posed by the congressionally-listed HAPs and takes an intentionally conservative approach to protecting human health. For example, when Congress passed the Clean Air Amendments of 1990, it shifted the burden of proving a substance's health hazard from those who support regulation to those that oppose regulation. See Section 112(b)(3) (requiring those who wish to remove a substance from the congressionally-created list of HAPs to provide "adequate data . . . [showing] the substance may not reasonably be anticipated to cause any adverse effects to human health or adverse environmental effects"). Given the overall emphasis on protecting human health, if faced with two alternatives methods of determining RfD, it is reasonable for the Agency to choose the method that is more conservative with respect to human health. Thus, EPA has applied an appropriate RfD in its analysis based Faroe Islands study, a decison supported by the findings of the National Academy of Sciences' Study on Mercury. 76 Fed. Reg. at 25,000.

In the 2000 determination, some utility groups took issue with EPA's reliance on a Faroe Islands study to determine a proper RfD.[125] This industry argument was largely based on the fact that (1) Faroe Islanders were exposed to high levels of polychlorinated biphenyl in addition to mercury and (2) the diet of Faroe Islanders differed from that of Americans.[126] However, this argument fails to acknowledge that the findings of the Faroe Island study were consistent with a smaller study conducted in New Zealand (0.1 μg/kg-day) for which neither of these issues was present. 76 Fed. Reg. at 25,000. Further, analyses done since 2000 integrating data from both the Faroe Island and New Zealand studies with a third study conducted

[124] Comments of Utility Air Regulatory Group, Docket ID No. OAR-2002-0056, at 16-18 (June 29, 2004).
[125] *Id.*
[126] *Id.*

in the Seychelles demonstrate a significant relationship between prenatal MeHg exposure and neurobehavioral deficits.[127]

Since the 2000 Finding, additional studies from Poland and the United States support the conclusion of the New Zealand, Faroe Island, and Seychelles studies, and find that there is a negative correlation between maternal mercury levels and neurological development.[128] These more recent studies, also find a clear associations between maternal blood Hg levels and delayed child development using new cohorts based on urban populations.

Finally, the RfD applied by EPA in this assessment is based on neurobehavioral test results. Other potential health impacts of prenatal mercury exposure have been identified. For example, an association between cardiovascular effects and MeHg exposure has been reported. A recent study finds significant associations between mercury exposure and indicators of cardiovascular disease.[129] Additionally, the potential effects of co-pollutants, those derived from exposures to pollutant mixtures, related to MeHg are ignored in the Agency's assessment. One recent study finds that such an omission may lead to additional health effect associated with MeHg exposure being overlooked.[130] This study identifies health

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[127] Daniel A. Axelrad, *Dose-Response Relationship of Prenatal Mercury Exposure and IQ: An Integrative Analysis of Epidemiologic Data*, 115 Envtl. Health Persp. 609 (2007), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1852694/.
[128] See Wieslaw Jedrychowski et al., *Effects of Prenatal Exposure to Mercury on Cognitive and Psychomotor Function in One-Year-Old Infants: Epidemiologic Cohort Study in Poland*, 16 Annals of Epidemiology 439 (2006), abstract available at http://www.mendeley.com/research/effects-prenatal-exposure-mercury-cognitive-psychomotor-function-oneyearold-infants-epidemiologic-cohort-study-poland/; S.A. Lederman et al., *Relation Between Cord Blood Mercury Levels and Early Child Development in a World Trade Center Cohort*, 116 Envtl. Health Persp. 1085 (2008), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2516590/.
[129] Anna L. Choi et al., *Methylmercury Exposure and Adverse Cardiovascular Effects in Faroese Whaling Men*, 117 Envtl. Health Persp. 367 (2009), available at http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2661905/.
[130] Takasi Yorifuji et al., *Parental Exposure to lead and cognitive deficit in 7- and 14-Year-Old Children in Presence of Concomitant Exposure to Similar Molar Concentration of Methylmercury*, 33 Neurotoxicology & Teratology 205 (2011),

effects associated with prenatal lead exposure when simultaneously exposed to MeHg.

EPA's national-scale assessment unequivocally identifies public health risks associated with Hg emissions from U.S. EGUs. The assessment results indicate that:

- EGU-attributable MeHg poses a hazard to public health at 28 percent of watersheds analyzed when considering all sources of Hg deposition. 76 Fed. Reg. at 25,010.
- Hg deposition attributable to U.S. EGUs alone poses a health risk at 12 percent of the watersheds analyzed without considering any other Hg source. *Id.*
- The contribution of U.S. EGUs to total Hg deposition may be greater than 10 percent at hundreds of watersheds. *Id.* at 25,009.

Additionally, the quantitative and qualitative sensitivity analyses completed by EPA for the most significant uncertainties in the analysis indicate that these uncertainties should not alter the Agency's conclusions. *Id.* at 25,011. EPA further acknowledges that limitations in the availability of fish tissue MeHg data could be leading to a substantial underestimation of the number of watersheds where populations are at risk of exposure to EGU-attributable MeHg. Thus, the Agency reasonably determined that mercury emissions pose a public health hazard, and regulation of EGUs is appropriate. EPA has correctly requested peer-review of national-scale risk analysis. The Agency will consider the results of the peer review prior to the final rule publication and make these available along with the Agency's response.

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abstract available at
http://www.sciencedirect.com/science/article/pii/S0892036210001686.

b. EPA's Case Studies For Non-Hg HAP Demonstrate That Non-Hg HAP from U.S. EGUs Pose a Hazard to Public Health

Although the risk to public health and the environment posed by Hg is sufficient to require regulation of HAP emissions from EGUs (see chapter 2, *infra*), EPA's risk assessment for non-Hg HAP demonstrates additional potential public health impacts and clearly calls for regulation. EPA conducted 16 test cases quantifying the health risk from chronic inhalation of non-Hg HAP from EGUs. Over 40 percent of the case studies conducted by EPA to quantify health hazards associated with the inhalation of non-Hg HAP indicated a cancer risk greater than or equal to the one in one million threshold level threshold required to delist a source as a category regulated under section 112 of the Clean Air Act. 76 Fed. Reg. at 25,011; *see also* Section 112(c)(9)(B) (indicates that "no source in the category . . . emits [carcinogenic] air pollutants in quantities which may cause a lifetime risk of cancer greater than one in one million to the individual in the population who is most exposed to emissions of such pollutants from the source."). The case study examining cancer risk from an oil-fired EGU indicated that the greatest cancer risk estimate quantified in the assessment, ten in one million, is associated with this source. 76 Fed. Reg. at 25,012. This reaffirms the need to regulate HAP emitted by both coal- and oil-fired EGUs.

In addition to other metallic HAP, there are several acid gases emitted by EGUs that also support regulation which were not included in the test cases. Studies of these acid gases were not included due to uncertainties in their emission rates. Potential overlapping impacts from different EGUs and other pollutant sources were also not quantified. All of these additional factors likely compound the cancer risks estimated in the case studies. We agree with EPA's decision to only peer-review the speciation of chromium and nickel in the analysis of the health risks posed by non-Hg EGU emissions. The AERMOD modeling system methodology applied in EPA's non-Hg HAP chronic inhalation test cases is well established and has undergone numerous evaluations. For example, one recent

comparative study finds that AERMOD produces the most reliable exposure risk simulation results among four different common exposure assessment methods.[131]

c. EPA's Qualitative Assessment of Potential Environmental HAP Impacts Indicates that HAP Emissions from U.S. EGUs Pose a Hazard to the Environment

When it made the 2000 Finding, EPA included evidence of adverse effects of mercury on the environment, which has been further supported by newer studies. Several of these newer studies are included in a special issue published by the journal *Ecotoxicology* in 2008 devoted to the effects of MeHg on wildlife.[132] Although EPA has not quantified the potential impacts of HAP from U.S. EGUs on the environment, a qualitative assessment conducted by the Agency reviewed existing literature reporting effects of Hg on fish and wildlife and acid gas contribution to ecosystem acidification. The potential adverse environmental effects associated with HAP are well documented and have been previously described in section (B) of this chapter. This qualitative assessment reaffirms EPA's determination that it is appropriate and necessary to regulate HAP emissions from EGUs.

2. EPA's Analyses Demonstrate that EGUs Remain the Largest Source of Hg, Hydrogen Chloride ("HCl"), Hydrogen Fluoride ("HF"), and Selenium, ("Se") in the U.S., as Well as a Major Source of Hydrogen Cyanide ("HCN") and Other Metallic HAP

The technical analyses conducted by EPA demonstrate that EGUs remain the largest source of Hg in the United States, accounting for approximately half of U.S. anthropogenic Hg emissions. 76 Fed. Reg. at 25,002. Hg emissions from EGUs are

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[131] Bin Zou, *How should environmental exposure risk be assessed? A comparison of four methods for exposure assessment of air pollutions*, 166 Envtl. Monitoring & Assessment. 166 (2010), abstract available at http://www.springerlink.com/content/a68l242m75215377/.

[132] Special Issue on Effects of Methyl Mercury on Wildlife, 17 Ecotoxicology 67–171 (2008), available at http://www.springerlink.com/content/vtj02mn13516/?p=8f4430c82b2e48c3af1dbabf5799fdb6&pi=2

projected to remain relatively unchanged through 2016 and then be over six times larger than those from the second largest contributing source. *Id.* Additionally, the significant fractions of oxidized and particulate Hg in Hg emissions from EGUs make these emissions more relevant to local and regional deposition than natural emissions comprised of elemental Hg. In 2005, EGUs accounted for 82 percent of HCl emissions, 62 percent of HF emissions, 8 percent of HCN emissions, and 13 to 83 percent of several non-Hg metallic HAP emissions in the U.S. *Id.* at 25,005.

a. EPA's National-Scale Hg Risk Assessment Demonstrates that EGUs Can Significantly Contribute to Hg Deposition

EPA's national-scale Hg risk assessment demonstrates that U.S. EGUs can significantly contribute to watershed Hg deposition. High variability in the contribution of U.S. EGUs to total Hg deposition is evident from the analysis, *id.* at 25,008. EPA's modeling results indicate that the fraction of total Hg deposition attributable to EGUs is greater than 10 percent at hundreds of watersheds., *id.* at 25,009. As previously discussed, the Hg deposition attributable to U.S. EGUs alone may endanger sensitive populations near many of these watersheds. Thus, there are many areas of the nation for which EGUs are a significant contributor to potential Hg hazards to public health and the environment.

b. EPA's Local Hg Deposition Analysis Demonstrates that Areas Close to EGUs are at Greater Risk for Adverse Public Health and Environmental Effects

EPA has also demonstrated that deposition of Hg emitted by EGUs can be significantly larger at locations close to emission sources. The Agency's assessment of potential for deposition "hotspots" shows that Hg deposition near EGUs can be three times as large as the regional average. *Id.* at 25,013. This excess Hg deposition would substantially increase the health and environmental risks associated with emissions at these sites. Furthermore, the methodology applied by EPA to quantify near-source Hg deposition is conservative. In EPA's analysis, the average local deposition is estimated from the area within 50 km of the EGU source.

This method averages local Hg deposition across a large area (over 7500 km2). Maximum excess local Hg deposition may be significantly underestimated by averaging high deposition sites downwind of an EGU in the direction of prevailing winds with lower excess deposition at locations close to but frequently upwind of the facility. A more rigorous alternative approach would be to identify potential "hotspots" from the modeled Hg deposition at individual grid cells within the modeling domain. For this technical analysis, the Community Multiscale Air Quality model used by EPA estimates Hg deposition individually for 144 km2 extensions of land corresponding to the 12 km model resolution selected.[133] The use of individual 144 km¬2 grid cells to quantify local deposition could increase the excesses Hg deposition at these locations significantly and place them at even greater risk of adverse health and environmental effects of HAP from U.S. EGUs. Though this alternative methodology might indicate the likelihood of much higher concentrations, EPA's methodology nonetheless quite clearly demonstrates that excess Hg deposition occurs in the vicinity of EGUs and is especially significant around the largest Hg emitters.

3. EPA's Analysis of Control Technologies for EGU HAP Demonstrates that Significant Emissions Reductions Can be Achieved with Available Controls

In its analysis, EPA identified the current control technologies available for HAP from U.S. EGUs and estimated the controls' expected impact on national total and category-specific emissions. The Agency's analysis identifies multiple available control technologies that would enable EGUs to comply with regulations, including electrostatic precipitators, fabric filters, flue gas desulfurization, activated carbon injection, and dry sorbent injection. Furthermore, significant reductions to Hg emissions may already be occurring at EGUs that have installed controls intended for other pollutants, such as particulate matter or sulfur oxides. 76 Fed. Reg. at 25,017. Available control technologies for metal HAP and acid gases were also

[133] Regulatory Impact Analysis of the Proposed Toxics Rule, Docket ID No. OAR-2011-0044, at 3-2 (March, 2011).

identified by EPA. As for Hg, the analysis finds that effective control of non-Hg HAP may be achieved as a co-benefit of particulate matter and sulfur oxides controls.

EPA's emissions projections clearly show that vast reductions to emitted HAP would result from this rule. Compliance with the rule is estimated to result in 79 and 91 percent reductions to U.S. EGU Hg and hydrochloric acid respectively. The reductions are also equivalent to 36 and 49 percent of national anthropogenic Hg and hydrochloric acid emissions respectively. The reduction in metallic HAP is projected to equal approximately 430 tons per year. These great reductions to U.S. HAP expected to result from this rule incontestably demonstrate that the proposed rule will produce effective results.

4. EPA's New Technical Analysis Provides Compelling Evidence that Demonstrates it is Appropriate and Necessary to Regulate HAP from U.S. EGUs

We commend EPA on the extensive technical analyses undertaken by the Agency prior to publication of this proposed rule. The science behind EPA's new technical analyses is comprehensive and robust. The technical analyses clearly demonstrate that HAP form U.S. EGUs pose a risk to public health and the environment. The new analysis reaffirms that utilities are the largest domestic source of Hg and a major source of non-Hg HAP. Proven effective control technologies for EGU HAP are available. The analyses incorporate updated data, newly published information, and current modeling tools. The Agency's assessments clearly show that HAP from U.S. EGUs pose hazards to public health and the environment after considering the requirements of the Clean Air Act.

II. EPA's Appropriate and Necessary Determination and Listing Decision For Coal- and Oil-Fired EGUs was Justified in 2000 and is Further Supported by EPA in the Proposed Rule.

A. An Overview of Section 112(n)(1) of the Clean Air Act and its History

As originally enacted in 1970, section 112 required EPA to identify air pollutants that "cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness," and to establish an emissions standard that "provides an ample margin of safety to protect the public health" for each of these pollutants within one year. Clean Air Act Amendments of 1970, Pub. L. No. 91-604, sec. 112, 84 Stat. 1676, 1685–86 (1970). Between 1970 and 1989, EPA only listed eight substances as hazardous air pollutants (HAPs) under section 112. H.R. Rep. No. 101-490, pt. 1, at 322 (1990).

Unhappy with EPA's ability to effectively regulate HAPs and secure large-scale reductions in the emission of these dangerous substances, Congress restructured section 112 in the Clean Air Act Amendments of 1990. S. Rep. No. 101-228, at 128, 133 (1989), *reprinted in* 1990 U.S.C.C.A.N 3385, 3513, 3518. Congress changed the Act by specifically listing 189 substances as HAPs, 42 U.S.C. § 7412(b)(1) (2006), and requiring those opposed to regulation to bear the burden of proving that a substance does not pose a hazard to public health or the environment, *id.* § 7412(b)(3).

In addition, in the 1990 Amendments, Congress transformed the statutory requirements for HAPs regulation away from a health-based program focused on specific pollutants to a technology-based program focused on the industrial source categories emitting the toxics that Congress specifically listed in the statute. Congress required EPA to list categories of sources containing major sources of the listed HAPs. *Id.* § 7412(c)(1)–(2), (c)(5). For each listed category, EPA must establish emissions standards under section 112(d)(2) and (d)(3). 42 U.S.C. § 7412(d)(2)–(3) ("MACT standards").

MACT standards "require the maximum degree of reduction in emissions . . . [that] is achievable for new or existing sources. . . ." *Id.* § 7412(d)(2). In section 112, for new sources, Congress established a minimum stringency "floor" requirement providing that the degree of emission control that is deemed achievable shall be no less stringent than "the emission control that is achieved in practice by the best controlled similar source . . . ." *Id.* § 7412(d)(3). Floors for existing sources must reflect the "average emission limitation achieved by the best performing 12 percent of existing sources" if the source category includes at least thirty sources, *id.* § 7412(d)(3)(A), and the emission limitation achieved by the best performing five sources if the category includes fewer than thirty sources, *id.* § 7412(d)(3)(B).

The Clean Air Act Amendments of 1990 directed EPA to regulate HAPs from EGUs "under this section"—that is, using the section 112(d)(2) & (3) MACT standards described above— if the Agency found such regulation to be "appropriate and necessary." *Id.* § 7412(n)(1)(A). In section 112(n), Congress required EPA to conduct three studies. Section 112(n)(1)(A) required EPA to perform a study (the "Utility Study") and report to Congress by no later than November 15, 1993 on "the hazards to public health reasonably anticipated to occur as a result of [HAP] emissions by [EGUs] . . . after imposition of the requirements of [the Clean Air Act]." *Id.* Section 112(n)(1)(B) required EPA to examine and report to Congress by no later than November 15, 1994 on the adverse public health and environmental effects posed by mercury emitted from EGUs in combination with other sources (the "Mercury Study"). *Id.* § 7412(n)(1)(B). Additionally, section 112(n)(1)(C) required the National Institute of Environmental Health Sciences to conduct a study, and transmit it to Congress by no later than November 15, 1993 (the "NIEHS Study"), that "determine[s] the threshold level of mercury exposure below which adverse human health effects are not expected to occur." *Id.* § 7412(n)(1)(C).

B. The 2000 Appropriate and Necessary Finding and Listing Decision

In December 2000, after having belatedly completed the required studies and reports to Congress mandated by section 112(n)(1), EPA found that regulation of HAP emissions from EGUs was appropriate and necessary and added coal- and oil-fired EGUs to the list of industries requiring MACT regulation. Regulatory Finding on the Emissions of Hazardous Air Pollutants from Electric Utility Steam Generating Units, 65 Fed. Reg. 79,825, 79,830 (December 20, 2000) ("2000 Finding"). The appropriate and necessary finding was based on the results of all three studies mandated by section 112(n)(1) (*see id.* at 79,826–30 (describing the required studies and their statutory bases)), and data and comments solicited from the public (*see* Electric Utility Steam Generating Units: Solicitation of Additional Information for Making Regulatory Determination, 65 Fed. Reg. 10,783 (Feb. 29, 2000), & Electric Utility Steam Generating Units;
Notice of Public Meeting, 65 Fed. Reg. 18,992 (Apr. 10, 2000)).

The Utility Study examined mercury and non-mercury HAP emission levels from EGUs in 1990, as well as projected emissions levels in 2010 in order to allow for an evaluation "after imposition of the requirements of the Act" as required by section 112(n)(1)(A). 1 U.S. Envtl. Prot. Agency, EPA-453/R-98-004a, Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units: Final Report to Congress ES-2 (1998) [hereinafter Utility Report], available at http://www.epa.gov/ttncaaa1/t3/reports/eurtc1.pdf. The Utility Study concluded that mercury was the HAP of greatest concern from EGUs, *id.* at ES-27, but that multiple-pathway exposure to arsenic and dioxins also posed a potential concern, *see id.* at 10-42 (finding lifetime cancer risks from arsenic of up to two in ten thousand); *id.* at 11-27 (finding a lifetime cancer risk from dioxins of one in one million and greater). The findings of the Utility Study, released to Congress in February 1998, were subject to scientific peer review. *Id.* at ES-25 to 26.

The Mercury Study required by section 112(n)(1)(B) examined "the magnitude of U.S. mercury emissions by source, the health and environmental

implications of those emissions, and the availability and cost of control technologies." 1 U.S. Envtl. Prot. Agency, EPA-452/R-97-003, Mercury Study: Report to Congress O-1 (1997), available at http://www.epa.gov/ttn/caaa/t3/reports/volume1.pdf. The Mercury Study highlighted the fact that scientific knowledge of mercury and its effect on public health and the environment were still evolving. *Id.* EPA found that EGUs are the largest anthropogenic source of atmospheric mercury in the United States, and that one-third of the mercury emitted from EGUs deposits in the lower forty-eight states. *Id.* at 3-6, table 3-1. The Mercury Study found that there was a plausible link between mercury emitted by EGUs and methylmercury in fish, and that the primary pathway for human exposure to mercury is by eating contaminated fish. *Id.* at 3-19. Dietary methylmercury is almost completely absorbed into the bloodstream and transported throughout the body, including to developing fetuses. *Id.* at 3-23 – 3-24. The health impacts of human exposures, *see* discussion *supra* Part I, were documented and all of these findings were subject to scientific peer review prior to submission to Congress in December 1997. *See id.* at iii-v. The NIEHS study, completed in 2000, had similar findings to the Mercury Study. Nat'l Acad. of Sci., *Toxicological Effects of Methylmercury* (2000).

Having considered the Utility Study as well as other information, EPA acted reasonably—and well within the scope of its statutory authority—in concluding that regulation of EGUs under section 112 was "appropriate and necessary." 65 Fed. Reg. at 79,830. Although EPA did not conclusively link mercury emitted from EGUs to methylmercury in fish, nothing in the Clean Air Act requires EPA to establish any such link. Nor does any statutory language require EPA to make any specific or general health or environmental finding before determining that it is appropriate and necessary to regulate EGU HAPs under sections 112(d)(2) & (3). EPA found that the "appropriate" finding was further supported because numerous control options were available at the time of the finding that would reduce HAP emissions. *Id.*; *see also id.* at 79,828–29 (describing HAP control strategies). That finding is even more true today. The "necessary" finding was bolstered further

because the other requirements of the Clean Air Act did not sufficiently address the hazards to human health and environment caused by HAP emissions. *Id.* at 79,830; *see infra* Part II.D.v.c (discussing the meaning of "other requirements").

The 2000 Finding included a decision to "add[] [EGUs] to the list of source categories under section 112(c)." 65 Fed. Reg. at 79,831. This triggered EPA's obligation to regulate HAP emissions from EGUs using MACT standards. 42 U.S.C. § 7412(c)(2), (c)(5) (requiring that EPA establish "emissions standards under subsection (d) of [Section 112]" for both the initial list of industries and later-listed industrial categories); *see supra*, Part II.A (discussing the MACT standards required by subsection (d)). In 2001, the Utility Air Regulatory Group sought immediate review of the 2000 Finding in court. Because section 112(e)(4) expressly provides that a listing decision is not judicially reviewable until after final emission standards are issued, the court dismissed the case for lack of jurisdiction. *Util. Air Regulatory Grp. v. EPA*, No. 01-0174, 2001 WL 936363 (D.C. Cir. July 26, 2001); *see also* 42 U.S.C. § 7412(e)(4) ("[N]o action . . . listing a source category or subcategory under subsection (c) of this section shall be a final agency action subject to judicial review . . . .)

The 2000 appropriate and necessary finding and listing decision triggered EPA's nondiscretionary duty to regulate HAP emissions from EGUs. In 2001, EPA assembled stakeholders—including states and local agencies, environmental groups, and industry representatives—in the Utility MACT Working Group to engage with the Agency in developing MACT standards. Utility MACT Working Group, Recommendations for the Utility Air Toxics MACT: Final Working Group Report 1–2 (2002), *available at* www.epa.gov/ttnatw01/combust/utiltox/wgfinalreport10_02.pdf. In its final report, delivered to the Clean Air Act Advisory Committee in October of 2002, the Working Group provided recommendations on (1) whether to subcategorize the source category for establishing MACT standards; (2) the appropriate MACT floor levels for mercury; (3) whether to establish a beyond-the-floor MACT for mercury; (4) whether the mercury MACT standard should be an emissions limit or a percent

reduction; (5) the method of monitoring compliance with the mercury standard; (6) the length of compliance time; (7) EPA's authority to regulate non-mercury HAPs; (8) and how to regulate oil-fired EGUs. *Id.* at 4–22. The various stakeholder groups—state and local agency, environmental, and industry—were unable to come to an agreement, and thus each group provided their own recommendations for each of the above-listed issues. *Id.*

Early in 2004, after discontinuing its engagement with the Working Group, EPA proposed to either (1) regulate EGU emissions under proposed new- and existing-source MACT floors, or (2) revise its 2000 Finding and issue performance standards for the industry under section 111 of the Act. Proposed National Emission Standards for Hazardous Air Pollutants; and, in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 69 Fed. Reg. 4,652 (proposed January 30, 2004). In the final rule, issued over a year later, EPA purported to "reverse" its appropriate and necessary finding and stated that by so doing, it could simply remove EGUs from section 112(c)'s list of source categories. Revision of December 2000 Regulatory Finding on the Emissions of Hazardous Air Pollutants From Electric Utility Steam Generating Units and the Removal of Coal- and Oil-Fired Electric Utility Steam Generating Units From the Section 112(c) List, 70 Fed. Reg. 15,994 (Mar. 29, 2005) ("2005 Delisting").

The 2005 Delisting claimed that regulation was neither appropriate nor necessary. *Id.* The supposed reversal was based largely on a cramped and narrow interpretation of the phrase "after imposition of the requirements of this Act" found in section 112(n)(1)(A). In 2005, EPA interpreted this phrase irrationally to mean that it is *only* appropriate and necessary to regulate EGUs under section 112 *if* "there are no other authorities available under the CAA that would, if implemented, effectively address the remaining HAP emissions from [EGUs]." *Id.* at 16,001. EPA then asserted its view that, because it was possible to regulate the hazards to human health posed by mercury alone under section 110(a)(2)(D) or section 111 of the Clean Air Act, regulation under section 112 was not necessary. *Id.* at 16,004.

EPA simultaneously finalized an unlawful rule, the Clean Air Mercury Rule (CAMR), governing new and existing EGU sources of mercury under section 111 of the Act that relied upon a "cap-and-trade" system for mercury control from new and existing EGU sources, among other features. Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units, 70 Fed. Reg. 28, 606 (May 18, 2005).

States, tribes, and environmental and public health groups challenged EPA's 2005 Delisting rule and CAMR in the D.C. Circuit as unlawful and arbitrary and capricious. *New Jersey v. EPA*, 517 F.3d 574, 582–83 (D.C. Cir. 2008). Although EPA admitted that it had listed EGUs in 2000 and that this listing otherwise would require the agency to set MACT standards for EGUs, the Agency claimed wrongly that it had authority to delist EGUs at any time just by reversing the appropriate and necessary finding and without making the delisting showing required by section 112(c)(9). *Id.* at 580; *see also* 70 Fed. Reg. at 16,032. The D.C. Circuit disagreed. The Court stated that the plain text of section 112(c)(9) "governs the removal of '*any* source category' from the section 112(c)(1) list, and nothing in the [Clean Air Act] exempts EGUs from section 112(c)(9)." *New Jersey v. EPA*, 517 F.3d at 582. Accordingly, the Court held that EPA could not delist EGUs and avoid regulation without first satisfying the requirements of section 112(c)(9). *Id.* Because EPA conceded that it never made the findings required to satisfy Section 112(c)(9), the Court held that the delisting was flatly unlawful and that EGUs remained listed and subject to MACT regulation under section 112(c). *Id.* at 578, 582. The Court then vacated CAMR and the Delisting rule simultaneously, including EPA's unlawful and embedded attempt to "reverse" its appropriate and necessary finding.

C. EPA's 2000 Appropriate and Necessary Decision Needs No Further Support

Section 112(n)(1)(A) of the Clean Air Act directs EPA to "regulate [EGUs] if the Administrator finds such regulation is appropriate and necessary after

considering the results of the study required by this subparagraph." 42 U.S.C. § 7412(n)(1)(A) (emphasis added). The record conclusively shows that EPA did just that: first it considered the study, and then it found that regulating EGUs was appropriate and necessary. Further, EPA fully explained and supported its decision. Nothing further is required by the Clean Air Act or by general principles of administrative law.

D. Additional Information Since 2000 Provides Further Justification for the Appropriate and Necessary Finding

Although no further support was required for EPA's 2000 Finding, EPA reaffirmed its appropriate and necessary finding in a signed proposed rule in March 2011. 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, 76 Fed. Reg. 24,976 (May 3, 2011) ("Proposed Rule") (signed March 16, 2011). This reaffirmation was unnecessary; the Agency's 2000 Finding and contemporaneous listing decision were fully supported at the time they were made, as described above. As EPA demonstrates, new studies performed since 2000 provide further support for the decision to regulate HAP emissions from this industry.

Because the Act makes clear that listing a source category is not judicially reviewable until issuance of final section 112 emissions standards (§ 7412(e)(4)), EPA clearly may augment and supplement its original 2000 appropriate and necessary finding with subsequent information, analysis and arguments to support and reaffirm that earlier finding. There is nothing in the Act that freezes in time the appropriate and necessary finding made in 2000, nor is there any prohibition on EPA's ability to supplement and update that finding up until the time that it issues final emissions standards for EGUs. Indeed, the natural reading of sections 112(n)(1)(A) and 112(e)(4) together make clear that the D.C. Circuit will review both

the appropriate and necessary finding and the related listing decision based upon the administrative record associated with issuance of final MACT emissions standards for EGUs.

i. EPA Correctly Interprets Section 112(n)(1)(A) to Allow Consideration of Environmental Effects in Making an Appropriate and Necessary Finding

In the Proposed Rule, EPA states that the statute allows for a finding that it is appropriate to regulate coal- and oil-fired EGUs based on either hazard to public health or the environment. 76 Fed. Reg. at 24,988. Although section 112 certainly allows the agency to find regulating EGUs is appropriate and necessary based on either finding, it does not require a "hazard" finding at all. Rather, it simply provides that EPA must regulate EGUs if, after "considering" the Utility Study, it finds that doing so is appropriate and necessary. Thus, it leaves the agency broad discretion to make the appropriate and necessary finding so long as the agency has reasonably "consider[ed]" the results of the study. EPA could have reasonably concluded that Congress wanted emissions of all listed HAPs reduced by the maximum achievable degree, and thus regulation of EGUs—the most significant emitter of virtually every HAP listed in section 112(b)—is both appropriate and necessary regardless of whether it was possible for the Agency to fully assess all of the risks that toxic emissions from EGUs present. In fact, EPA should reach just this conclusion in its final rule.

Because section 112(n)(1)(A) only requires that EPA assess "the hazards to public health reasonably anticipated to occur" in the Utility Study, EPA's 2005 Delisting Rule asserted (incorrectly) that the Agency was required to base its decision *solely* on public health hazards—and not environmental hazards—posed by HAP. 70 Fed. Reg. at 15,997. However, even where the Clean Air Act provides that EPA's action must be "based on" a study—more limiting language than the "considering" language found in section 112(n)—the Agency is not required to base its action *exclusively* on that study unless Congress has expressly stated so. *See*

Sierra Club v. EPA, 325 F.3d 374, 377 (D.C. Cir. 2003) (holding that section 202(*l*) of the Clean Air Act—which requires the EPA to conduct a "study of the need for, and feasibility of, controlling emissions of toxic air pollutants" and then requires EPA to promulgate standards for mobile source air toxics "based on" that study—does not require that the standards be based *exclusively* on the required study). And nowhere in section 112(n)(1)(A) or elsewhere has Congress expressly stated, or even implied, that EPA must base its appropriate and necessary finding *exclusively* upon the study prescribed in the first sentence of that section.

EPA itself noted in the 2005 Delisting that the requirement to perform and consider the Utility Study does not constrain the Agency from considering facts beyond those contained in the study when determining whether regulation is appropriate and necessary. 70 Fed. Reg. at 15,999. In addition, as EPA discusses in the 2011 Proposed Rule, it is possible that the Utility Study was limited in such a way, "not because Congress was unconcerned with adverse environmental effects or the cumulative impact of HAP emissions, but because the Utility Study, as required, was a significant undertaking in itself and Congress wanted the Agency to complete the study within 3 years." 76 Fed. Reg. at 24,987.

EPA's reliance in the 2011 Proposed Rule on environmental effects as additional support for the finding that it is appropriate to regulate EGUs is further supported by the rest of section 112, which contains many examples of language evincing Congressional concern about the adverse environmental effects of HAPs. For example, EPA can add a substance to the list of HAPs based solely on its adverse environmental effects. 42 U.S.C. § 7412(b)(2)–(3) (authorizing EPA to add a pollutant to the section 112(b) list based on "a threat of adverse human health effects . . . *or* adverse environmental effects . . . .") (emphasis added). Furthermore, an industry may be listed as containing major sources, and sources within that industry thus made subject to MACT regulation, based solely on HAPs that have adverse effects on the environment. *See id.* § 7412(b)(2); *id.* § 7412(a)(1) (defining a major sources as those that emit "10 tons per year or more of any hazardous air pollutant or 25 tons per year or more of any combination of hazardous air

pollutants"); *id.* § 7412 (c)(1)–(2), (c)(5), (d)(3) (requiring EPA to list categories of major sources of HAPs and to establish MACT standards for listed source categories).

Additionally, the subsection immediately following section 112(n)(1)(A) requires EPA to examine the environmental effects of EGU mercury emissions as part of the Mercury Study. *Id.* § 7412(n)(1)(B). It is unreasonable to assume that Congress required EPA to conduct an assessment of mercury's environmental effects, but at the same time forbade the Agency from considering these effects in its subsequent decision-making process. Thus, even though not mandated by the text of section 112(n)(1)(A), the Agency's decision to consider both public health and environmental hazards as a basis for regulating HAP emissions from EGUs is both reasonable and consistent with Congressional purpose, as shown by other provisions in the Clean Air Act.

ii. EPA Correctly Interprets Section 112(n)(1)(A) to Allow for Regulation of EGUs Based upon a Single HAP

In the Proposed Rule, EPA states that the statute requires a finding that it is appropriate to regulate coal- and oil-fired EGUs if "the emissions of *one or more* HAP emitted from EGUs pose an identified or potential hazard to public health or the environment." 76 Fed. Reg. at 24,987 (emphasis added). Again, the statute does not require any "hazard" finding at all, but the Agency would have acted well within its authority had it found regulating EGUs appropriate and necessary based on hazards presented by mercury alone.

There is nothing in the Act prohibiting a finding that EGU mercury emissions alone make it appropriate and necessary to regulate *all* HAPs from EGUs under section 112(d)(2) & (3) – since MACT standards must be adopted for all HAPs emitted by a listed source category, as EGUs are. Nor would it be arbitrary and capricious had EPA determined it was appropriate and necessary to list EGUs based upon mercury emissions alone, considering that the Congressionally-

established, performance-based approach of section 112 has proven effective in reducing mercury and all other HAPs from other industrial source categories; EGUs are the largest remaining uncontrolled sources of industrial mercury emissions in the country; and other statutory programs are less suited toward reducing mercury emissions than section 112(d).

iii. EPA Correctly Considers HAP Emissions Not Only From EGUs But From All Sources in Finding That it is Appropriate to Regulate Coal- and Oil-Fired EGUs Under Section 112(d)

In the Proposed Rule, EPA states that section 112(n)(1)(A) allows for an "appropriate and necessary" finding regardless of whether the hazard posed to public health or the environment results from either HAP emissions from EGUs alone or the harm is in conjunction with HAP emissions from other sources. 76 Fed. Reg. at 24,988. Utility industry representatives have argued in the past that section 112 regulation based on mercury is inappropriate because they assert that only one percent of the global pool of atmospheric mercury is attributable to coal-fired power plants located in the United States. *See, e.g.*, Comments of American Electric Power, Document ID No. EPA-HQ-OAR-2002-0056-3558, at 3 (June 29, 2004) (arguing that, because the industry is only responsible for one percent of global atmospheric mercury, reductions in EGU-attributable emissions will "have no discernible impact on the exposure of sensitive populations to high levels of mercury"). The Agency parroted industry's twisted logic in its unlawful 2005 Delisting. EPA interpreted the phrase "occur as a result of emissions by electric utility steam generating units," 42. U.S.C. § 7412(n)(1)(A), to mean that it should "focus solely on whether the utility HAP emissions themselves are posing a hazard to public health." 70 Fed. Reg. at 15,998. However, this is both an unreasonable interpretation of the statute and inconsistent with case law, as well as a misuse of the science.

In the Proposed Rule, EPA correctly reiterates the understanding of the statute underlying its 2000 finding and listing decision. Specifically, EPA must

take a holistic view of toxic air pollution, including mercury, as it impacts human health and the environment in determining whether to regulate EGUs. As explained above, EPA did not need to make a finding that EGU emissions were a hazard to public health at all. EPA acted well within its statutory authority by concluding that EGUs' contribution to emissions of air toxics makes regulating them under section 112 appropriate and necessary. Further, the remainder of section 112 confirms that Congress did not intend any industrial category to avoid regulation because EPA might not have exacting proof of the harm caused by that category in isolation. It shows that Congress was well aware that the problem presented by air toxics—the problem it enacted section 112 to solve—resulted from emissions from many different source categories.

First, in addition to the requirement to conduct the Utility Study found in section 112(n)(1)(A), section 112(n)(1)(B) explicitly requires EPA to conduct "a study of mercury emissions from electric utility steam generating units, *municipal waste combustion units, and other sources, including area sources*." 42 U.S.C. § 7412(n)(1)(B) (emphasis added). It is highly unlikely that Congress would have required EPA to conduct an assessment of the cumulative effects of these various source categories, but then *prohibited* that assessment from being considered in any decisions regarding regulation of one of them. Certainly there is *no* statutory support for such any such suggested prohibition.

Second, the phrase "result of emissions," used in section 112(n)(1)(A), is also found in section 112(k)(3)(B) with respect to developing a national strategy for area source HAP emissions. Interpreting that language, EPA has said that determining which HAPs pose the greatest threat to human health "as the result of emission from area sources," does *not* require that "such threats must be exclusively the result of emissions from area sources." *See* National Air Toxics Program: The Integrated Urban Strategy, 64 Fed. Reg. 38,706, 38,716 (July 19, 1999).

Third, section 112(c)(3) requires that EPA list for regulation sufficient source categories so that, in the aggregate, ninety percent of emissions for the thirty most hazardous air pollutants are regulated. 42 U.S.C. § 7412(c)(3). This requirement

illustrates that Congress was aware that the cumulative emissions from different industries have cumulative adverse effects on public health and the environment.

In *Massachusetts v. EPA*, 549 U.S. 497, 525 (2007), decided two years after EPA's reversal of the appropriate and necessary finding, the Supreme Court held that regulation of greenhouse gases from motor vehicles is appropriate even if it only addresses a portion of the climate change problem. Similar to industry arguments here, in *Massachusetts*, EPA argued that it was not required to regulate emissions from motor vehicles because such emissions only accounted for six percent of global carbon dioxide emissions. *Id.* at 524. Because regulation of motor vehicle emissions would not eliminate the problem of climate change, EPA believed it was not required to act. *Id.* at 523–24.

The Court strongly disagreed with this argument. It stated that "[a]gencies, like legislatures, do not generally resolve massive problems in one fell regulatory swoop," *id.* at 524, and EPA had a duty to address climate change even if the steps taken only "*slow* or *reduce* it," *id.* at 525 (emphasis in original). Acknowledging that climate change depends on global carbon dioxide emissions, the Court noted that "a reduction in domestic emissions would slow the pace of global emissions increases, no matter what happens elsewhere." *Id.* at 526. After *Massachusetts*, the industry argument that it is not appropriate for EPA to regulate EGU mercury emissions because they allegedly comprise such a small portion of global emissions must fail. Notably, these industry commenters fail to identify any statutory text or legislative history supporting their argument that this alleged global level of U.S. EGU mercury emissions somehow makes it unlawful for EPA to conclude it is appropriate and necessary to regulate EGU HAPs under section 112(d). It is reasonable for EPA to conclude that it must take steps to reduce the hazards that mercury poses to human health and the environment, even if those steps do not or cannot fully solve the problem.

In *Ethyl Corp. v. EPA*, 541 F.2d 1, 29–31 (D.C. Cir. 1976), which involved regulation of lead gasoline additives, the D.C. Circuit took a similar approach to the regulation of lead gasoline additives. The Court explained that "Congress

understood that the body lead burden is caused by multiple sources. It understood that determining the effect of lead automobile emissions, by themselves, on human health is of no . . . practical value"; rather, the cumulative impact approach was the best method for determining public health hazards posed by lead emissions. *Id.* at 30–31. Because lead gasoline additives were the most easily regulated source of lead, regulation was appropriate. *Id.* at 31. The same considerations apply to mercury emissions from EGUs. Though multiple sources contribute to methylmercury in the environment and in fish, EGUs are the largest anthropogenic sources of atmospheric mercury, and thus are more practicable to control than multiple diverse sources. EPA's conclusion that it was appropriate and necessary to regulate EGU HAP emissions under section 112(d) was thus reasonable.

Furthermore, scientific evidence shows that EPA's former interpretation of section 112(n)(1)(A), focusing solely on EGU-attributable emissions, would lead to absurd results in practice. For an effect to be "a result of" an action, the action does not have to be fully and solely responsible for the effect. "[I]f a person climbs into a bathtub filled to the brim, the overflow is 'a result of' both the too-full tub and the person getting in[,]" not—as the 2005 interpretation would claim—neither. NRDC et al., Petition for Reconsideration, Document ID No. EPA-HQ-OAR-2002-0056-6270, at 13 (May 31, 2005). Under the proffered 2005 reading of the statute, EGUs could avoid regulation even if the total emissions of a particular HAP from all sources posed a human health or environmental hazard—as, in the case of mercury, the science demonstrates it does. This would be true, so long as EGUs themselves emitted just below levels required to pose a human health or environmental hazard, even if EGUs contribute the vast majority of the emissions responsible for the problem. *See* Gerald J. Keeler et al., *Sources of Mercury Wet Deposition in Eastern Ohio, USA*, 40 Envtl. Sci. & Tech. 5874, 5880 (2006) (finding that local and regional coal combustion by EGUs was the "dominant influence," accounting for about 70 percent of wet mercury deposition in Steubenville, Ohio). Such a result is inconsistent with the language and purpose of section 112, which specifically seeks near-term reductions and relief from the dangers posed by the listed HAPs.

The technical analyses conducted by the Agency after the 2000 Finding demonstrate that EGUs remain the largest industrial source of mercury in the United States. Mercury emissions from EGUs account for approximately half of U.S. anthropogenic mercury emissions. 76 Fed. Reg. at 25,002 (finding that EGUs emitted fifty-three tons of mercury in 2005, which is comparable to the fifty-two tons emitted by all other anthropogenic sources collectively). Mercury emissions from EGUs are projected to be over six times larger than those from the second largest contributing source by 2016. *Id.* Additionally, the significant fractions of Hg^{+2} and Hg_p in mercury emissions from EGUs make these emissions more relevant to local and regional deposition than natural emissions comprised of elemental mercury. The national-scale risk assessment indicates that high variability exists in the contribution of U.S. EGUs to total mercury deposition. 76 Fed. Reg. at 25,008. Modeled contributions of EGU mercury emissions to total mercury deposition are greater than ten percent in hundreds of watersheds. *Id.* at 25,009. Deposition of mercury emitted by EGUs is proven to be significantly larger at locations close to emission sources. Excess mercury deposition can be as large as three times the regional average at these locations, known colloquially as "mercury hot spots," and the resulting higher biotic uptake of mercury in turn increases the local health risks associated with consuming contaminated fish and wildlife from these locations. *Id.* at 25,013. For many areas of the country, local EGUs are a more significant contributor to mercury's public health and environmental hazards than would appear from industry's formulation based on a simple look at the national average.

Furthermore, EPA data likely underestimate HAP emissions—and the resulting hazards to human health and the environment—as the data reflect average emissions rates from tests that do not take into account startup, shutdown, and malfunction (SSM) events, periods during which emissions are generally higher. If EPA believes that emissions test data do not adequately capture variability for the purposes of setting floors, it follows that the emissions test data EPA has also do not capture the full variability of sources' emissions for the

purposes of determining the extent of the hazards posed by EGUs' emissions. In setting floors, EPA addresses variability by adding a 99th percentile variability factor. Although we do not concede that approach is valid for reasons discussed elsewhere in these comments, the agency should use it consistently if it uses it at all. Thus, EPA should apply the same 99th percentile variability factor to its test data in determining the extent of hazard from EGUs' HAP emissions.

iv. The Agency Correctly Did Not Consider Implementation Costs in Determining Whether Regulation is Appropriate

The Proposed Rule states that costs may not be considered in determining whether regulation of EGUs is appropriate. *See* 76 Fed. Reg. at 24,988. In fact, the Clean Air Act makes clear that cost may not be considered at this stage. The Supreme Court has held that the Clean Air Act is detailed and technical, and Congress in it has expressly granted authority to consider the costs of implementation only in circumstances that are specifically indicated. That Congress has been so clear in those cases in which consideration of costs is allowed or required shows that implementation costs may not be relied upon by EPA when making decisions under sections that do not expressly provide for their consideration. *Whitman v. Am. Trucking Ass'ns*, 531 U.S. 457, 467 (2001); *see also Am. Textile Mfrs. Inst. v. Donovan*, 452 U.S. 490, 510 (1981) (finding a general presumption in all statutes that "[w]hen Congress has intended that an agency engage in cost–benefit analysis, it has clearly indicated such intent on the face of the statute"). Section 112(n)(1)(A) only requires that EPA "consider" the Utility Study in making its finding, and the Utility Study in turn is only required to cover "hazards to public health reasonably anticipated to occur." 42 U.S.C. § 7412(n)(1)(A). There is no statutory language or legislative history that renders unlawful or arbitrary EPA's conclusion that costs may not be considered when determining whether regulation of EGUs is appropriate and necessary.

v. EPA's "Necessary" Finding Provides Further Support for its 2000 Decision to Regulate and List EGUs Under Section 112.

a. Given that EGUs are the Largest Emitters of Several HAPs that Pose Hazards to Public Health and the Environment, It Would be Unreasonable to Determine Regulation is Not Necessary.

Courts have found that the "statutory term 'necessary' does not have a plain meaning." *E.g.*, *Cellular Telecomm. & Internet Ass'n v. Fed. Commc'ns Comm'n*, 330 F.3d 502, 504 (D.C. Cir. 2003). Rather, the meaning of "necessary" in any statute can only be determined after looking at its context. *Id.* at 510. Here, this context would include Congress's desired statutory goals, gleaned from the full text of the statute, its structure and its legislative history. Although EPA has discretion to determine whether regulation is necessary, *see* 76 Fed. Reg. at 24,986, 24,987, 24,990 (claiming that *Cellular Telecomm.*, 330 F.3d at 510, and other cases have given EPA "considerable" discretion in making its necessary finding), this discretion is not unlimited, *Ass'n of Irritated Residents v. EPA*, 632 F.3d 584, 593 (9th Cir. 2011) (finding that "failure to act in light of the strong evidence . . . is arbitrary and capricious").

With respect to section 112(n)(1)(A), both legislative history and other provisions in section 112 provide important context for the statutory term "necessary," and further support the Proposed Rule's conclusion that regulation of EGUs' HAPs is necessary to carry out the statutory goals. *See Ass'n of Irritated Residents*, 632 F.3d at 593–94 (finding that the overall purpose of a statute informs whether an agency's action is arbitrary and capricious). Congress in 1990 was unhappy with EPA's pace and historical inability to secure large-scale reductions of HAPs under the Act. *See* S. Rep. No. 101-228, at 128–33 (1989), *reprinted in* 1990 U.S.C.C.A.N 3385, 3513–18; *see also* H.R. Rep. No. 101-490, pt. 1, at 322 (1990) (noting that EPA had listed only eight HAPs between 1970 and 1990). When Congress restructured section 112 in the Clean Air Act Amendments of 1990, it eliminated much of EPA's discretion in determining both what substances to

regulate and how those substances should be regulated, in order to ensure that these dangerous substances would be reduced in a timely and effective fashion.

Instead of authorizing the Agency to do so, Congress itself listed 189 specific HAPs, 42 U.S.C. § 7412(b)(1), and required that EPA list industrial source categories and subcategories including major sources of the listed HAPs. Congress further required EPA to establish MACT emissions standards for all major sources and area sources in the listed categories on a carefully prescribed timetable, *id.* § 7412(c)(1)–(2), (c)(5), (d)(3). The precise textual directives and the structure Congress adopted in section 112 clearly evince Congress's understanding of the dangers to public health and the environment posed by the listed HAPs, and concern about expeditiously setting rigorous standards to reduce these highly toxic, frequently carainogenic pollutants. Given this framework and in light of the wealth of information and data showing that EGUs are the largest emitters of many HAPs with proven adverse effects on public health and the environment, it would be both unreasonable and outside EPA's discretion for the Agency not to reaffirm that it is necessary to regulate this industry.

b. EPA Correctly Made the "Necessary" Determination Prior to Full Implementation of the Act

Industry representatives in the past have argued that EPA is required to wait until the Clean Air Act is fully implemented before conducting the Utility Study and before any appropriate and necessary determination can be made. *Oversight: Review of EPA Regulations Replacing the Clean Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR): Hearings before the Subcomm. on Clean Air & Nuclear Safety of the S. Comm. on Env't & Pub. Works*, 112th Cong. 5 (2011) (testimony of Barbara Walz, Sr. Vice President Policy & Environmental, Tri-State Generation & Transmission Ass'n).

This industry claim is unreasonable and contrary to the plain meaning of the statute. Congress was very specific that the Utility Study be completed by November 1993, 42 U.S.C. §7412(n)(1)(A), only three years after the Clean Air Act

Amendments of 1990. Congress was aware that it was impossible for all the provisions of the Clean Air Act to be fully implemented within three years. Moreover, many provisions of the 1990 Amendments had effective dates that extended beyond three years. *See, e.g.*, *id.* § 7412(c)(3) (area sources for hazardous air pollutants were not required to be regulated until November 2000); *id.* § 7651c (Phase I of the Acid Deposition Control program was not required to go into effect until January 1995).

Instead, Congress mandated that EPA conduct the Utility Study before November 1993 and estimate what emissions levels would be after the imposition of the requirements of the Act. The determination about whether regulation is necessary takes into consideration the reasonably foreseeable reductions in emissions levels due to those requirements. This interpretation is consistent with the plain language of the statute. Section 112(n)(1)(A) directs EPA to study the "hazards to public health *reasonably anticipated to occur* as a result of emissions by electric utility steam generating units of pollutants listed under subsection (b) of this section *after imposition* of the requirements of this Act." *Id.* § 7412(n)(1)(A) (emphasis added). If EPA were required to await full implementation of the Act, Congress would have used different language than it did in section 112(n)(1)(A). Thus, EPA completed the Utility Study, considered that study and made its appropriate and necessary finding prior to full implementation of the Clean Air Act.

c. EPA Correctly Determined that Regulation is "Necessary"

Section 112(n)(1)(A) requires that EPA regulate EGUs under section 112(d) if the agency finds regulation "necessary after considering the results of the [Utility] study," which in turn requires EPA to study the hazards posed by EGU emissions "after imposition of the requirements of [the Clean Air Act]." *Id.* § 7412(n)(1)(A). EPA in the Proposed Rule interprets the phrase "after imposition of the requirements of the [Clean Air Act]," *id.* § 7412(n)(1)(A), to require that EPA only consider "those requirements that Congress directly imposed on EGUs through the

[Clean Air Act] as amended in 1990 and for which EPA could reasonably predict HAP emission reductions at the time of the Utility Study." 76 Fed. Reg. at 24,990. The short time frame provided by Congress to complete the Utility Study, just three years, strongly suggests that Congress did not intend for EPA to search for any and all possible sources and levels of future regulation and predict the resulting emissions reductions before performing the Utility Study.

In the 2005 Delisting, EPA wrongly interpreted "the phrase 'imposition of the requirements of th[e] Act' to include not only those requirements already imposed and in effect, but also those requirements that EPA reasonably anticipates will be implemented [in the future] and will result in reductions of utility HAP emissions." 70 Fed. Reg. at 15,999; *see also* 69 Fed. Reg. at 4,686 (claiming that section 112(d) regulation is not necessary if there is some other "viable statutory authority by which to address Hg and Ni emissions from existing coal- and oil-fired Utility Units"). In light of section 112's history, the interpretation of "imposition of the requirements of [the Clean Air Act]" used in the 2005 Delisting is clearly unreasonable, and the interpretation used in the Proposed Rule is the correct one. At any rate, the Proposed Rule's interpretation is plainly a reasonable and permissible one.

The sections of the Clean Air Act that the 2005 Delisting argued could be used to regulate EGU HAP emissions instead of section 112 existed prior to Congress enacting the 1990 amendments. *See* 70 Fed. Reg. 15,994 (attempting to regulate mercury through sections 110(a)(2)(D) and 111); Clean Air Act Amendments of 1977, Pub. L. No. 95-95, 91 Stat. 685, 693, sec. 108(a)(4), § 110(a)(2)(E) (1977); 91 Stat. at 697–703, sec. 109, § 111. As discussed above, Congress was well aware in 1990 that these provisions were not effective in achieving the reduction in HAPs that Congress sought. *See* S. Rep. No. 101-228, at 128–33. It is unreasonable to assume that Congress intended for EGUs to avoid regulation under section 112 based on the existence of provisions that Congress already had found insufficient to achieve its desired emission reductions.

In sum, the Proposed Rule appropriately does not search for *other possible* sources of regulation within the Clean Air Act, but focuses solely on "requirements that Congress directly imposed on EGUs through the [Clean Air Act] as amended in 1990 and for which EPA could reasonably predict HAP emission reductions at the time of the Utility Study." 76 Fed. Reg. at 24,990 (also interpreting "requirements" to refer to "obligatory," and not just viable, sources of regulation).

EPA's statutory duty to regulate HAP emissions under section 112(d) springs from its listing decision, and as the D.C. Circuit has held, cannot be "undone" until the showings of section 112(c)(9) are made. *See* 42 U.S.C. § 7412(c)(9) (requiring for pollutants, like mercury, that cause non-cancer health effects, "a determination that emissions from no source in the category or subcategory concerned . . . exceed a level which is adequate to protect public health with an ample margin of safety and no adverse environmental effect will result from emissions from any source"). EPA's original 2000 appropriate and necessary finding was fully supported by the science before the Agency at the time, and EPA's reaffirmation of the finding in the Proposed Rule demonstrates that nothing in the years since proves to the contrary. Indeed there has been a great deal of new science in the interim period that provides ample support for the decision that MACT standards for this industry are necessary.

Finally, it is worth calling out specifically arguments that enjoy no statutory support and that are sometimes advanced by utility industry representatives to avoid MACT standards for utilities under sections 112(d)(2) & (3).

There is no statutory support for any suggestion that Congress considered the same listed HAPs *less* harmful and *less* worthy of regulation from power plants than from other industrial sectors emitting far *less* of those HAPs than EGUs. There is no statutory support for any suggestion that Congress wished EPA to return to the discredited, abandoned risk-based approach that existed prior to the 1990 amendments, or to apply that approach just to EGUs.

There is no statutory support for any suggestion that Congress meant to require EPA to make specific health-based or risk-based findings before

determining that it was "appropriate and necessary" to regulate HAP emissions from EGUs under section 112(d)(2) & (3). Indeed, other sections of the Act and other provisions in section 112 do contain such health- and risk-based language as a regulatory (or deregulatory) predicate, and it is instructive that the key final sentence of section 112(n)(1)(A) lacks any such language. *See, e.g.*, 42 U.S.C. § 7412(b)(3)(C) (allowing deletion from the HAP list only "if the substance may not reasonably be anticipated to cause any adverse effects to the human health or adverse environmental effects"); *id.* § 7412(c)(9)(B) (requiring specific health- and risk-based findings before a source category may be delisted); *id.* § 7412(d)(4) (permitting health-based emissions standards "[w]ith respect to pollutants for which a health threshold has been established"); *id.* § 7412(f)(2). Congress did not employ similar language or concepts in section 112(n)(1)(A) to constrain EPA's discretion to determine whether regulation is appropriate and necessary.[1]

There is no statutory support for any suggestion that the Administrator's determination that MACT regulation of EGUs is appropriate and necessary could *not* be based (in part) upon the appropriateness of treating the power sector equitably and similarly relative to other industrial sectors covered by MACT; upon the appropriateness of maintaining uniform regulatory treatment of HAP emissions from EGUs under section 112(d)(2) & (3); and upon the appropriateness of applying the proven, performance-based HAP reduction approach of sections 112(d)(2) & (3) to EGUs.

Industry commenters do not and cannot identify any statutory *prohibitions* under a *Chevron* step I analysis to EPA deeming MACT regulation for EGUs appropriate and necessary based upon the foregoing considerations. Nor can industry critics hope to establish that MACT regulation is arbitrary and capricious based upon the foregoing. EPA is following the statutory structure and instructions

[1] As discussed above, EPA must consider the results of the study prescribed by section 112(n)(1)(A) but EPA need not base its determination exclusively on that study. Accordingly the language describing the study in the first sentence of section 112(n)(1)(A) is not a Congressional directive imported directly or indirectly into the final sentence of that section to dictate the basis for EPA's determination.

that Congress has mandated for HAP regulation under the Clean Air Act, and it is unavailing to contend that applying this same structure and instructions to HAP emissions from EGUs is arbitrary and capricious. When Congress employs capacious and judgment-laden language like "appropriate and necessary," it is surely within EPA's discretion and authority to determine the statutory structure and instructions prescribed by Congress for HAP regulation is reasonable and justified for HAP emissions from the single largest industrial source of those toxic emissions.

Chapter III. EPA Correctly Determines That A Section 112(d)(4) Health-Based Standard Is Not Appropriate Or Lawful For EGU Acid Gases

EPA proposes to set what it calls a "conventional MACT standard" for hydrogen chloride ("HCl") and for HCl as a surrogate for all other acid gas HAPs [hydrogen fluoride ("HF"), hydrogen cyanide ("HCN"), chlorine ("Cl_2") and selenium dioxide ("SeO_2")] emitted by all new and existing units in all the solid fuel-fired EGU subcategories.[1] 76 Fed. Reg. 25,049-25,051; 76 Fed. Reg. 25,124-25,128 (Tables 1 and 2 to Subpart UUUUU of Part 63). For its liquid oil subcategory, EPA proposes "conventional MACT standards" for HCl and for HF. 76 Fed. Reg. 25,124-25,128 (Tables 1 and 2 to Subpart UUUUU of Part 63). While we do not concede that the Agency's surrogacy justification is adequate, *see infra* Chapter VII, we agree that the Agency must set MACT floors for the acid gases emitted by solid- and liquid-fueled coal- and oil-fired EGUs. The Agency correctly concludes, 76 Fed. Reg. at 25,049-25,050, that it does not have sufficient information to set a section 112(d)(4) "health-based" standard. Moreover, the statutory prerequisites for setting such a standard for the acid gases are simply not met, as we will show below. For, while EPA continues to describe its authority to issue section 112(d)(4) standards as "discretionary" in the broadest terms, in fact the statute narrowly cabins EPA's ability to invoke section 112(d)(4) to those situations in which an appropriate health threshold has already been established at the time of the MACT standard setting process. That is not the case here.

A. The Statute Does Not Permit EPA to Establish Standards under Section 112(d)(4) for any HAP for which there is no Existing Health Threshold Based on No Observable Adverse Effects

CAA section 112(d)(4) states that "[w]ith respect to pollutants *for* which a health threshold *has been established*, the Administrator may consider such

[1] In the alternative, EPA proposes limits on SO2 as a surrogate for the HCl "conventional MACT standard" but only for units equipped with flue gas desulfurization equipment. 76 Fed. Reg. 25,124-25,128 (Tables 1 and 2 to Subpart UUUUU of Part 63). This surrogacy approach is not adequately justified as discussed *infra* Chapter VII.

threshold level, with an ample margin of safety, when establishing emission standards under this subsection." 42 U.S.C. § 7412(d)(4) (emphasis added). Congress's use of the phrase "has been established," is evidence that EPA only may rely on this authority where an accepted health threshold already is in existence at the time of the MACT standard setting process. See Brief for Respondent Environmental Protection Agency in *National Lime Ass'n v. EPA,* (D.C. Cir. No. 99-1325, July 14, 2000). Furthermore, the legislative history for section 112(d)(4) clearly shows that an acceptable health threshold, at a minimum must be based on the "no observable effects level" for any health endpoint associated with the hazardous air pollutant for which the section 112(d)(4) "health based standard" is considered. *See* S. Rep. No. 101-228 at 171 (1990). Congress did not intend for EPA to spend time and resources during the standard setting exercise to evaluate or set health thresholds for HAPs, but rather to rely on previously established health thresholds.

Prior to 1990, the CAA required individual HAP listing and standard setting, based on public health protection with "an ample margin of safety." CAA of 1970 §112(b)(1)(B), P. Law 91-604 (amended in 1990). The 1990 revisions to the air toxics section of the Act were comprehensive, including a Congressionally-mandated list of HAPs to be regulated, and very specific statutory directives to EPA requiring the Agency to set technology-based standards for those HAPs for listed industries. Section 112(d)(4) also was included in the 1990 revisions. Section 112(d)(4), as finalized, authorized the Agency to "consider" an "establish*ed*" health threshold[2] in setting such standards. By contrast, an earlier bill, which was not adopted, would have made the authority to set a health-based standard contingent on a finding that a threshold "*can be* established"[3] – a forward looking construct that would accommodate investigation and establishment of the threshold as part of the MACT standard setting exercise, in a way that the final enacted language of section

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[2] In fact, the Senate Report describes the prerequisite as a "well-established" health threshold. See S. Rep. 101-228 at 171.

[3] 3 1990 Legislative History at 4425.

112(d)(4) clearly does not. In addition, the legislative history makes clear that any established health threshold that might form the basis for a section 112(d)(4) health-based alternative standard must be based on the "'no observable [adverse] effects level' ("NOAEL") below which human exposure is presumably 'safe'." S. Rep. No. 101-228 at 171 (1990). As will be shown below, there is no such established health threshold currently for HCl, or for any of the other acid gases (non-metal inorganic HAPs) EPA identifies as emitted by coal- or oil-fired EGUs.

As a threshold matter, then, section 112(d)(4) authority to set an alternative, health-based standard for HCl is simply not available to the Agency here, because as shown below, there is no currently established NOAEL-based health threshold for HCl, or for any of the other acid gases emitted by coal- and oil-fired EGUs. And, as EPA has admitted, the agency's information on the carcinogenicity of these substances is incomplete. The Agency notes that it has not evaluated the potential carcinogenicity of HCl, and does not know whether or not HCl causes cancer. 76 Fed. Reg. at 25,050, see also 71 Fed. Reg. 76,542, 76,553 (Dec. 20, 2006) ("The data are inadequate to make a determination as to whether HCl is carcinogenic in either humans or animals, so EPA has not developed an assessment for the carcinogenicity of HCl."). Obviously, if EPA does not know whether HCl causes cancer, the agency has not identified an established health threshold below which HCl does not cause cancer. For this reason alone, EPA cannot invoke section 112(d)(4) with respect to HCl.

B. EPA Is Not Authorized to Set Section 112(d)(4) Standards Based on A Surrogate Pollutant.

It is well established that when acting under section 112(d), EPA must set standards for each HAP emitted by a category or subcategory of sources. *National Lime Ass'n v. EPA*, 233 F.3d 625, 633-34 (D.C. Cir. 2000). Similarly, if the Agency invokes section 112(d)(4) authority to consider setting a health-based alternative standard, the Agency must conduct that evaluation on a pollutant-specific basis with respect to pollutants for which a health threshold is already established. See Fed. Reg. 25,049 n.162. Even if HCl could reasonably serve as a surrogate for the

other acid gases in setting MACT floors (a point which we do not concede), it cannot be a surrogate in health-based standard setting, because EPA must base any section112(d)(4) health based standard on a NOAEL threshold for the toxic pollutant in question. EPA seems to understand this point, *id.* & n. 163, at least as a technical matter. As EPA properly notes, 76 Fed. Reg. 25,049 n. 163, and as shown in Table III-1 below, for HCl, Cl_2, and HF, the primary health endpoint is respiratory irritation. For HCN, however, the primary health endpoint is neurological, and for HF, adverse bone density effects are also experienced with chronic exposures. Indeed, EPA notes that "[t]hese gases (*e.g.,* HF) can act on biological organisms in a different manner than HCl, and each of the acid gases affects human health with a different dose-response relationship." *Id.* It is not accurate or technically correct to select one acid gas (HCl) with one health endpoint to serve as a surrogate for another acid gas (HF or HCN) with a different health endpoint in health based standard setting "with an ample margin of safety" as resulting surrogate based health threshold simply will does not address or relate to the adverse health effects of the other HAP.

Additionally, acid gas health effects are based both on exposure and toxicity, and the degree of adverse affect due to these factors can vary significantly between the acid gas HAPs. The California standards for the acid gases Cl2, HF and HCN show that these pollutants are more toxic on a weight/volume basis than HCl (considering the respiration/inhalation pathway of exposure). And Cl2, HCN and HF are approximately 10 times more toxic than HCl for short-term exposures. Therefore, unless Cl2, HF, and HCN are *always* present at concentrations that are ten-fold lower than HCl, even for short durations (and EPA does not claim to posses such information), only pollutant-specific health-based thresholds could ever be technically supported.

C. The requirement that Section 112(d)(4) standards must incorporate "an ample margin of safety" prohibits EPA from acting under this section where it lacks evidence on certain dimensions of health risk

The "ample margin of safety" language in section 112(d)(4) means at the very least that any standard that is set under this authority must be sufficient to protect against significant unforeseen consequences, particularly where the Agency is aware that those consequences may occur, but simply does not have enough evidence about them. *See, e.g. EDF v. EPA*, 598 F.2d 62, 81 (D.C.Cir. 1978)(holding that the phrase 'ample margin of safety' in the Clean Water Act's toxic provisions required EPA to protect against as yet unidentified risks to human health, including those "which research has not yet identified."). The fact that EPA has asserted in previous rulemakings that it was appropriate to exercise section 112(d)(4) discretion in the absence of evidence of carcinogenic risk, and on the limited understanding of the health risks it did have,[4] does not make that interpretation correct.[5] The absence of evidence of risk is not sufficient to demonstrate that an "ample margin of safety" exists. In fact, EPA's prior view turns the statutory requirement, as interpreted by the D.C. Circuit, on its head. Because the 'ample margin of safety' requirement is meant to protect against risks that have not yet been identified in research, a section 112(d)(4) standard simply cannot be justified on grounds that EPA does not have sufficient evidence about the health risks posed by a HAP.

Additionally, the Administrator must evaluate the potential for environmental impacts when considering whether to exercise her discretion under section 112(d)(4). As the legislative history indicates, and EPA has correctly noted here that it has authority to consider adverse environmental effects as well in

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[4] See 76 Fed. Reg. 25,050 (citing the Agency's previous section 112(d)(4)decisions, which it characterizes as unit-specific, under the 1998 Pulp and Paper MACT, 63 Fed. Reg. at 18,765 (April 15, 1998) and Lime Manufacturing MACT, 67 Fed. Reg. at 78,054 (Dec. 20, 2002)).

[5] Indeed, EPA seems to recognize that its earlier decisions were in error, and recently has opted not to finalize section 112(d)(4) standards for acid gas HAPs emitted by Portland Cement Facilities, 75 Fed. Reg 54,970 (Sept. 9, 2010).

evaluating whether it may set a section 112(d)(4) standard. Fed. Reg. at 25,050. As EPA previously has said it understands, "employing a section 112(d)(4) standard rather than a conventional MACT standard '*shall not* result in adverse environmental effect which would otherwise be reduced or eliminated.' " See proposed Industrial Boiler MACT, 75 Fed. Reg. 32,006, 32,031 (June 4, 2010)(emphasis added) (quoting S. Rep. No. 228, 101st Cong., 1st Sess. (1989) at 171). It is therefore not only "*appropriate* to consider potential adverse environmental effects in addition to adverse health effects when setting an emission standard … under 112(d)(4)," 76 Fed. Reg. at 25,050 (emphasis added), EPA *must* do so, and must show that any resulting health threshold-based standard does not cause adverse environmental effects in excess of those that would result from a MACT standard.

D. Existing RfCs for the acid gases are insufficient to form the basis for a Section 112(d)(4) standard for EGU emissions of these pollutants.

EPA now distances itself from previous actions in previous rulemakings, in which it relied on the RfC for HCl as the basis for essentially exempting HCl from the statutory requirements by invoking section 112(d)(4). 76 Fed. Reg. at 25,050. Commenters assert that EPA acted unlawfully in doing so in those previous actions, and that it would be equally incorrect here to suggest that the existing RfC is an "established health threshold" that could as a legal or technical matter offer sufficient support for an alternative regulatory approach for HCl, whether as a surrogate or not. Nor can the existing RfCs for the other EGU acid gases (where they exist) be used in this way. And EPA correctly notes that it has never implemented a NESHAP that used section 112(d)(4) with respect to the acid gases HF, CL2, SeO2 or HCN. *Id.*

The inhalation Reference Concentrations, or RfCs, for Cl2, HF, HCN and HCl are shown in Table III-1. An inhalation RfC represents the air-related toxicity value for a noncancer health endpoint associated with exposure to an air toxic, and

is expressed in weight of the toxic per volume of air (mg/m^3).[6] The inhalation RfC provides a continuous inhalation exposure estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. The inhalation RfC considers toxic effects for both the respiratory system (a portal of entry) and effects peripheral to the respiratory system (extra-respiratory or systemic effects). An RfC can be derived from a 'no observed adverse effect level' (NOAEL), 'lowest observed adverse effect level' (LOAEL), or benchmark dose, with uncertainty factors generally applied to reflect limitations of the data used.[7] Reference values may also be derived for acute (≤24 hours), short-term (>24 hours, up to 30 days), and subchronic (>30 days, up to approximately 10% of the life span) exposure durations, all of which are derived based on an assumption of continuous exposure throughout the duration specified. RfDs and RfCs are generally used in noncancer health assessments.

Table III-1 summarizes U.S. EPA (via the Integrated Risk Information System, IRIS[8]) and California Environmental Protection Agency (Cal EPA) toxicity values[9] for the acid gases HCl, Cl_2, HF, and HCN. IRIS is a human health assessment program that provides high-quality science-based human health assessments to support EPA's regulatory activities. IRIS is prepared and maintained by the EPA's National Center for Environmental Assessment within the Office of Research and Development.[10] IRIS contains toxicity values for noncancer

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[6] See U.S. EPA, "A Review of the Reference Dose and Reference Concentration Processes. Risk Assessment Forum, Washington, DC" (2002). EPA/630/P-02/002F. Available at: http://www.epa.gov/ncea/iris/RFD_FINAL1.pdf.

[7] *Id.*

[8] Available at http://www.epa.gov/ncea/iris/index.html.

[9] Available at http://www.oehha.ca.gov/air/allrels.html.

[10] Animal studies can form the basis for these thresholds, as is clear from Table III-1. To account for the fact that humans may be more or less sensitive than the test animal, a 10-fold uncertainty factor is usually applied to the NOAEL. This uncertainty factor is called the "interspecies uncertainty factor." An additional 10-fold uncertainty factor, the "intraspecies uncertainty factor," is usually applied to account for the fact that some humans may be substantially more sensitive to the

and cancer endpoints. In addition, Table III-1 contains Cal EPA toxicity values, which are promulgated for use in California by the state's environmental agency, but which are not necessarily endorsed or adopted ("established") by U.S. EPA. Thus, while Cal EPA values are presented here to indicate the acid gases for which one well-regarded governmental agency has determined that enough toxicity information is available to set an exposure threshold, that fact does not mean that the Cal EPA values are "established" for the purposes of section 112(d)(4), as discussed below.

Table III-1: Regulatory toxicity values from IRIS and Cal EPA.

Acid Gas	Regulatory Agency	Type of Inhalation Toxicity Value	Value	NOAEL/LOAEL basis? Confidence?	Study Population/ Exposure Type	Target Organ	References
HCl	U.S. EPA	Chronic Reference Concentration	0.02 mg/m^3	LOAEL: 15.0 mg/m^3 (10 ppm) Low confidence in RfC.	Rats/ Chronic	Respiratory tract	Sellakumar et al., 1985; Albert et al., 1982
	U.S. EPA	Carcinogenicity	This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.				
	Cal EPA	Chronic Reference Exposure Level	0.009 mg/m^3		Rats/ Chronic	respiratory tract	Sellakumar, et al., 1985
	Cal EPA	Acute 1-hour Reference Exposure Level	2.1 mg/m^3		Asthmatics aged 18-25/ Acute (45 minutes)	respiratory system, eyes	Stevens et al., 1992
	Cal EPA	Carcinogenicity	No cancer potency value listed.				
Cl_2	U.S. EPA	Chronic Reference Concentration	No chronic inhalation value determined at this time.				
	U.S. EPA	Carcinogenicity	Not available at this time.				
	Cal EPA	Chronic Reference Exposure Level	0.0002 mg/m^3		Rats/ Chronic	upper respiratory epithelial lesions	Wolf et al., 1995
	Cal EPA	Acute 1-hour Reference Exposure Level	0.21 mg/m^3		Adult volunteers/ Acute (30 minutes)	itching or burning of throat	Anglen, 1981
	Cal EPA	Carcinogenicity	No cancer potency value listed.				
HF	U.S. EPA	Substance not listed					
	CalEPA	Chronic Reference Exposure Level	0.014 mg/m^3		Adult occupational/ Chronic (5 to 26 yrs)	Bone density effects	Derryberry et al., 1963
	CalEPA	Acute 1-hour	0.24		Adult	Upper	Lund et al.,

effects of substances than others. Additional uncertainty factors may also be applied. If studies using human subjects are the basis of a RfC, then the interspecies uncertainty factor can be reduced to as low as 1, but generally the 10-fold intraspecies uncertainty factor is retained.

		Reference Exposure Level	mg/m^3		volunteers/ Acute (1 hour)	respiratory tract irritation	1997
	Cal EPA	Carcinogenicity	No cancer potency value listed.				
HCN	U.S. EPA	Chronic reference concentration	0.003 mg/m^3	LOAEL: 7.07 mg/m^3 (6.4 ppm). Low confidence in RfC.	Adult occupational/ Chronic	CNS and thyroid	El Ghawabi et al., 1975
	U.S. EPA	Carcinogenicity	This substance/agent has not undergone a complete evaluation and determination under US EPA's IRIS program for evidence of human carcinogenic potential.				
	Cal EPA	Chronic Reference Exposure Level	0.009 mg/m^3		Adult occupational/ Chronic	CNS and thyroid	El Ghawabi et al., 1975
	Cal EPA	Acute 1-hour Reference Exposure Level	0.34 mg/m^3		Monkeys/ Acute (30 minutes)	CNS depression	Purser, 1984; Purser et al., 1984
	Cal EPA	Carcinogenicity	No cancer potency value listed.				

ppm=parts per million

To serve as the basis for a section 112(d)(4) standard, the "established health threshold" must be based on a NOAEL, as described *supra*. A NOAEL is the highest concentration where no adverse effect is observed in the most sensitive health endpoint among all studies examined. As Table III-1 indicates, there are no NOAELs forming the basis for existing RfCs for HCl, HF, Cl_2 or HCN. A NOAEL relates to a specific adverse health endpoint and cannot be assumed to apply to all health endpoints. The existence of a NOAEL set for a particular health endpoint for a specific pollutant cannot be interpreted to mean that there are no other health endpoints adversely affected by exposure to that pollutant; rather only that the other health endpoints do not occur at the concentration seen for the NOAEL of the most sensitive endpoint. If effects are observed at all dose levels tested, then the smallest dose tested, the Lowest Observed Adverse Effect Level (LOAEL) is used to calculate the RfC. An additional uncertainty factor usually is applied in these cases, since the NOAEL, by definition, would be lower than the LOAEL had it been observed.

As table III-1 demonstrates, however, the existing RfCs for both HCN and HCl are based on studies providing 'LOAEL values, as no appropriate studies providing NOAEL values are available. These RfCs also are "inhalation RfCs" – that is they represent the health risk and toxicity associated with the inhalation pathway of exposure only. But for these pollutants, there are other exposure

pathways (the skin and eyes for example) by which health effects can occur. So, even if these RfCs were set on the basis of a NOAEL (which they are not), they would be an inadequate basis for section112(d)(4) standard setting. Additionally, no RfC is available for Cl_2 at all, and HF is not among the 540 substances listed within IRIS, so no RfC is available for that acid gas. Finally, in evaluating the evidence that is available, for HCl and HCN, EPA states it has "low confidence" in the RfC values.

Indeed, EPA has acknowledged that exposure to HCl does damage people's health by conceding that it causes "corrosive tissue damage." 71 Fed. Reg. 76,542. Although EPA has claimed in the past that such damage does not constitute "adverse effects" because the tissue damage "does not exceed an organism's ability to repair it" — *i.e.*, is not permanent or fatal, *id.*, that argument was capricious – even preposterous – at the time, and commenters hope that EPA no longer even entertains it. Damage to an "organism's" tissue — *e.g.* the lung tissue of a child — *is* an adverse health effect. By contrast, EPA regularly relies on the American Thoracic Society's Statement on "What Constitutes an Adverse Health Effect of Air Pollution?" in reviewing the effects of pollutants under Sections 108 and 109.[11] That statement[12] identifies adverse respiratory effects to include clearly reversible health endpoints such as "acute upper respiratory tract infections that do not interfere with normal activity" and "increased prevalence or incidence fo cough/phlegm production requiring medical attention." Congress did not intend EPA to invoke section 112(d)(4) unless it was established that there would be no adverse health effects and, *a fortiori*, did not intend the agency to do so when it knew that there would be any adverse health effects.

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[11] See, for example, U.S.EPA. 2008. *Integrated Science Assessment for Sulfur Oxides: Health Criteria*, p. 1-12 – 1-13 and U.S, EPA, 2009. *Integrated Science Assessment for Particulate Matter*, p.1-23.

[12] American Thoracic Society. 2000. What Constitutes and Adverse Health Effect of Air Pollution, Am J Respir Crit Care Med. 161: 665-673.

As noted above, in evaluating human health risk for noncancer endpoints, it is equally important to consider short-term exposures as well as long-term/chronic exposure to these emissions. Moreover, health effects depend upon both exposure and toxicity, and for acute effects, HF and HCN are more toxic on a weight/volume basis than HCl. The Cal EPA sets an acute reference exposure level (1 hour exposure) (REL) as 2.1 mg/m^3 for HCl, 0.21 mg/m^3 for Cl_2, 0.24 mg/m^3 for HF, and 0.34 mg/m^3 for HCN. Therefore, Cl_2, HF, and HCN are approximately 10-fold more toxic than HCl on a weight-standardized basis for short-term exposures. For these reasons, as well, unless Cl_2, HF, and HCN are *always* present at concentrations that are at least 10-fold lower than HCl, even for short (1-hour) durations (a point on which EPA does not have information in the record for this rulemaking), only separate health-based thresholds, established for each acid gas, could ever be used to support a section 112(d)(4) standard.

Respiratory effects (the endpoint of most concern for HCl, Cl_2, and HF but not HCN) are likely after short-term exposures to high concentrations of acid gases. EPA asserts that it has little information on the peak short-term emissions of HCl from boilers, however. Were the existing RfCs used as the basis for a section 112(d)(4) alternative standard (and we do not concede they could be used in this way), compliance with the health-based threshold would therefore be based on long-term average exposures. Lack of data on exactly what these intermittent peak exposures might be, however, is not sufficient reason to adapt a threshold based solely on chronic exposures. As discussed above, inhalation RfCs exist only for two of the acid gases emitted by EGUs, HCl and HCN, and both of these RfCs reflect only studies of chronic exposures.

It is notable that none of the four acid gases examined, HCl, CL_2, HF, or HCN, has undergone a complete evaluation and determination of human carcinogenic potential under the IRIS program. As described above, this absence of information does not provide evidence that there is an absence of risk. Because section 112(d)(4) requires any alternative to a MACT standard to be based on both

"no adverse effects" and an "ample margin of safety," the incomplete nature of this evaluation makes a section 112(d)(4) standard unavailable for these pollutants. EPA's IRIS evaluates cancer risks through a two-step process, which first evaluates whether a pollutant is carcinogenic, and then, if so further describes its toxicity. The first step uses a cancer weight-of-evidence descriptor to describe a substance's potential to cause cancer in humans, and the conditions under which the carcinogenic effects may be expressed. Under the EPA's 2005 guidelines for carcinogen risk assessment, a narrative approach is used to characterize carcinogenicity.[13] Five standard weight-of-evidence descriptors (*Carcinogenic to Humans, Likely to Be Carcinogenic to Humans, Suggestive Evidence of Carcinogenic Potential, Inadequate Information to Assess Carcinogenic Potential,* and *Not Likely to Be Carcinogenic to Humans*) are used as part of the narrative.

In the second IRIS step, for pollutants found to be carcinogenic at step 1, cancer slope factors (for oral exposures) and unit risks (for inhalation exposures) are used to estimate the risk of cancer associated with exposure to a carcinogenic or even a potentially carcinogenic substance. A unit risk is defined as the upper-bound, approximating a 95% confidence limit, of excess lifetime cancer risk estimated to result from continuous exposure to an agent at a concentration 1 mg/m^3 in air. The interpretation of unit risk for a substance in air would be as follows: if unit risk = 2×10^{-6} per mg/m^3, one might expect, as an upper bound estimate of risk, that based on a lifetime daily exposure to 1 mg/m^3 of the substance in air, up to 2 excess cancer cases may develop per 1,000,000 exposed individuals.

The California EPA, under its Office of Environmental Health Hazard Assessment, conducts health risk assessments of chemical contaminants found in air, including those identified as toxic air contaminants under California's Air Toxics Hot Spots Act. Assessments can include development of Cancer Potency

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[13] U.S. EPA (2005). Guidelines for Carcinogen Risk Assessment. U.S. Environmental Protection Agency, Washington, DC, EPA/630/P-03/001F, 2005. Available at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=116283.

Factors[14] to assess the cancer risk from carcinogens in air, and development of Reference Exposure Levels (RELs) to assess noncancer health impacts. Cal EPA has set both chronic RELs and acute RELs for the four acid gases considered in this rulemaking (see Table III-1). These limits are not U.S. EPA limits, however, and just as for the EPA RfCs, they do not include cancer risk assessments for these pollutants.

E. Section 112(d)(4)'s Requirement to Set Any Health-Based Standards With "An Ample Margin of Safety" Requires Evaluation of Synergistic Health Effects.

EPA correctly notes that the fact that EGUs can be located in close proximity to a wide variety of industrial facilities makes predicting and assessing all possible mixtures of HCl and other acid gases difficult, if not impossible. 76 Fed. Reg. 25,050. By the same token, the fact that EGUs are often located in close proximity to other industrial facilities means that the cumulative effect of such interactions is a necessary component to any evaluation of health thresholds "with an ample margin of safety." EPA's comment that it could set such standards at a level that "at lease assures that persons exposed to emissions of the pollutant would not experience the adverse health effects on which the threshold is based due to source in the controlled category or subcategory," 76 Fed. Reg. at 25,050-51, ignores these synergistic effects between the emissions from the source in the controlled category and other sources in close proximity to it. EPA may not disregard the fact that there are other sources of air toxics, or other air pollutants located in the vicinity, in setting section 112(d)(4) standards. Such an approach would discount potential toxicologic interactions. Since all of the acid gases are respiratory irritants, one way to account for potential toxicologic interactions of these pollutants would be the use of the hazard index (HI) approach, as described in EPA's "Guideline for the Health

[14] Available at http://www.oehha.ca.gov/air/hot_spots/tsd052909.html.

Risk Assessment of Chemical Mixtures" and the Supplement thereto.[15] 76 Fed. Reg. 25,050.

EPA asserts that in the absence of information on interactions, the Agency assumes an "additive cumulative effect" citing the Supplementary Guidance. Based on its Hazard Index approach,[16] and in the absence of studies explicitly addressing the toxicity of mixtures of HCl with other respiratory irritants, EPA is taking the position that *if* the different acid gases affect health through the same health endpoint, they can be assumed to interact additively. However, this fundamental assumption is not correct. At least one of the acid gases emitted by EGUs, HCN, is a known neurotoxin. Its health effects therefore must not be considered additive with the health effects of other acid gases for which the health endpoint is different. Additionally, although Table III-1 shows the effects for the target organs and pathways studied, there are other pathways of exposure affecting other target organs, and the combined effects are not additive just as the effects of HCN are not additive with HCl. For these reasons, the Agency should not assume additive cumulative effects among these HAP.

For example among the pollutants that may be emitted by other emissions units in the vicinity is particulate matter ("PM"), including PM in the respirable size range, PM_{10} (PM that are 10 micrometers [µm] in aerodynamic diameter) and smaller. Under atmospheric conditions volatile HAPs that are emitted by boilers can condense onto or react with the surface of these PM, allowing the HAPs to travel along with the particles. Such particles can serve as "carriers" to bring the adhered HAPS deep within the lung, where the HAPS can interact with the

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[15] US EPA 2000. Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures. U.S. Environmental Protection Agency, Washington DC. EPA/630/R-00/002. Available at: http://www.epa.gov/nceawww1/pdfs/chem_mix/chem_mix_08_2001.pdf. This guidance replaced previous U.S. EPA "Guidelines for the Health Risk Assessment of Chemical Mixtures," 51 Fed. Reg. 34,014 (Sept. 24, 1986), available at: http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=22567.

[16] 75 Fed. Reg. at 32032 referencing "Guidance for the Health Risk Assessment of Chemical Mixtures" (no citation given), but see previous note.

respiratory system directly or be leached off of the particle surface and become available systemically. Other HAPS and criteria pollutants may also be present on PM, including transition metals, ions (sulfate, nitrate), organic compound, carbonaceous material, minerals, reactive gases, and materials of biologic origin.[17]

The wide variety of HAPs and other pollutants EGUs emit, plus the proximity of other industrial and mobile sources of HAPS provide multiple opportunities for reaction and makes predicting and assessing all possible mixtures of HCl and other emitted air pollutants difficult, if not impossible. Because the statute requires standard setting with an "ample margin of safety" when section 112(d)(4) is invoked, as discussed above, these synergies make section 112(d)(4) standard setting practicably impossible to do lawfully for this industrial category.

F. Section 112(d)(4)'s Requirement to Set Any Health-Based Standards With "An Ample Margin of Safety" Requires Evaluation of Health Effects Beyond the EGU Fenceline. Environmental Justice Concerns Mitigate Against Anything Other than MACT-based Standards for this Reason.

Existing coal- and oil-fired EGUs are disproportionately located in industrial areas that are lower income or areas in which concentrations of persons of color reside. 76 Fed. Reg. 25,089-90 & Table 30. Because as EPA notes, "the fact that EGUs can be located in close proximity to a wide variety of industrial facilities makes predicting and assessing all possible mixtures of HCl and other emitted air pollutants difficult, if not impossible," 76 Fed. Reg. at 25,050, that fact also means that it is impossible for EPA fully to assess the health effects "with an ample margin of safety" of the combination of the air pollutants from these facilities on the people living in the vicinity. This fact pattern alone illustrates why national MACT standard setting is and must be the default requirement in the 1990 Clean Air Act, rather than "health-based" standard-setting under section 112(d)(4). The fact that

[17] *See, e.g.*, Chapter 3, U.S. EPA. Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F, 2009, available at http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=216546.

EGUs and other major industrial sources of air toxics are often located together with other sources of HAPs, including area sources and mobile sources, is a key reason (although not the only reason) that the former, exclusively health-based scheme for standard setting, was so unworkable. Not only are the physical interrelationships between the HAPs synergistic, making specific health effects very difficult to predict, but each situation will involve HAPs with different characteristics with respect to spatial distributions and health endpoints. Defining the geographic scope will not be possible on a nationwide basis.

These issues obviously implicate questions related to environmental justice concerns. As EPA reports, its own analysis demonstrate that "coal-fired EGUs are located in areas where [the] minority share of the population living within a 3-mile buffer is higher than the national average. For these same areas, the percent of the population below the poverty line is also higher than the national average." 76 Fed. Reg. at 25,090. EPA's analysis further shows that "some EGUs emit enough Ni or Cr to cause elevated lifetime cancer risks greater than 1 in a million in nearby communities, and that there are localized areas with elevated levels of [mercury] deposition around most U.S. EGUs." *Id.* at 25,089. As mentioned in Chapter 1, mercury hot spots will be of particular concern for subsistence fishers who must eat their catch either for economic, or in some instance (as is the case for some Native American tribes) cultural reasons. Information gathering and better understanding of the cumulative health impacts in areas where many sources of HAP are located together (for example, in industrial areas) would be beneficial. But we assert that the issues EPA raises here amply demonstrate that it is impossible to set a national health-based standard for these air toxics that incorporates an "adequate margin of safety."

IV. Statutory Compliance Deadlines And Electric System Reliability

The Clean Air Act compels the Agency to establish a compliance deadline for existing sources that requires such sources to meet the MACT standards "as expeditiously as practicable, but in no event later than three years after the effective date" of the standards' effective date.[1] 42 U.S.C. § 7412(i)(3). The Agency acknowledges that the controls required by the mercury and particulate standards can uniformly be installed in "significantly less than 3 years," and that many owners and operators already have installed controls needed to meet those standards, or are in the process of installing them. *See* 76 Fed. Reg. at 25,054-56. Units that already have installed scrubbers, for example (more than half of the existing fleet, with additional installations planned or ongoing), need only optimize those controls to meet the new acid gas standards. Even where additional equipment is needed to meet some standards, technology vendors agree that the required controls can be installed in one or two years. *Id.* at 25,054 n.172. The vast majority of sources should consequently be able to reduce emissions to the meet the standards within three years, without need for the one-time case-by-case extension of "up to one year" available by permit from the Administrator or a State if "necessary for the installation of controls." 42 U.S.C. §7412(i)(3)(B).

A. EPA May Not Alter the Statutory Deadlines Provided in Section 112(i)

EPA has no authority to provide a deadline for any category or subcategory that exceeds the statutory three-year maximum. *Natural Resources Defense Council v. E.P.A.,* 489 F.3d 1364, 1373-74 (D.C. Cir. 2007). Nor may EPA extend any particular source's compliance deadline beyond three years, unless the standards set forth in the statute for such an extension are met, *e.g.,* 42 U.S.C. §§7412(i)(3)(B) (authorizing the Administrator or a State to grant up to one year

[1] New and reconstructed units must be in compliance immediately upon start-up, or on the effective date of the final rule, whichever is later. 42 U.S.C. § 7412(i)(1); *accord,* 76 Fed. Reg. at 25,054.

extensions on a case-by-case basis "if necessary for the installation of controls"), (5) (allowing longer compliance period for sources that achieved certain reductions prior to first proposal of standards), & (6) (5-year compliance period where BACT or LAER controls have been installed on "the same …stream of pollutants" prior to the effective date of the MACT standards).[2]

Congress provided, in section 112, an explicit and comprehensive scheme defining the deadlines by which existing sources must comply. The Agency has no discretion to add to that scheme, as Congress emphasized: "*in no event*" may EPA provide more than "3 years after the effective date of [the] standard" for an existing source to comply. 42 U.S.C. § 7412(i)(3)(A) (emphasis added).[3] *See Natural*

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[2] There should be no need for the Presidential exemption authorized by 42 U.S.C. § 7412(i)(4). Such an exemption is available only where the required control technology is "not available," *id.,* and EPA has confirmed that the technologies required here have long been available, *see* 76 Fed. Reg. at 25,054-56. And neither EPA nor any other party has made a particularized showing that such exceptions are likely to advance the "national security interests of the United States." 42 U.S.C. § 7412(i)(4).

[3] To our knowledge, EPA has attempted to alter those deadlines only once: by making the 8-year compliance schedule provided in Section 112(j)(6) available to plants that obtain a case-by-case MACT limit under Section 112(g). 40 C.F.R. § 63.44(b)(1). When it proposed that alteration, EPA asserted that it was filling "gaps left by Congress in Section 112(g)." 59 Fed. Reg. 15,504, 15547-48 (April 1, 1994). The statutory language belies the existence of any such gap; on the contrary, its detail and specificity suggest completeness. *See also Natural Resources Defense Council,* 489 F.3d at 1374. Congress declined, in Section 112, to provide an exception for sources obtaining case-by-case limits under Section 112(g). The existence of such an exception for sources subject to section 112(j) does not permit EPA to add that exception; rather, "when the legislature uses certain language in one part of the statute and different language in another, the court assumes different meanings were intended." *Sosa v. Alvarez Machain,* 542 U.S. 692, 712 n.9 (2004) (citation omitted). At any rate – whether or not EPA's past alteration of the statutory deadlines is permissible – there is no gap in Section 112(i) (or anywhere else in Section 112) that would allow the Agency to extend the compliance schedule in this rule beyond the three to four years specified in Section 112(i)(3). Finally, because the proposed rule failed to include or suggest extensions beyond the clear and complete schedules reflected in Section 112(i), any such extensions in the final rule would be impermissible procedurally as well as invalid substantively.

Resources Defense Council, 489 F.3d at 1374 (noting that Congress "set an outer limit of three years" for compliance). "Congress has spoken on the question and not provided EPA with authority . . . to extend the compliance date" in the statute. *Id.* (citation omitted).[4]

We note that for purposes of calculating the compliance deadlines for the standards, their "effective date" should be no later than the date on which they are published in the Federal Register. Section 112(d)(10), and EPA's implementing regulations, specify that "emissions standards promulgated under this subsection shall be effective upon promulgation." 42 U.S.C. § 7412(d)(10); 40 C.F.R. § 63.2 (defining "effective date" as "the date of promulgation in the Federal Register of such standard"). *See also Horsehead Res. Dev. Co. v. E.P.A.,* 130 F.3d 1090, 1095 (D.C. Cir. 1997) (regulations are promulgated no later than when published in Federal Register). While the Congressional Review Act requires a sixty-day delay before the standards become operative, it does not alter the standards' effective date. *Liesegang v. Secretary of Veterans' Affairs,* 312 F.3d 1368, 1375-76 (Fed. Cir. 2002).

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[4] If a specific facility fails to comply within the statutory time-frame, EPA may require compliance on a schedule which will, by definition, exceed the statutory timeframe. 42 U.S.C. §7413(a)(3) &(4) (allowing such orders to "specify a time for compliance which the Administrator determines is reasonable," and requiring that "any order issued under this subsection shall require the person to whom it was issued to comply with the requirement as expeditiously as practicable but in no event longer than one year after the date the order was issued, and shall be nonrenewable."). That general enforcement authority does not, however, allow EPA to broadly exempt a source (or sources) from the statutorily defined time-lines, whether through its rulemaking authority or otherwise. Parties may not "agree to take action that conflicts with or violates the statute" from which the consent decree emerges. *Local No. 93, Intern. Ass'n of Firefighters, ALF-CIO C.L.C. v. City of Cleveland,* 478 U.S. 501, 526 (1986). *Cf. Conservation Law Foundation v. Franklin,* 989 F.2d 54, 60-61 (1st Cir. 1993) (approving consent decree delaying compliance only where statute provides agency "discretion to set a timetable").

B. Existing Source Compliance Is Practicable In Three Years, or Less

EPA proposes to offer the maximum three year compliance period for existing sources, characterizing that timeframe as being "as expeditious[] as practicable," given that the standards will "require the control technology industry to ramp up quickly." *Id.* at 25,055. The Agency's supporting analysis is based largely on controls produced to comply with the Clean Air Interstate Rule (CAIR). EPA's analysis indicates, however, that those controls were installed at a rate that would allow compliance in well under three years. *An Assessment of the Feasibility of Retrofits* 12 (U.S.E.PA. Office of Air & Radiation March 9, 2011). And CAIR required a smaller group of significantly more resource-intensive controls than will be required by this rule.

The record indicates that at present over 50 percent of EGUs have already installed technologies EPA asserts can be used to meet the standards, and that many more scrubber installations are pending. 76 Fed. Reg. 25,054. *See also* U.S. EPA, Coal-fired Characteristics and Controls: 2010: Table of Coal Unit Characteristics: 2010 & Summary of Coal Unit Controls: 2010, available at http://www.epa.gov/airmarkets/quarterlytracking.html (last checked July 31, 2011). According to a 2009 study prepared by the U.S. General Accounting Office, many existing coal-fired power plants achieved substantial mercury controls given then-installed control technologies – up to 98 percent from inlet mercury levels.[5] Given plants' ability to meet the standards with existing controls, the diversity of available control options that can meet the standards, and the relatively short timeframe necessary to install the necessary controls, 76 Fed. Reg. 25,054-56, EPA's

[5] U.S. Government Accountability Office, "Clean Air Act Mercury Control Technologies at Coal-Fired Power Plants Have Achieved Substantial Emissions Reductions," Report to the Chairman, Subcommittee on Clean Air and Nuclear Safety, Committee on Environment and Public Works, U.S. Senate (GAO-10-47 Oct. 2009), available at http://www.gao.gov/new.items/d1047.pdf.

proposed three year compliance period is entirely reasonable, despite the protestations of various industry spokespersons during the public comment period.[6]

C. Compliance Within the Statutory Deadlines Will Not Adversely Affect Electric System Reliability

EPA also asserts the maintenance of reliable electricity supplies supports its proposed industry-wide three-year compliance schedule. 76 Fed. Reg. at 25,055. But information in current studies shows that shorter compliance periods are in most instances achievable – particularly given that EPA's proposed standards can be met by a variety of control options beyond retrofits with wet scrubbers. See BPC Report at 26-27 & nn.63 & 66 (citing studies). The analysis underlying EPA's

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[6] *See, e.g.* Oral Statement of Chris Hobson, The Southern Company, MACT Public Hearing Atlanta Georgia (May 26, 2011). Mr. Hobson's broad statements about the need for installation of pollution controls to meet the standards and concern about the three year compliance period are belied by his recognition that the industry has had many years to get ready for the clear requirements of the Act, prior to the proposal and finalization of this rule, and indeed that his company has been able to respond by "install[ing] more pollution controls than any other." These, and other similar claims, are not accompanied by any specific evidence – while other, well-supported reports confirm the opposite is true. See, *e.g.*, Bipartisan Policy Center, Environmental Regulation and Electric System Reliability 27 & nn. 66-67 (June 13, 2011), available at http://www.bipartisanpolicy.org/library/report/environmental-regulation-and-electric-system-reliability (hereinafter "BPC Report") (noting "most pollution control projects can be implemented in less than two years from design to start-up without the need for outage or with the final step occurring during a regularly scheduled maintenance period so as to avoid additional outage time") (citing URS Corp., Lipinski, G., *et al.*, "Assessment of Technology Options Available to Achieve Reductions of Hazardous Air Pollutants" (April 2011), available at http://www.supportcleanair.com/resources/studies/file/4-8-11-URSTechnologyReport.pdf (last visited July 31, 2011)).

Other complaints have suggested that design defects in certain models of scrubbers may require unexpected repairs, and suggested that those defects warrant a delay in compliance. *E.g.,* Columbus Ohio Dispatch, July 11, 2011. To the extent that such defects exist, their manufacturers and owners should be able to remedy them within three years (indeed, the regulatory requirements that led to those scrubbers' installation and operation will presumably require them to do so). And difficulties with a handful of pollution-control devices could not justify an industry-wide delay in compliance.

proposal indicates that current reserve margins are projected at 25%; the Agency acknowledges that reserve margins will be sufficient to buffer any reliability related concerns associated with installation schedules. Resource Adequacy and Reliability in the IPM Projections for the Toxics Rule at 2-3.

Moreover, utilities have had many years to prepare for compliance with these rules, and EPA's record shows that many of them have already started installing the necessary controls. 76 Fed. Reg. 25,056. The D.C. Circuit vacated EPA's "delisting" of power plants in 2008, more than three years ago. *New Jersey v. EPA,* 517 F.3d 574 (D.C. Cir 2008). The record and various studies show that dry sorbent and activated carbon injection systems are relatively quickly installed, and can be put in place without unscheduled outages. 76 Fed. Reg. 25,055-56; BPC Report at 15, 27 (citing studies) (http://www.bipartisanpolicy.org/library/report/environmental-regulation-and-electric-system-reliability).

EPA therefore should be able to establish and stick to a prompt yet reasonable compliance schedule. In the unlikely event of site-specific difficulties with the installation of controls, creating particular reliability concerns, the statute authorizes the Administrator or a State with an approved program to grant a single extension of "up to 1 additional year to comply."[7] 42 U.S.C. §7412(i)(3)(B).

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[7] Some have suggested that the statutory one-year extension, or even further extra-statutory extensions or exemptions, might be granted for so-called "reliability-must-run" (RMR) sources, as defined by local system operator agreements or other unspecified legal authority. System operator agreements may not trump the plain text of the Clean Air Act, which requires expeditious compliance with MACT standards by listed source categories, to avoid the significant public health implications of prolonged exposure to air toxics. However, should EPA or an approved State entertain the idea of authorizing case-by-case one-year extensions beyond the basic three year compliance period for RMR sources or units, such extensions must be accompanied by limits on the operation of such sources or units to contain that operation to true "must run" situations, needed for real reliability reasons. Such extensions also must comply with the statutory conditions and requirements discussed in these comments.

D. Shut-down of Existing Units Is a "Pollution Control," and EPA May Consider the Construction of Replacement Power in Applying the Statutory Criteria Governing Compliance Deadlines

EPA notes that it, or approved state agencies, may receive requests for the one-year extension authorized by section 112(i)(3)(B), from facilities planning to permanently shut down and replace existing units with new, lower polluting generation. Because permanent shut-down of an existing unit is a form of "pollution control" – indeed in some cases, the best form of pollution control – shut-downs may be considered a form of meeting MACT standards as discussed in this section.[8] The Agency and approved states may consider, at the end of the three-year compliance period, applications for up to one-year extensions on a one-time, case-by-case basis – but only where such an extension is demonstrably necessary to shut down the existing units at issue in the applications. If the unit (or units) cannot be practicably shut down within the ordinary three-year compliance period without the construction of replacement facilities, the statute allows EPA (or state agencies) to take the time necessary to construct those facilities into account when assessing applications for permits allowing the one-year extension described by section 112(3)(B). See 42 U.S.C § 7412(i)(3)(A)&(B).

The Agency specifically seeks comment on whether the phrase "installation of controls" can be read not only to include changes made to an existing unit, but also the replacement of that unit with new, cleaner generation. 76 Fed. Reg. 25,055. Regardless of the answer, such an interpretation is not necessary to support the result EPA seeks: availability of the statutory one-year extension, where necessary to construct replacement power which is, in turn, required to accommodate the shut-down of an existing unit.

Shut-down of an existing unit is within the definition of a pollution "control" under Section 112, as well as under the Act generally. Section 112 uses "emission

[8] If EPA allows compliance on an average basis within a specific facility, however, shut-down units should not and may not be allowed to combine their emissions with operating units. *See* Section XI.B.

control" broadly to refer to pollution reductions of any sort. *See, e.g.,* 42 U.S.C. § 7412(d)(3), (d)(5), (d)(6), & h(1) (all using "control" to refer to pollution-reduction and referring to "emission control" achieved by "best controlled similar source"). In keeping with that general synonymy, Section 112 defines "maximum achievable *control* technology" limit as a limit reflecting the "maximum degree of *reduction*" achievable. 42 U.S.C. § 7412(d)(2) & (g)(2) (emphasis added). And the statute confirms that any "measure[]," "method[]" or "technique[]" that reduces hazardous air pollution may be prescribed to accomplish the necessary limitation. 42 U.S.C. § 7412(d)(2). Elsewhere in the statute, as well, the term "control" is defined broadly enough to include the cessation of polluting operations. *See, e.g.,* 42 U.S.C. § 7479 (defining "best achievable control technology"). Closure of a high-polluting unit is a measure that reduces pollution, and is therefore a "control" under the Act. EPA has, accordingly, recognized in its consent decrees that shut-down is under some circumstances a method of pollution-reduction that is a "control technology" within the meaning of the Act. *See, e.g.,* Consent Decree*, United States v. Tampa Electric Co.,* Civ. No. 99-2524 (M.D. Fla. 204) at 7-8 (prescribing permanent shut-down amongst "emissions reductions and controls" required to comply with Clean Air Act).[9] Consequently, the word "control" in Section 112 encompasses the shut-down of a polluting unit, and "installation of controls" should be understood to include the on-site physical operations required to accomplish permanent shut-down.

The accompanying term "practicable," in section 112(i)(3)(A), allows EPA to consider the need to provide replacement power necessary to permit such a permanent shut-down. Section 112(i)(3) allows EPA (or state agencies) to provide up to one additional year to an existing source where "necessary for the installation of controls," 42 U.S.C. § 7412(i)(3)(B), while also establishing that controls are to be installed "as expeditiously as practicable," 42 U.S.C. §7412(i)(3)(A). Whether an extension is "necessary" for the installation of controls must be informed by whether those controls can "practicabl[y]" be put in place at an earlier date. Read together,

[9] http://www.epa.gov/compliance/resources/decrees/civil/caa/tecocd.pdf

sections 112(i)(3)(A) & (B) allow an extension of up to one year to be granted on a case-by-case basis for facilities at which controls cannot practicably be installed within three-years. EPA has, elsewhere in its proposed rulemaking, considered reliability to determine the pace at which controls can practicably be installed. *See* 76 Fed. Reg. at 25,054, 25,056 & nn. 177-178 (describing EPA's efforts and intention to work with FERC, NERC, the Department of Energy, and regional transmission organizations on issues related to compliance and reliability, particularly in the event unit shutdowns occur in load-constrained areas).

Consequently, if the absence of replacement power demonstrably renders shut-down of a unit or plant impracticable within three years, and that is the chosen compliance method by the plant operator, EPA or an approved state may, on a case-by-case basis, authorize a single extension of up to one year for the source to comply. Fidelity to the statute's commands that compliance occur "as expeditiously as practicable," and that extensions be allowed only where "necessary," requires that extensions under section 112(i)(3)(B) be issued only on a case-by-case basis, where the following minimum plant-specific conditions are met: (1) the agency confirms that permanent shut-down is prescribed, (and mandatory) in order to comply with section 112, and that this requirement is enforceable under federal law; (2) the plant demonstrates that replacement power is necessary to permit the unit or plant to shut down (in many cases, demand-side reductions or existing power supplies are likely to permit shut-down without the construction of new facilities); (3) the applicant has proceeded as expeditiously as possible, and (4) the required replacement power cannot practicably be put in place within three years.[10]

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[10] These basic pre-conditions must be met before any permit under 112(i)(3)(B) may be issued, whether the means of pollution control is shut-down, addition of new mechanical systems, or something else entirely. The plant-owner should be required to demonstrate the delayed controls will result in pollution reductions that exceed those that could practicably achieved by controls that could be installed more quickly – otherwise, the extension cannot be said to be necessary. The permit should, for the same reason, include federally enforceable conditions ensuring emissions reductions equivalent to (or greater than) those resulting from the delayed controls. And the plant-owner must demonstrate that the specified control

cannot be accomplished within three years, even with diligent and maximally expeditious effort (and that it has proceeded expeditiously to date); otherwise, either the extension is unnecessary, or the controls will not be installed as expeditiously as practicable. Given the prospect that EPA and the states may face large numbers of applications for permit extensions under section 112(i)(3)(B), we suggest the Agency promptly provide guidance regarding these and other conditions governing such permits.

V. The Rule Properly Establishes MACT Emission Limits for Area Source EGUs

A. There is No Significant Difference Between Major and Area Sources That Would Warrant Exercise of EPA's Discretion to Establish Different Standards for Area Sources

EPA's proposed Utility Air Toxics Rule properly sets MACT emission standards for all coal- and oil-fired EGUs greater than 25 megawatts ("MW"), without further distinguishing between "major" sources and "area" sources. Rather than relying on the Agency's discretion under Clean Air Act section 112(d)(5) to set alternative generally available control technology ("GACT") standards for area source EGUs, EPA's "proposed rule treats all EGUs the same and proposes MACT standards for all units." 76 Fed. Reg. at 25,021. EPA based this decision, in part, on "data show[ing] that similar HAP emissions and control technologies are found on both major and area sources greater than 25 MWe."[1] *Id.* Additionally, EPA found that there is "no essential difference between area and major source EGUs with respect to emissions of HAP." *Id.* EPA's decision to establish MACT emission limits for both major and area source EGUs is well-grounded in fact and is necessary to implement the Act's HAP control requirements for EGUs.

The Clean Air Act does not require, or even promote, different emission control standards for major and area source EGUs that have an electric generation capacity of greater than 25 MW. For purposes of HAP regulation under section 112, the Act defines "electric utility steam generating unit" as "any fossil fuel fired combustion unit of more than 25 megawatts that serves a generator that produces electricity for sale." 42 U.S.C. § 7412(a)(8). EPA has, thus, appropriately limited

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[1] Indeed, many of the air toxics emitted by EGUs are very harmful even in small quantities. *See* supra Chapter I of these comments. Total EGU industry emissions of mercury, for example, are on the order of 45 tons per year, but are centrally responsible for the mercury contamination and damage to public health and the environment, as this industry is the largest source of such emissions without final NESHAPs at present.

the scope of the Utility Air Toxics Rule to EGUs as defined by section 112. The Act separately defines "major source" as "any stationary source . . . that emits or has the potential to emit considering controls . . . 10 tons per year or more of any hazardous air pollutants or 25 tons per year or more of any combination of hazardous air pollutants." 42 U.S.C. § 7412(a)(1). And the Act defines "area source" simply as "any stationary source that is not a major source." 42 U.S.C. § 7412(a)(2).

Unlike the case-by-case provisions of Clean Air Act section 112(g), which apply only to major sources, Clean Air Act section 112(d)(1) imposes on EPA a non-discretionary duty to promulgate HAP emission standards that apply to both major sources and area sources. 42 U.S.C. § 7412(d)(1). The MACT emission standards required and defined in Clean Air Act section 112(d)(2) and (3), respectively, likewise are not limited to "major sources," and apply presumptively to new and existing major and area sources alike. 42 U.S.C. § 7412(d)(2), (3). As an alternative to this presumption, Clean Air Act section 112(d)(5) provides EPA discretion to promulgate generally available control technology ("GACT") standards in lieu of MACT standards for area sources. After reviewing the substantial record in this rulemaking, EPA has correctly determined that major and area source EGUs greater than 25 MW have similar HAP emissions and use the same control technologies and techniques to reduce HAP emissions. Thus, the record demonstrates that there is no technical basis for distinguishing between major and area source EGUs for purposes of establishing HAP emission control standards under Clean Air Act section 112(d).

Moreover, experience in recent permit proceedings for large new EGUs under the case-by-case MACT regime of Clean Air Act section 112(g) confirms the basis and emphasizes the importance of EPA's decision to hold both major and area source EGUs to MACT standards pursuant to Clean Air Act section 112(d)(2) and (3). These permit proceedings further demonstrate that: (1) major and area sources are not appreciably different with respect to boiler size, HAP emissions and pollution controls; and (2) setting different standards based on such a distinction would further encourage recent attempts by large, highly polluting HAP sources to

evade MACT emission standards for the HAPs of greatest concern by claiming minor (or area) source status. In fact, distinguishing between major and area sources, and holding the latter to less rigorous GACT standards, would undermine the HAP program for EGUs.

Following the D.C. Circuit Court of Appeals vacatur of the EGU Delisting Rule and Clean Air Mercury Rule in *New Jersey v. EPA*, 517 F.3d 574 (D.C. Cir. 2008), several proposed new EGUs have attempted to circumvent the case-by-case MACT requirements that apply to new and expanded major HAP sources under Clean Air Act section 112(g) by claiming that the units are minor sources of HAPs and, as such, are exempt from the case-by-case MACT requirements of section 112(g). Table V-1 below summarizes pertinent design details for five EGU projects that have claimed minor HAP source status in the wake of *New Jersey v. EPA*. As this table illustrates, each of these sources is a large EGU and, individually and as a class, they include the full array of pollution control technologies found on major source EGUs. Thus, recent experience supports EPA's determination that "similar . . . control technologies are found on both major and area sources greater than 25 MWe." 76 Fed. Reg. at 25,021.

Table V-1

Source	**Boiler Type**	**Boiler Size**	**Controls**
Duke Energy, LLC: Cliffside Steam Station Unit 6[2]	Super-critical Pulverized Coal	800 MW	Low NOx Burners, Selective Catalytic Reduction ("SCR"), Spray Dry Absorber ("SDA") with Lime Injection, Fabric Filter ("FF") Baghouse, and Wet Flue Gas Desulfurization ("Wet FGD")
LS Power:	Super-	Two 600	Low-NOx Burners, SCR, SDA, and FF

[2] *See* Air Quality Permit No. 04044T29, Issued for Duke Energy Cliffside Steam Station Unit 6 (March 13, 2009), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Cliffside_Permit_T29.pdf.

Longleaf[3]	critical Pulverized Coal	MW Boilers	Baghouse
LG&E: Trimble County Generating Station Unit 2[4]	Super-critical Pulverized Coal	750 MW	Low-NOx Burners with closed-coupled Overfire Air, SCR, Dry Electrostatic Precipitator ("ESP"), Pulse Jet Fabric Filter ("PJFF") with Activated Carbon and Lime Injection, Wet FGD, and Wet ESP
Otter Tail Power Company: Big Stone II[5]	Super-critical Pulverized Coal	580 MW	Low-NOx Burners, SCR, FF Baghouse, and Wet FGD
East Kentucky Power: Spurlock Unit 17[6]	Circulating Fluidized Bed	300 MW	Selective Non-Catalytic Reduction ("SNCR"), FF Baghouse, and a Dry-Lime Scrubber (*See* p. 29 of 103 for case-by-case MACT avoidance limits)

The case-by-case permit proceedings subsequent to *New Jersey v. EPA* also highlight a more insidious problem that, if not resolved by the Utility Air Toxics Rule, would undermine the fundamental purpose of the HAP control provisions with respect to EGUs: any rule that establishes separate and less rigorous HAP control standards for area sources would spur dubious minor source claims by large new and modified EGU sources attempting to skirt highly protective MACT emission

[3] *See* Longleaf Application for Notice of MACT Approval (Oct. 6, 2008), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/mactapp.pdf.
[4] *See* Attachment V-1, Revised Air Permit for Trimble County Generating Station (Apr. 21, 2009); *see also* Attachment V-2, Section 112(g) Evaluation for Trimble County Generating Station Unit 31 (July 10, 2009).
[5] *See* Attachment V-3, Big Stone II Air Permit (June 9, 2009).
[6] *See* Attachment V-4, Hugh L. Spurlock Generating Station Air Quality Permit (Dec. 22, 2009).

standards for the HAPs of greatest concern to public health and the environment. Several cases following *New Jersey v. EPA* underscore this danger and mandate EPA's decision to hold major and area source EGUs alike to MACT standards.

B. Case Study: Duke Energy's 800 Megawatt Cliffside Unit 6

1. Permit Proceedings Prior to *New Jersey v. EPA*

In December 2005, Duke Energy Carolinas, LLC ("Duke") applied for a permit to construct a new, 800 MW, super-critical pulverized-coal EGU, designated as Unit 6, at its existing Cliffside Steam Station. In its initial application, Duke asserted that Unit 6 would emit 171.9 tons per year of hydrogen chloride ("HCl") and more than 217 tons per year of all HAPs combined, far above the 10-ton individual and 25-ton aggregate thresholds for application of section 112(g) of the Clean Air Act.[7] In March, 2007, Duke filed a substantially new application to construct Unit 6, in which it again stated that Unit 6 would emit over 171 tons per year of HCl and more than 217 tons per year of combined HAPs.[8]

On January 29, 2008, just ten days before the D.C. Circuit issued its decision in *New Jersey v. EPA*, the North Carolina Department of Environment and Natural Resources, through its Division of Air Quality ("NCDAQ") issued a construction and operation permit for Cliffside Unit 6.[9] Duke claimed that it began constructing Unit 6 the next day. Throughout the T28 Permit process, Duke consistently represented

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[7] *See* Duke's PSD Application for Cliffside Units 6 & 7 (Dec. 16, 2005), *available at* *http://daq.state.nc.us/permits/psd/docs/cliffside/Original_Unit_6and7_Application.pdf; see also* 42 U.S.C. § 7412(a)(1).

[8] *See* Duke's PSD Application for Cliffside Unit 6, Forms B and D1 (March 31, 2007), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Application_Additional_Info_3-31-07.pdf.

[9] *See* Cliffside Unit 6 Final Air Quality Permit No. 04044T28 (Jan. 29, 2008) ("Permit T28"), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Final_Permit-Final_Determ_App_A.pdf.

that Cliffside Unit 6 would emit more than 217 tons of HAPs annually. Nevertheless, the T28 Permit did not require Duke to perform a case-by-case MACT analysis or obtain MACT emission limits for Unit 6.

2. After *New Jersey v. EPA*: A Citizen Enforcement Suit and the "MACT-like" Process

Subsequent to the D.C. Circuit ruling in *New Jersey v. EPA*, Duke continued to construct Cliffside Unit 6 without complying with the case-by-case MACT requirements of undergoing a MACT determination or obtaining MACT emission limits pursuant to Clean Air Act section 112(g). On May 6, 2008, several environmental organizations sent a 60-day notice letter detailing their intent to institute a citizen enforcement action against Duke for constructing Cliffside Unit 6 in violation of section 112(g).[10] Less than a month later, NCDAQ wrote to Duke, stating that while it was unsure whether the Act's case-by-case MACT requirements applied to Unit 6 in light of the *New Jersey v. EPA* decision, the public interest would best be served if Unit 6 "has the maximum degree of reduction of emissions achievable."[11] NCDAQ requested that Duke agree voluntarily to undertake an assessment of its HAP emissions, "consistent with the analyses that would apply under [CAA] § 112."[12]

Duke responded that, because Cliffside Unit 6 was permitted prior to the D.C. Circuit's decision invalidating the Clean Air Mercury Rule, it was not subject to the case-by-case MACT requirements of Clean Air Act section 112(g).[13] Nevertheless, Duke agreed to participate in a strictly voluntary "MACT-like"

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[10] *See* Attachment V-5, Letter from National Parks Conservation Assoc., *et al.* to B. Keith Overcash, *et al.* (May 6, 2008).
[11] *See* Letter from Overcash to Roper Re: "MACT-like" process (June 2, 2008), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Letter_Regarding_Cliffside_MACTs.pdf.
[12] *Id.*
[13] *See* Attachment V-6, Letter from Turner to Overcash (June 13, 2008).

process without agreeing to submit to the requirements of Clean Air Act section 112(g).[14]

On July 3, 2008, Duke submitted its so-called "MACT-like" assessment to NCDAQ, but reiterated its position that, because Unit 6 was permitted under the Clean Air Mercury Rule, it was not subject to the requirements of Clean Air Act section 112(g).[15] In its MACT-like assessment, Duke argued that, for purposes of establishing case-by-case MACT emission limits, it would be inappropriate to rely on limited stack test data from specific sources because such data did not account for differences in the characteristics of the coal that different units might burn; differences in unit-specific equipment and pollution control performance, even among units employing the same or similar equipment; and variations in boiler and pollution control performance that an individual unit would experience under a range of actual operating conditions during the course of a year.[16]

Duke continued to construct Unit 6 during the voluntary "MACT-like" process. Thus, on July 16, 2008, the environmental organizations filed a Clean Air Act citizen enforcement suit in the U.S. District Court for the Western District of North Carolina based on Duke's construction of Cliffside Unit 6 without the case-by-case MACT determination and emission limits required by Clean Air Act section 112(g).[17] On August, 8, 2008, environmental plaintiffs filed a motion for summary judgment asserting Cliffside Unit 6 was a major source of HAPs and that Duke's

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[14] *Id.*; *see also* Duke's "MACT-like" Assessment (July 3, 2008) at 2 fn 1, *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Case-by-Case_MACT_Assessment-Final_07-03-08.pdf.

[15] *See* Duke's "MACT-like" Assessment at 2 fn 1, *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Case-by-Case_MACT_Assessment-Final_07-03-08.pdf.

[16] *Id.* at 9-10.

[17] *See Southern Alliance for Clean Energy, et al. v. Duke Energy Carolinas, LLC*, No. 1:08-CV-00318 (W.D.N.C. filed July 16, 2008).

construction of Cliffside Unit 6 without a MACT determination and emission limits violated Clean Air Act section 112(g).[18]

Throughout both the "MACT-like" process initiated by NCDAQ and in its briefing in response to environmental plaintiffs' motion for summary judgment in the federal citizen suit, Duke did not revise its estimates of Unit 6's potential HAP emissions or challenge the fact that Unit 6 would exceed the statutory thresholds for a major source. But on October 14, 2008, just two days before the federal court hearing on environmental plaintiffs' motion for summary judgment, and three days before NCDAQ was due to publish draft "MACT-like" HAP emission limits for Unit 6, Duke suddenly declared that Unit 6 would emit less than the 10- and 25-ton thresholds for major sources of HAPs and was, therefore, exempt from the case-by-case MACT requirements in Clean Air Act section 112(g).[19] Duke based its eleventh-hour minor HAP source claim on stack test data from one of its other units, Marshall Unit 5, which were acquired approximately a year-and-a-half earlier.[20] Remarkably, Duke asserted the minor source claim for Cliffside Unit 6 based on precisely the type of data that it rejected as too unreliable for developing case-by-case emission limits in its "MACT-like" assessment – *i.e.*, results of short-term stack tests conducted at another unit operating under a narrow range of controlled conditions and burning a limited range of coal types.

3. Federal Court Rules Unit 6 is Subject to Clean Air Act Section 112

On December 2, 2008, the federal district court issued an Order granting the environmental plaintiffs' motion for summary judgment. In its ruling, the court

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[18] *See* Attachment V-7, Mem. in Supp. of Mot. for Summary Judgment, *Southern Alliance for Clean Energy, et al. v. Duke Energy Carolinas, LLC,* No. 1:08-CV-00318 (W.D.N.C. filed Aug. 8, 2008).
[19] *See* Duke Minor Source Letter to NCDAQ, with attachments (Oct. 14, 2008), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/OvercashLetter.pdf; http://daq.state.nc.us/permits/psd/docs/cliffside/Attachment1.pdf; *and* http://daq.state.nc.us/permits/psd/docs/cliffside/Attachments2-4.pdf. .
[20] *Id.*

held that, by commencing and "continuing with the construction of Unit 6 without the required § 112 MACT determination," Duke "[was] simply refusing to comply with controlling law."[21] The court rejected Duke's claim that Unit 6 is a minor source of HAPs, stating that it "has the potential to emit in excess of" the applicable statutory thresholds.[22] Based on these findings, the court ordered Duke to engage in a formal Clean Air Act section 112 process for Unit 6.[23]

4. Minor Source Permit

Rather than complete a case-by-case MACT determination and obtain MACT emission limits, however, Duke sought and obtained from NCDAQ a minor source permit on March 13, 2009.[24] NCDAQ contemporaneously issued an "Air Permit Review" explaining why it decided to issue the minor source permit. In its Air Permit Review, NCDAQ accepted Duke's claims and presented a fatally flawed "potential to emit" ("PTE") calculation for HCl and HF – the two HAPs that Cliffside Unit 6 and other coal-fired EGUs emit in the greatest quantities – which purported to demonstrate that Unit 6's potential HAP emissions would fall below major source thresholds.[25] Because Clean Air Act section 112(g) requires case-by-case MACT emission limits for major sources only, NCDAQ's minor source determination ended the process.

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[21] *See* Attachment V-8, *SACE, et al. v. Duke*, Dec. 2, 2008 Order at 22 (citing 42 U.S.C. § 7412(g)(2)(B)).
[22] *Id.* at 21-22; *see also* Attachment V-9, *SACE, et al. v. Duke*, Dec. 2, 2008 Judgment ¶ 3.
[23] *See* Judgment, *supra.* ¶ 5.
[24] *See* Cliffside Unit 6 Final Air Quality Permit No. 04044T29 (March.13, 2009) ("Permit T29"), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Cliffside_Permit_T29.pdf.
[25] *See* Cliffside Unit 6 Air Permit Review, Permit T29, *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/Cliffside_Permit_Review_T29.pdf.

5. EPA's Response

On April 30, 2009, EPA wrote to NCDAQ to express its "concern[] about the Unit 6 HAP potential to emit (PTE) analysis" DAQ had performed.[26] EPA also criticized the monitoring conditions in the minor source permit, recommending a CEMS for HCl "sufficient to verify compliance with" minor source requirements "at all times."[27] EPA explained that Unit 6 must achieve very high removal efficiency (99.913%) . . . for the Unit to stay below major source thresholds. This removal efficiency is sufficiently tight that a small deviation of the annual removal efficiency, such as might occur during periods of start-up, shutdown, or malfunction, would cause the unit's emissions to exceed the major source threshold for HCl.[28] NCDAQ did not modify its PTE calculations or adjust any permit terms to address EPA's concerns

6. Consequences of Minor Source Status

By accepting Duke's minor source claims and designating Cliffside Unit 6 a minor HAP source, NCDAQ allowed Duke to avoid application of rigorous MACT standards for the more than 50 HAPs Unit 6 will emit, including those, like the potent neurotoxin mercury, that pose the greatest risk to public health. For the people of North Carolina, this consequence is material. Unit 6 is permitted to emit 133 pounds of mercury per year.[29] In contrast, Dominion Power's 668 megawatt coal-fired power plant in Wise County, Virginia, a somewhat smaller plant conceded

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[26] *See* EPA Letter to Sec'y Freeman (Apr. 30, 2009), *available at* http://daq.state.nc.us/permits/psd/docs/cliffside/EPAmemo_04302009.pdf.
[27] *Id.*
[28] *Id.*
[29] *See* Cliffside Permit T28 Final Determination (Jan. 28, 2008), at 23 Response to SELC Comment – 25, *available at* *http://daq.state.nc.us/permits/psd/docs/cliffside/Final_Determination.pdf*.

by its operator to be a major source of HAPs, received a MACT limit of 4.45 pounds of mercury per year.[30]

C. Other EGUs Make Similar Minor Source Claims Following *New Jersey v. EPA*

Faced with the prospect of completing case-by-case MACT determinations and obtaining stringent MACT emission limits following the D.C. Circuit's decision in *New Jersey v. EPA*, other utilities similarly reversed course. Companies which previously had acknowledged that their proposed new EGUs were major HAP sources now claimed that these large new units were minor sources to avoid MACT emission limits for all HAPs. And in each of these cases, state permitting authorities approved the EGUs' request for designation as minor HAP sources that are exempt from the case-by-case MACT requirements for major HAP sources under Clean Air Act section 112(g).

1. Longleaf

In 2004, LS Power Development, LLC ("LS ") submitted a case-by-case MACT analysis along with its PSD permit application to construct the Longleaf Power Plant, a proposed 1200 MW super-critical pulverized-coal plant to be located in Early County, Georgia.[31] Subsequent to EPA's promulgation of CAMR, in May

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[30] *See* Virginia City Hybrid Energy Center MACT Permit (June 30, 2008), *available at* http://www.deq.state.va.us/export/sites/default/info/pdf/vchec/D-11526-Permit-MACT-20080630.pdf.

[31] *See* Attachment V-10, Relevant Excerpts from LS Power Brief Supporting Minor Source Designation, ¶ 33; *see also* Longleaf Air Quality Permit (May 14, 2007), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/permitdocs/0990030final.pdf.

2007, Georgia's Environmental Protection Division ("GA EPD") issued the PSD permit for Longleaf without completing a case-by-case MACT determination.[32]

Following vacatur of CAMR in *New Jersey v. EPA*, LS Power submitted to GA EPD another case-by-case MACT application on October 6, 2008, which LS Power supplemented on October 8 and December 3, 2008.[33] GA EPD issued a draft Notice of MACT Approval ("NOMA") in June 2009.[34] Throughout the PSD permitting process and for most of the case-by-case MACT process through issuance of the draft NOMA, LS Power maintained that the Longleaf plant would be a major HAP source that is subject to the provisions of Clean Air Act section 112(g). After receiving comments on the NOMA, specifically including the comments of environmental organizations advocating for more stringent MACT floor limits, however, LS Power suddenly changed its approach.[35] On December 22, 2009, LS Power responded to public comments by filing a minor HAP source application in an attempt to avoid MACT limits for all of the HAPs the Longleaf facility would emit.[36]

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[32] *See* Attachment V-10, LS Power Brief*, supra,* ¶¶ 33, 34; *see also* Longleaf Air Quality Permit (May 14, 2007), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/permitdocs/0990030final.pdf..

[33] *See* Attachment V-10, LS Power Brief, *supra,* ¶ 36; *see also* Longleaf's Application for MACT Approval (Oct. 6, 2008), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/mactapp.pdf; and http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/120308leaepd0022.pdf.

[34] *See* Attachment V-10, LS Power Brief, *supra.* ¶ 37; *see also* Notice of MACT Approval (June 2009), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/0990030mactapproval.pdf. .

[35] *See* Attachment V-10, LS Power Brief, *supra.* ¶ 38; *see also* Longleaf Response to Comments (Dec. 22, 2009), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/12222009leaepd0031.pdf.

[36] *See* Attachment V-10, LS Power Brief, *supra.* ¶ 39; *see also* Longleaf Response to Comments (Dec. 22, 2009), *available at* http://www.georgiaair.org/airpermit/downloads/permits/psd/dockets/longleaf/112docs/psd18499/12222009leaepd0031.pdf.

GA EPD approved Longleaf's minor HAP source application on November 8, 2010.[37] Nevertheless, LS Power has not yet commenced construction of the Longleaf plant.

2. Trimble County Unit 2

In December 2004, a consortium lead by Louisville Gas and Electric Company ("LG&E") applied for a Title V permit revision to include a PSD permit authorizing construction of a new 750 MW super-critical pulverized-coal unit at the existing Trimble County Generating Station. After a series of permit revisions and appeals, EPA Region 4 objected to the proposed permit on June 5, 2009. One of EPA's two objections was that the Kentucky Division for Air Quality ("KDAQ") "must undertake a Section 112(g) analysis for all hazardous air pollutants with respect to [the new unit] in order to comply with all applicable Clean Air Act requirements."[38] On August 12, 2009, EPA reaffirmed that Trimble Unit 2 was a major source of HAPs subject to the case-by-case MACT requirements of Clean Air Act section 112(g).[39]

In response to EPA's Objections, KDAQ re-issued the Trimble County permit on January 28, 2010.[40] But the re-issued permit did not include MACT emission limits for Unit 2.[41] Instead, the permit included blanket emissions limits restricting emissions of HCl to no more than 9 tons per year, and total HAP emissions to no more than 22.5 tons per year.[42] The permit further explained that:

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[37] *See* Georgia EPD website, Final Permit Issued 11/8/10, *available at* http://www.georgiaair.org/airpermit/html/permits/psd/dockets/longleaf/112docs.htm.
[38] *See* Attachment V-11, In the Matter of: Louisville Gas and Electric, Trimble County, Kentucky Title V/PSD Air Quality Permit # V-02-043 Revisions 2 and 3, EPA Order Responding to Issues Raised in April 28, 2008 and March 2, 2006 Petitions at 7 (Aug. 12, 2009).
[39] *Id.* at 60-61.
[40] *See* Attachment V-12, Trimble County Generating Station Air Quality Permit V-08-001R2 (Jan. 28, 2010).
[41] *See id.*, Attachment V-12.
[42] *Id.* at 30.

> To preclude the applicability of CAA, Section 112 (g), the operation of a WFGD and WESP shall begin upon start-up of the unit (i.e. initiation of coal combustion) and throughout the shutdown period. Continuous compliance with the HCl limit is demonstrated by continuous operation of the WFGD and WESP. Operation shall be consistent with manufacturer's specification and standard operating practices.[43]

As in each of the cases described in this section, the Trimble County Unit 2 minor source claim relied on the projected ability of the unit's sulfur dioxide controls (principally WFGDs) to achieve high levels of HCl and HF control, as these are the two HAPs that coal-fired EGUs emit in the greatest quantities. As a consequence of the minor source designation, however, each of these EGUs has evaded stringent MACT emission limits for the dozens of HAPs these sources will emit, including HAPs, like mercury, that present the greatest threats to public health and the environment.

3. Big Stone II

On February 25, 2008, Otter Tail Power Company submitted a case-by-case MACT application for its proposed Big Stone II coal-fired power plant (also identified as Unit 13). Less than a month later, on March 18, 2008, the company withdrew its application for a MACT determination, claiming that the 580 MW super-critical coal plant would, in fact, be a minor HAP source that is exempt from the case-by-case MACT provisions of Clean Air Act section 112(g).[44] On June 9, 2009, the South Dakota Department of Environment and Natural Resources issued a Title V Permit exempting Unit 13 from case-by-case MACT requirements based on its purported status as a minor HAP source.[45]

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[43] *Id.* at 38, § B(7)(c).
[44] *See* Attachment V-13, Letter from Terry Graumann to Kyrick Rombough, with attachments (March 18, 2008).
[45] *See* Attachment V-14, Title V Permit for Big Stone Power Plant (June 9, 2009).

4. Spurlock

On April 1, 2009, East Kentucky Power Cooperative ("EKPC") announced that it had completed and commenced operating a new 300 MW circulating fluidized bed EGU identified as Spurlock Power Station Unit 4.[46] Approximately three weeks later, the Sierra Club brought a challenge in the U.S. District Court for the Eastern District of Kentucky asserting EKPC's failure to obtain a case-by-case MACT determination and emission limits pursuant to Clean Air Act section 112(g). On December 22, 2009, KDAQ issued a permit revision designating the new unit as a minor HAP source. As with Trimble Unit 2, KDAQ approved the minor source permit provisions in order "[t]o preclude applicability of Section 112(g) of the Clean Air Act."[47]

D. Conclusion

Since the D.C. Circuit handed down its decision in *New Jersey v. EPA*, a pattern has emerged in which large EGUs previously designated as major HAP sources have claimed minor source status to avoid MACT emission limits for all of the 60 or more HAPs the sources will emit. In each of these cases, the EGUs asserted that the suite of pollution controls planned for the units would reduce HCl and HF emissions below the 10-ton per year major source threshold for individual HAPs, and that the combination of all HAP emissions would fall below the 25-ton per year threshold. These cases reaffirm EPA's conclusion that there is no material difference between major and area source EGUs insofar as HAP emissions and controls are concerned. The putative area sources discussed above have large

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[46] *See* EKPC Press Release (Apr. 1, 2009), *available at* http://www.ekpc.coop/pressreleases/2009%20press%20releases/2009-04-01_Spurlock4_commercial_start.pdf.

[47] *See* Attachment V-15, Hugh L. Spurlock Generating Station Air Quality Permit, at 27 (Dec. 22, 2009).

capacity boilers; they emit the same HAPs as major sources; and they include the full range of pollution controls available for major sources.

Additionally, these minor source case studies provide a compelling justification for EPA's proposal to establish MACT emission limits for both major and area source EGUs. To avoid MACT emission limits that apply to major HAP sources pursuant to Clean Air Act section 112(g), large, highly polluting EGUs have sought and obtained designation as minor HAP sources based on projected control of two pollutants – HCl and HF – and blanket limits for HAP emissions. In so doing, however, these sources have evaded stringent MACT emission control requirements for all the HAPs they will emit, including the HAPs of greatest concern to people and the environment. Distinguishing between major and area sources would perpetuate this loophole and threaten public health and welfare in the process.

CHAPTER VI: EPA HAS NOT JUSTIFIED ITS DECISION TO SUBCATEGORIZE COAL UNITS DESIGNED TO BURN COAL OF LESS THAN 8300 BTU/LB

EPA proposes MACT standards for coal- and oil-fired EGUs in five subcategories. Two are based on the BTU-content of coals, one encompasses EGUs burning "solid oil-derived" fuels (essentially petcoke), another is technology-based (IGCC units), and the last includes liquid oil-fired EGUs. 76 Fed. Reg. at 25037. While EPA correctly does not devolve the standard setting process into one based on multiple fuel-based subcategories, as it proposed to do in 2004 with its unjustified "coal-rank" based subcategorization scheme, the Agency still does not provide sufficient justification for its choice of certain of the subcategories it adopts in this rule. In particular, EPA's decision to distinguish between units burning two different kinds of coal based on its Btu content is unlawful and not reasonably justified, as set forth below.

A. EPA's Authority to Set MACT Standards for Subcategories of an Industrial Category is not Unlimited

The CAA provides only that the Agency "*may* distinguish among classes, types, and sizes of sources within a category or subcategory in establishing [MACT] standards." 42 U.S.C. § 7412(d)(1)(emphasis added). It does not permit EPA to distinguish between sources on other grounds, and does not *require any* subcategorization in MACT standard setting for a listed industry. And EPA's "subcategorization authority . . . does not authorize EPA to sidestep what Congress has plainly prohibited," or otherwise contradict Section 112's basic command to require the maximum achievable reductions in hazardous air pollution. *Natural Resources Defense Council v. Environmental Protection Agency,* 489 F.3d 1364, 1372 (D.C. Cir. 2007) ("NRDC v. EPA"). The plain text of the Act demonstrates that Congress intended EPA to create categories and subcategories in a regulated industry "as *a step toward establishing* emission standards," *id. at* 1371 (emphasis added), not as part of a scheme to provide incentives for existing sources to *avoid*

controls or standards. Where EPA sets MACT standards based on subcategories of an industry, EPA must offer a reasoned justification for the subcategories it has chosen. 42 U.S.C. §§ 7607 (d)(3), (d)(6), (d)(9). *See, e.g., Northeast Maryland Waste Disposal Authority v. EPA,* 358 F.3d 936, 947-950 (D.C. Cir. 2004) (remanding a decision to subcategorize in setting MACT standards because the Agency had not properly justified its subcategorization scheme).

B. EPA's Coal Subcategories For Existing Sources Are Not Adequately Justified On the Record, Which Shows Instead that They are Created to Preserve Poor Performance and Benefit and Prolong the Burning of Low-Btu "Junk" Coals

EPA asserts that all of the five subcategories it creates are in fact based on the combustion technology in use at facilities burning different kinds of fuels:

> Changes to the fuel type would generally require extensive changes to the fuel handling and feeding system (e.g., liquid oil-fired EGUs cannot fire solid fuel without extensive modification). Additionally, the burners and combustion chamber would need to be redesigned and modified to handle different fuel types and account for increases or decreases in the fuel volume. In some cases, the changes may reduce the capacity and efficiency of the EGU. An additional effect of these changes would be extensive retrofitting needed to operate using a different fuel.

76 Fed. Reg. at 25036. This may justify EPA's decision to distinguish units burning liquid fuels from units burning solid fuels, and IGCC units from those utilizing other methods of coal combustion. It does not, however, permit EPA's distinction between units burning coals above and below 8300 Btu/lb.[1] Although EPA implies that its proposed Btu content-based coal subcategories are not merely set to give advantage to, or allow continued burning of low-Btu "junk coals" at new facilities,

[1]Existing units such as fluidized bed boilers can similarly burn a wide variety of solid fuels, including various coal types, waste coal, and petroleum coke; they should not, therefore, be separately subcategorized.

the data and the technologies for burning different coal ranks suggest otherwise.[2] So does the Agency's rationale: that "a distinguishable difference in [emissions] *performance* exists based on … coal-fired units designed to burn coal with greater than or equal to 8,300 Btu/lb (for Hg emissions only); [and] coal-fired units designed to burn coal with less than 8,300 Btu/lb (for Hg emissions only)." 76 Fed. Reg. at 25037.

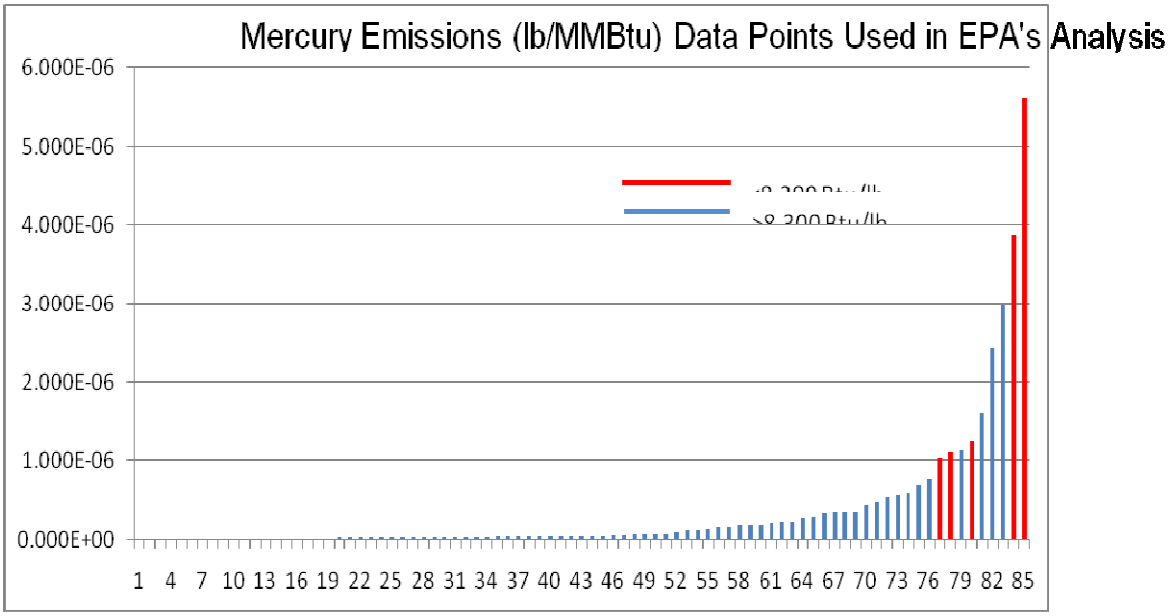
EPA's selection of the 8,300 Btu/lb heating value to subdivide the coal category is not discussed or justified in the record. EPA provides no record evidence to show that sources using fuels above and below this heating value are of a different class, type or size and, indeed, does not even claim they are. In particular, EPA has not provided a clear technical basis for its apparent conclusion that units burning coals below this heating value are of different design, or that the difference in design affects the method of pollution reduction available to such units. EPA provides no technical basis that these units have different fuel handling, burner or combustion systems. In fact, units burning lignite coals can burn other types of coals. For example units in Texas and North Dakota (where most of these lignite burning units are located) can also burn PRB sub-bituminous coals as well for fuel diversity. Physical systems for coal handling, burners, and combustion systems are the same when either fuel is burned. The controls that may be used for minimizing mercury emissions, such as activated carbon injection (ACI), baghouses, and scrubbers, can all be used on units that can burn either type of coal – regardless of heating value.

Sub-dividing the category according to the specified heating value is likely to cause confusion during implementation. For example, it is entirely possible that heating values for a number of sub-bituminous coals may fall above or below this break-point based on variability of heating values, mineral matter content, moisture content and the like. EPA has provided no clear standard by which to distinguish units "designed" to burn low-calorie coals, and those doing so by choice. Given the

[2] A review of EPA's data indicates that all of the units for which EPA has information that fall into the less than 8,300 Btu/lb category burn lignite coal.

difference in the proposed mercury MACT limits (1.2 lb/TBtu for the greater than 8,300 Btu/lb category, and 4 lb/TBtu for the less than 8,300 lb/TBtu category), there will be a significant incentive for many sources that burn sub-bituminous coals to classify themselves into the less than 8,300 Btu/lb sub-category, and thereby bypass available means of reducing their pollution.

The data do not support the proposed sub-categorization of coal-fired units. The chart below shows the mercury data (in lb/MMBtu) that were used in EPA's analysis. The bars in red are units in the "less than 8,300 Btu/lb" sub-category while all of the other data are for the greater than 8,300 Btu/lb sub-category. As shown below, there is no distinction between the two groups of data. In other words, the mercury data for the two sub-categories do not fall into two different or distinct populations. In fact, while the mercury emissions for the best performing lignite units were generally higher, EPA's floor analysis for the greater than 8,300 Btu/lb sub-category includes suggests that some best-performing units in that sub-category have mercury emissions greater than those used in the lignite sub-category – these are the blue bars in the chart below that are to the right of the red bars.



EPA asserts that in its ICR data set there were "no EGUs designed to burn a nonagglomerating virgin coal having a calorific value (moist, mineral matter-free basis) of 19,305 kJ/kg (8,300 Btu/lb) or less in an EGU with a height-to-depth ratio of 3.82 or greater among the top performing 12 percent of sources for Hg emissions." 76 Fed. Reg. 25037. The next sentences in the preamble demonstrate clearly that this is *not* a combustion technology driven subcategory, but rather one designed to accommodate EPA's conclusion that "emissions of Hg are different between these two subcategories." *Id.* Subcategorizing an industry *in order to preserve poor performance* – essentially EPA's asserted rationale – is an effort to sidestep the requirements of the statute, of the kind that the court invalidated in *NRDC v. EPA*, 489 F.3d at 1372-73. Units lacking pollution controls may have poor performance; the Agency cannot, however, create a subcategory for such units so as to prevent them from installing the necessary controls.

There is no technical justification for two subcategories defined by the 8300 Btu/lb characteristic; there is no difference between the combustion technologies and pollution-control options available to facilities burning the different grades of coal. Indeed, the industry experience is one in which the same or very similar pollution-control methods are employed for a variety of coal ranks, as environmental groups pointed out previously to the Agency in comments on the 2004 MACT standards proposal.[3] The data demonstrates that EGUs commonly burn a blend of coals, above and below the 8300 Btu/lb threshold. Moreover, Babcock and Wilcox, the manufacturer of various coal-fired power plant

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[3] Comprehensive Comments of Clean Air Task Force, *et al.*, "Proposed Emission Standards for Hazardous Air Pollutants; and in the Alternative, Proposed Standards of Performance for New and Existing Sources: Electric Utility Steam Generating Units," 69 Fed. Reg. 4652 (January 30, 2004) and Supplemental Notice, 69 Fed. Reg 12398 (March 16, 2004), Docket No. OAR-2002-0056, Chapter II at II-7 to II-9 (June 29, 2004).
Notably, EPA has not revived in the 2011 proposal the five unlawful coal-rank based subcategories it proposed in 2003/2004, however the 8300 Btu/lb is a thinly disguised coal-rank based subcategory which is beyond EPA's authority for the reasons stated not only herein but in the 2004 comments as well.

components, states that the majority of bituminous, sub-bituminous and lignite-fired conventional units are adaptable to most types of coal.[4]

EPA has presented no reason why the units in its less-than-8300 Btu/lb subcategory could not alter their choice of fuels, or otherwise reduce their emissions to match the performance of units burning higher-calorie coals. *See 42* U.S.C. § 7412(d)(2) (requiring EPA to set standards which include pollution reductions achievable, *inter alia,* through "process changes, [or] substitution of materials.").[5] Most coal plants (including their various sub-systems) are designed to accommodate coals of different properties. Even for conventional pulverized coal fired units, the fuel storage areas, flue handling systems, pulverizers, burners and the combustion air circuit, the firebox, as well as the later heat transfer surfaces such as the superhaters, reheaters, economizer, air preheaters are all designed to accommodate coals of different properties. Fluidized bed units are even more accommodating of a range of fuel properties. Similarly, the add-on pollution controls affecting hazardous air pollution depend mainly on the nature of exhaust gases from the unit; they can, accordingly, can be uniformly installed at coal-fired units of various designs. There are no significant design differences between coal-fired units to justify the proposed (or any other) sub-categories.

The sparse record underlying the Agency's rationale for the junk coal subcategory is suggests that the two coal subcategories are intended to preserve the ability to burn high-mercury coals, rather than truly distinguish sources based upon their "class, type, and size." This is unlawful, as well as arbitrary, and defeats the Act's directive to set standards that ensure that all sources will match the emission levels achieved by the best performers. 42 U.S.C. § 7412(d)(3). EPA therefore has

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[4] S.C. Stultz and J.B. Kitto, *Steam: its generation and use*, 40th edition, (Babcock and Wilcox, 1992), Chapter 13 at 13-3.

[5] In fact, the practice of fuel switching is very common in the utility industry, a practice that allows utilities to seek the less expensive coal. See comments of the Clean Energy Group on the utility MACT following the 2000 listing decision, in a letter to EPA dated September 6, 2002. Available on line at http://www.epa.gov/ttn/atw/combust/utiltox/ceg2epa9-6-02.doc (visited August 4, 2011).

not sufficiently justified its subcategory based on coals with less than 8300 Btu/lb heat input.

C. EPA's Coal Subcategories For New And Reconstructed Sources Are Not Justified To Any Extent

EPA does not simply propose its 8300 Btu/lb distinction as defining *existing* source subcategories; it also extends this for use in standard setting for *new sources.* EPA has *absolutely* no rationale for selecting this subcategory for *new* units. New EGUs can very easily be designed to provide optimum performance – and control – when firing all kinds of coal. Even in its extraordinarily weak 2003 proposal, EPA agreed that "the industry has some ability during the designing of new units to choose coal or oil that would minimize emissions of Hg and Ni and recognizes that the MACT standard for new units should, to the extent possible, encourage the industry in that direction."[6] But EPA now seems to believe that a unit combusting coal with heat values below 8300 Btu/lb and coal above 8300 Btu/lb are not "similar units," for the purpose of deriving MACT floors for new sources. These units are not just *similar,* they frequently are units of *exactly the same* design, with the only difference being that their owners/operators choose different fuel suppliers as they strive to minimize the cost of coal. Put differently, the same units can and do burn more than one type of coal. EPA has not justified the less than 8300 Btu/lb subcategory for new units. EPA should establish a single MACT limit for emissions from all new coal units.[7]

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[6] 69 Fed. Reg. at 4667.

[7] If EPA were to base its standards on a single coal-fired category, the floor for the new source would be the same as the floor for the best performing source of the combined category – i.e., the floor that is currently proposed (or as it should be properly modified based on other comments) for the greater than 8,300 Btu/lb sub-category.

D. Coal-fired EGUs are properly defined as those burning coal or coal refuse in any combination with other fuels in any amount

EPA requests comment on "whether the proposed rule should address how sources that change fuel input (e.g., burn solid waste or biomass), or otherwise take action that would change the source's applicability…must demonstrate continuous compliance with all applicable standards." 76 Fed. Reg. 25036. EPA has listed coal- and oil-fired EGUs. The statute simply describes "electric utility steam generating units," as those fueled by "fossil fuels" of no specified percentage. 42 U.S.C. §§ 7412(n)(1); 7412 (a)(8). The technical reality, as described above, is that EGUs designed to fire solid fossil fuels burn a mélange of coal types as well as other solid fuels including solid oil-derived fuels (petcoke), biomass, and other solid fuels. Any subcategorization must be based on design differences – specifically design differences which materially affect the availability of cleaner fuels, or other methods of reducing pollution. Where a plant voluntarily (or for economic reasons) chooses to burn a high-polluting fuel, that decision should not affect the standards applicable to the plant, with one exception: the Agency is obligated to distinguish between EGUs that are waste combusters (and thus subject to stricter standards governing waste combusters) from EGUs that are primarily fossil-fueled, and therefore must be included under this rule.

Accordingly, EPA has proposed rule definitions for the solid fuel subcategories. Coal fired units are defined as "electric utility steam generating unit meeting the definition of 'fossil fuel-fired' that burns coal or coal refuse either exclusively, in any combination together, or in any combination with other fuels in any amount." 76 Fed. Reg. 25122 (Proposed §63.10042 definitions). "Fossil fuel-fired," in turn, is defined as

> an [EGU] that is capable of combusting more than 73 MWe (250 million Btu/hr, MMBtu/hr) heat input (equivalent to 25 MWe output) of fossil fuels. To be 'capable of combusting' fossil fuels, an EGU would need to have these fuels allowed in their permits [sic] and have the appropriate fuel handling facilities on-site….In addition, fossil fuel-fired means any EGU that fired fossil fuels for more than 10.0 percent of the average annual heat input during the previous 3

calendar years or for more than 15.0 percent of the annual heat input during any one of those calendar years.

Id. at 25123. To the extent that an EGU that is capable of burning primarily coal or other solid fossil fuels to generate electricity, and also elects to co-fire biomass to meet some other statutory requirement, it must continue to meet the MACT limits for the subcategory in which it is listed. This is particularly important for biomass, as burning green wood produces more of various regulated HAPs than does burning coal. See figure 1 below.

Figure 1. Killen Coal Plant, OH: Significant increases in organic hazardous air pollutants when co-firing 5% biomass

TOXIC AIR POLLUTANT	Tons Per Year Coal Only	Tons Per Year Coal/biofuel
POM (reported as PAH)	0.02	0.20
Acetaldehyde	0.66	1.71
Benzene	1.51	6.89
Formaldehyde	0.28	5.98
Toluene	0.28	1.46

It would be unlawful for EPA to finalize a MACT subcategory that would *worsen* the HAP emissions profile of the EGU beyond what it would be absent the biomass burning.

VII. EPA Must Finalize HAP-Specific MACT Floors Except Where Surrogacy-Based Standards Meet the Legal Requirements for Surrogacy-Based MACT, and are Otherwise Justified by the Technical and Emissions Data Available to the Agency

A. Introduction

Rather than proposing HAP-specific emissions limits for this industry for all HAPs and all subcategories, EPA proposes surrogate-pollutant based floors, with pollutant-specific emissions limits only for mercury, and for some toxic metals and some acid gases from some industry subcategories. Specifically for all coal-fired EGUs including IGCCs and what it calls "solid oil-fired EGUs" (together, the "solid fuel subcategories"), EPA proposes mercury standards, and also proposes for the other toxic metals *either* that owners and operators of existing and new units can meet a total particulate matter standard (filterable plus condensable) *or* a total non-Hg HAP metals standard, *or* specific metals-based floors for ten metals.[1] For oil-fired units, mercury is regulated under an alternative total HAP metals standard.[2] Acid gas emissions from the solid fuel subcategories are regulated using HCl as a surrogate for all the acid gas emissions (HCl, HF, HCN), *or* SO2 as a surrogate only where some form of flue gas desulfurization controls are installed. EPA proposes separate HCl and HF standards for liquid oil-fired units. EPA asserts such surrogacy-based limits are justified because: "the

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[1] Alternative pollutant-specific emissions limits are proposed for antimony, arsenic, beryllium, cadmium, chromium, cobalt, lead, manganese, nickel and selenium. We support these HAP-specific limits.

[2] EPA properly observes that mercury and certain other metals, for example arsenic and selenium, do not behave like particulates, but instead have the potential to exist in both particulate and vapor phases. These pollutants will not be well correlated with particulate matter – that is, the metals are not invariably present in PM, and controlling particulates does not indiscriminately control emissions of these metals. 76 Fed. Reg. 25,024. While noting this EPA at the same time proposes to use an emissions limit based on total PM as an alternative surrogate standard for selenium and arsenic from solid-fuel fired EGUs.

acid gas HAP, HCl and HF, are water-soluble compounds," such that "the technologies for removal of the acid gases are primarily those that are also used for [flue gas desulfurization]," 76 Fed. Reg. at 25,023; and "[e]missions of certain non-Hg metallic HAP … have been assumed to be well controlled by PM control devices," *id.* at 25,024. EPA requests comments on the surrogate-based emissions limits, the theories under which they were derived and established, and the alternative emissions standards proposed.

B. Legal Standard for the Use of Surrogates In Setting MACT Emissions Limits

EPA's authority to issue surrogacy-based standards is not unlimited. Clean Air Act section 112(d)(1) requires EPA to set emission standards for every [listed] HAP emitted from each [listed] category or subcategory of major sources." *Mossville Envt'l Action Now v. EPA,* 370 F.3d 1232, 1236 (D.C. Cir. 2004). EPA may set MACT emissions standards for "surrogate" pollutants in lieu of emissions limits addressing each HAP only under limited circumstances. *Nat'l Lime Ass'n v. EPA,* 233 F.3d 625, 637-39(D.C. Cir. 2000)(*Nat'l Lime II*); *Sierra Club v. EPA,* 353 F.3d 976, 982-985 (D.C. Cir. 2004) (*Sierra Club I).* While the D.C. Circuit Court has held that it is within EPA's authority to regulate a surrogate air pollutant that effectively minimizes emissions of the target HAP, *Nat'l Lime II,* EPA must identify each of the HAPs it regulates by surrogates, specifically link the surrogate and the HAP it is intended to represent, *Mossville Envtl. Action Now,* 370 F.3d at 1243, and further show that three well-established conditions are satisfied:

1) the identified listed HAP is "invariably" present in the surrogate pollutant;
2) methods to control or capture the surrogate pollutant "indiscriminately" control or capture the listed HAP as well; and
3) surrogate controls are the "only means" by which facilities "achieve" reductions of the listed HAP.

Sierra Club I, 353 F.3d at 984 (quoting *National Lime*, 233 F.3d at 639). EPA has relied on this test for the validity of surrogates in previous air toxics rules, as it does here, 76 Fed. Reg. at 25,021.

EPA has not adequately demonstrated that the three pre-conditions supporting the reasonableness of surrogacy-based limits are met for all of the HAPs that the Agency proposes to regulate through surrogate limits, as discussed below. Where the use of surrogates is not supported by the record, pollutant specific emissions limits are required.

C. EPA Has Not Justified Use of a Total PM Limit as a Surrogate for all Non-Mercury Metal HAPs

EPA has proposed MACT limits on individual metal HAPs for all subcategories of the industry, and an alternative total non-Hg metal HAPs limt, The Agency also proposes as an alternative to allow existing and new units to comply with an emission limit for total PM (condensable plus filterable) as a surrogate for non-mercury metal HAPs. *See*, e.g., Tables 1 and 2 to Subpart UUUUU of Part 63 (76 Fed. Reg. 25,124-25,128 (May 3, 2011) (setting out the alternative compliance options for non-mercury metals, including the surrogacy-based approach)). The particulate matter surrogacy-based emissions limits do not meet the legal requirements for surrogacy, and (as a result) do not ensure the maximum achievable reductions in all non-mercury metal HAPs.

1. Non-Mercury HAP Metals Are Not All Invariably Present in Particulate Matter.

The first precondition for the use of a surrogate pollutant in MACT standard setting is that the HAP in question is "invariably present" in the surrogate pollutant. *Sierra Club I,* 353 F.3d at 984. This precondition is not met by EPA's proposed total PM surrogate for the non-mercury metal HAPs. As EPA has acknowledged, "[i]t has become widely recognized that some trace metals concentrate in certain waste particle streams from a combustor (bottom ash,

collector ash, flue gas particulate), while others do not…."[3] These elements are not all consistently present in particulate matter (that is, the particulates that arrive at the inlet to the particulate control device). Ex. 7-1[4] at 223-224; Ex. 7-2.[5] Some are present as gases and as such are not removed by pollution-control devices that limit particulate matter. Metal HAPs can be divided into the following groups: "Class 1: Elements which are approximately equally distributed between fly ash and bottom ash, or show little or no small particle enrichment; Class 2: Elements which are enriched in fly ash relative to bottom ash, or show increasing enrichment with decreasing particle size; Class 3: Elements which are intermediate between Class 1 and 2; Class 4: Volatile elements which are emitted in the gas phase."[6] These substances are not all consistently present in particulate matter (that is, the particulates that arrive at the inlet to the particulate control device). Ex. 7-1[7] and Ex. 7-2.[8]

Class I elements, which include beryllium and manganese, do not volatilize during combustion and distribute more or less equally between bottom ash and flyash. Class II elements, including lead, cadmium, antimony, and nickel, are vaporized in the boiler but are found mainly in the fly ashes after condensation on particles and nucleation mechanisms from decreasing temperature through the

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[3] *See* Emission Factor Documentation for AP-42, Section 1.1, Bituminous and Subbituminous Coal Combustion, EPA OAQPS, April 1993, at 2-14 (Available at http://www.epa.gov/ttn/chief/ap42/ch01/index.html).

[4] Minghou Xu, Rong Yan, Chunguang Zheng, Yu Qiao, Jun Han, and Changdong Sheng, *Status of Trace Element Emission in a Coal Combustion Process: A Review*, Fuel Processing Technology, v. 85, 2003, at 215-237.

[5] William P. Linak and Jost O.L. Wendt, *Trace Metal Transformation Mechanisms During Coal Combustion*, Fuel Processing Technology, v. 39, 1994, at 173-198.
[6] *Id.* at 2-13.

[7] Minghou Xu, Rong Yan, Chunguang Zheng, Yu Qiao, Jun Han, and Changdong Sheng, *Status of Trace Element Emission in a Coal Combustion Process: A Review*, Fuel Processing Technology, v. 85, 2003, at 215-237 at 223-244.

[8] William P. Linak and Jost O.L. Wendt, *Trace Metal Transformation Mechanisms During Coal Combustion*, Fuel Processing Technology, v. 39, 1994, at 173-198.

control train. A limit on total particulate matter, if appropriately designed, may effectively serve a surrogate for these pollutants.

However, Class III elements, which include arsenic, selenium, as well as mercury, are vaporized and condense only partially within the control train. *See* reviews in Exs. 7-1 and 7-3. EPA has recognized these issues with mercury and has not proposed any surrogate for mercury. *See* 76 Fed. Reg. 25,038 (May 3, 2011).

EPA has acknowledged that selenium is not always invariably present in particulate matter. EPA found that 55-90% of selenium tended to be in the gas phase upstream of the particulate control device when bituminous coal was fired in its pilot-scale boiler. *See* 76 Fed. Reg at 25,038. When the unit was fired with subbituminous coal, EPA found that 95% of the selenium was in the particulate form. *Id.* And EPA found that 80% of the selenium was in the particulate form when firing Gulf Coast lignite. *Id.*

It does not appear that EPA analyzed all of the metal HAPs to determine if the HAPs were in the gas phase upstream of the particulate control device. If EPA had done so, it would have likely found arsenic, chromium, and cadmium exists in the gaseous form upstream of the PM controls.[9] Up to 52% of the arsenic also may be present as a gas. Ex. 7-4.[10] Depending upon the fuel and control train, some of the otherwise nonvolatile trace metals, including cadmium, chromium and nickel, may be present in the vapor phase. Exs. 7-3,[11] 5,[12] 6,[13] 7.[14]

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[9] Mercury controls such as powdered activated carbon have been demonstrated to increase the amount of chromium and nickel in stack gases, compared to no mercury control. McIlvaine Hot Topic Hour, Hazardous Air Pollutants, May 15, 2008, Presentation of John Pavlish, EERC. Voice recording also available online to subscribers of McIlvaine Power Plant Knowledge System and available for purchase EPA has not adequately addressed this cross-controls related issue.

[10] Honghong Yi and others, *Fine Particle and Trace Element Emissions from an Anthracite Coal-Fired Power Plant Equipped with a Baghouse in China*, Fuel, v. 87, 2008, pp. 2050-2057.

[11] Zevenhoven and Kilpinen, *Trace Elements*, Alkali Metals, http://web.abo.fi/~rzevenho/tracalk.PDF.

2. Particulate Matter Control Technologies Do Not Indiscriminately Capture All HAP Metal Emissions

The second precondition for the use of a surrogate pollutant is that control of the surrogate must "indiscriminately capture" the air toxic along with the surrogate. *Sierra Club I,* 353 F.3d at 984. The capture efficiency of particulate control devices – whether a fabric filter baghouse, an electrostatic precipitator (ESP) or a particle scrubber – varies for particles of different sizes. Because, as discussed above, metallic HAP are not uniformly present in PM of all sizes, different devices achieve different rates of capture of non-mercury metal HAP emissions.[15] For those metal HAPs in the gaseous form upstream of the particulate control device, only a baghouse might remove some HAPs. Other control devices are unlikely to remove any of them.

Many of the metal HAPs that do exist in the particulate form are concentrated in the smallest particles or are condensable particulates, which are not always efficiently collected by the particulate collection device (and are usually collected with less efficiency than larger particles). Metallic HAPs that are enriched in particulate matter are, as a general matter, volatilized in the boiler and condense as very fine particulate matter or nanoparticles (typically smaller than 1 micron) in

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[12] McIlvaine Hot Topic Hour, Hazardous Air Pollutants, May 15, 2008, Presentation of John Pavlish, EERC, Trace Metals in Combustion Systems. Voice recording also available online to subscribers of McIlvaine Power Plant Knowledge System and available for purchase.

[13] Frank B. Meserole and Winston Chow, *Controlling Trace Species in the Utility Industry, In: Winston Chow and Katherine K. Connor* (Ed.), Managing Hazardous Air Pollutants, 1993.

[14] Frank Meserole, Greg Behrens, and Winston Chow, *Fate of Trace Elements in Coal-Fired Power Plants*, 84th Annual Meeting, Air & Waste Management Association, June 1991.

[15] EPA's proposal for solid fuel-fired EGUs includes a total PM based alternative limit only for non-Hg metals.

the pollution control train. Exs. 7-8,[16] 9[17], 10[18]*; see also* Exs. 7-2 and 7-5. The highest concentrations of most metallic HAPs are consistently found in the smallest particles. Exs. 7-1, 7-11,[19] 7-12,[20] 7-13,[21] and 7-14.[22] And the metallic HAPs of greatest environmental concern are enriched in these tiny submicron particles. Ex. 7-1, at 222-223. These smaller particles also cause proportionately more of the adverse health impacts because they can penetrate deep into the lung. Ex. 7-15.

In order to satisfy the second element of the surrogacy test, for particulate matter as a surrogate for non-mercury metallic HAP, the surrogacy-based standard must be based on sources using controls that efficiently capture the smaller fraction of particulates, where such HAP reside.[23]

But particulate-matter control devices in use at the best performing sources do not capture these smaller particles as efficiently as they capture larger particles.

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[16] R.C. Flagan and S.K. Friedlander, Particle Formation in Pulverized Coal Combustion – A Review, In: *Recent Developments in Aerosol Science*, D.T. Shaw (Ed.), 1978, Chapter 2..

[17] A.S. Damale, D.S. Ensor, and M.B. Ranade, *Coal Combustion Aerosol Formation Mechanisms: A Review*, Aerosol Science & Technology, v. 1, no. 1, 1982, pp. 119-133.

[18] S.K. Friedlander, *Smoke, Dust, and Haze: Fundamentals of Aerosol Dynamics*, 2nd Ed., Oxford University Press, 2000.

[19] Richard L. Davidson and others, *Trace Elements in Fly Ash,* Environmental Science & Technology, v. 8, no. 13, December 1974, pp. 1107-1113.

[20] E.S. Gladney and others, *Composition and Size Distribution of In-State Particulate Material at a Coal-Fired Power Plant*, Atmospheric Environment, v. 10, 1976, pp. 1071-1077.

[21] John M. Ondov, Richard C. Ragaini, and Arthur H. Biermann, *Emissions and Particle-size Distributions of Minor and Trace Elements at Two Western Coal-fired Power Plants Equipped with Cold-side Electrostatic Precipitators,* Environmental Science & Technology, v. 13, 1979, pp. 946-953.

[22] W.P. Linak and others, *Comparison of Particle Size Distributions and Elemental Partitioning from Combustion of Pulverized Coal and Residual Fuel Oil*, J. Air & Waste Manage. Assoc., v. 50, 2000, pp. 1532-1544.

[23] It should be noted that methods for measuring particulate matter smaller than 2.5 microns or PM2.5, have been developed.

Exs. 7-16 (Table 1.1-6)[24], 7-17 (Fig. 8)[25], 7-6[26], 7-7.[27] For example, the record shows that the universe of best performing sources contains sources with a variety of electrostatic precipitators, baghouses, as well as some with a variety of different scrubber designs. The capture efficiency of fine particles is a function of the design and operating parameters of such devices, for which EPA did not collect adequate data. It cannot be assumed that all of these devices are capturing the smaller particles that contain the metallic HAPs in question. As a result, particulate matter controls – at least the ones on which the proposed total PM floors are based -- do not "indiscriminately" capture HAP metals at the same rate as other particulates; they favor the larger, non-HAP-bearing particles. For example, one study found that particles smaller than 1 micron made up 5% of the total particle mass before the particulate control device while after the device, they made up 50% of the mass. Ex. 7-5.

EPA's analysis of its experience with its pilot plant demonstrates the problem with total PM as a surrogate for non-Hg metal HAPs. The particulate matter control device in use at the pilot plant (either a fabric filter or an ESP) does not indiscriminately remove metal HAPs with particulate matter. Specifically, EPA found that the average PM control during the tests was 99.5%, but the average metal HAP control varied from 95.3% for antimony to 97.6% for nickel to 98% for arsenic and chromium. *See* 76 Fed. Reg. at 25,038. While these control efficiencies may look similar or reasonably close, they are not. Nearly ten times more HAP is emitted at a control efficiency of 95.3 % than at 99.5%. Only a few metal HAPs had

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[24] U.S. EPA, Compilation of Air Pollutant Emission Factors, September 1998, Section 1.1, Coal Combustion.

[25] M.W. McElroy and others, *Size Distribution of Fine Particles from Coal Combustion*, Science, v. 215, no. 4528, January 1, 1982.

[26] Frank B. Meserole and Winston Chow, *Controlling Trace Species in the Utility Industry, In: Managing Hazardous Air Pollutants, State of the Art, Winston Chow and Katherine K. Conner*, 1993.

[27] Frank Meserole, Greg Behrens, and Winston Chow, *Fate of Trace Elements in Coal-Fired Power Plants, Presentation*, 84th Annual Meeting, Air & Waste Management Association, 1991.

similar control efficiencies as the 99.5% PM control efficiency (manganese, lead and cobalt). *Id.* That the efficiencies were "greater than 95%," 76 Fed. Reg. at 25,038, does not indicate a lack of wide variations in actual emissions of non-mercury metals (or even particulate matter).

Most significant for the Agency's attempt to include selenium (a metal that is often volatized in stack emissions) under the total particulate matter surrogate emissions limit, EPA found in its pilot plant studies that selenium was *not* consistently well controlled among coal types or control types, except for subbituminous coal.[28] Selenium control with an ESP and eastern bituminous coal ranged from 0 to 73%, and with lignite was 80%. *Id.*

Based on the above data and information, it cannot be said that the particulate control devices on which the total PM surrogacy-based floors are set indiscriminately remove all metal HAPs. This is especially true for selenium.

3. Facilities Achieve Reductions in HAP Metal Emissions By Means Other Than Particulate Matter Control.

The third precondition for the use of a surrogate pollutant is that control of the surrogate must be the "only means by which facilities achieve reductions" in the air toxic in question. *Sierra Club I,* 353 F.3d at 984. Particulate matter control is not the only means by which facilities achieve reductions in metallic HAP. As the D.C. Circuit Court of Appeals has observed, in order for particulate matter to serve as an adequate surrogate for metal HAP:

> other inputs [such as fuel type] must "affect HAP metal emissions in the same fashion than they affect the other components of [particulate matter.]" Put another way, "[particulate matter] might not be an appropriate surrogate for HAP metals if switching fuels would decrease HAP metal emissions without causing a corresponding reduction in total [particulate matter] emissions. The reason is clear: if EPA looks only to [particulate matter], but HAPs are reduced by altering inputs in a way that does not reduce [particulate matter], the best achieving

[28] When subbituminous coal was the fuel, similar control efficiencies averaging 98.9% were achieved irrespective of the particulate control device. *Id.*

> sources, and what they can achieve with respect to HAPs, might not be properly identified.

Sierra Club I, 353 F.3d at 985 (quoting *National Lime,* 233 F.3d at 639).

Several "other inputs" affect HAP metal emissions in a different fashion than they affect particulate matter emissions. *Id.* First, "switching fuels would decrease HAP metal emissions without causing a corresponding reduction" in total particulate matter. *Id.* Burning coals that contain lower amounts of metallic HAP can yield reductions in the HAPs contained on and in the particulate matter residue. In such cases, a standard based on burning those coals in combination with particulate controls will result in even lower non-mercury metal HAP emissions. Conversely, setting a PM-based surrogate standard and applying it to units burning coals with high metal content will result in higher HAP emissions than would result from a metals-specific limit were in place.

The effect of fuel-related inputs on metallic HAP emissions differs from such inputs' effect on particulate matter for three reasons. The ash[29] content of the coal used as a fuel determines the particulate matter concentration in a plant's flue gases. Ex. 7-19.[30] The summary of Powder River coal quality attached as Ex. 7-20A shows that the ash content remains stable across many coals, while the trace elements can vary significantly. For example, coal from the Jacobs Ranch mine contains about 5.5% ash and lower concentrations of antimony, arsenic, cadmium, chromium, lead and selenium than coal from the

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[29] Ash is a measure of the inorganic material present in coal. This inorganic material is not burned, but becomes bottom ash, removed in the boiler, and fly ash, which becomes airborne and is particulate matter. About 80% of the ash becomes fly ash. *See, e.g.*, Gary L. Borman and Kenneth W. Ragland, Combustion Engineering, WCB McGraw-Hill, 1998, pp. 522-523 and Exhibit 9, Table 1.1-4 (filterable PM emission factors expressed as a constant times the ash content).

[30] J-I. Yoo and others, *Particle-Size Distributions and Heavy Metal Partitioning in Emission Gas from Different Coal-Fired Power Plants*, Environmental Engineering Science, v. 22, No. 2, 2005.

Cordero mine. Lower stack emissions of these elements could be obtained by burning Jacobs Ranch coal instead of Cordero coal. Such alterations in fuel supply thus "affect HAP metal emissions" in a far different fashion than they affect particulate matter. *Sierra Club I,* 353 F.3d at 985.

In addition, the relationship between individual HAPs and particulate matter is different for the individual HAPs that are included in the collection of elements represented by the particulate matter surrogate. Exs. 7-21A, 7-21B, and 7-21C show the relationship between ash content and selenium, lead, manganese, chromium, cadmium, beryllium, and arsenic for Kentucky bituminous coals. These charts show that there is a direct positive relationship between ash and the amount of selenium, manganese, and chromium in this coal, but no relationship between ash and the amount of lead, cadmium, beryllium and arsenic.

The relationship between ash and metallic HAPs varies for different coals in unpredictable ways. Ex. 7-20B[31] reports an analysis of the relationship between ash and metallic HAPs for Pittsburg 8 coals. This analysis found not only different relationships between HAPs and ash for each HAP (*see* equations for each HAP at bottom of page 8), but also different relationships for Kentucky coal in Exs. 7-6 and 7-7 and Pittsburg 8 coal in Ex. 7-20B. As a result of this variation in HAP-content of coals (and thus coal ash, and then particulate matter derived from such coals), particulate matter cannot be reliably used as an indicator of HAP emissions.

EPA has exacerbated these problems by proposing to allow a limit on total particulate matter as its surrogate (meaning all sizes of particles from the largest to the smallest). As discussed above, HAP metals are present primarily in fine particulates, less than 1 micron in size. As a result, particulate controls

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[31] P.R. Tumati and R.A. Bilonick, *Estimating Trace Element Emissions Using USGS Coal Data*, Journal of the Air & Waste Management Association, v. 46, no. 1, 1996, pp. 58-65.

focusing on total particulates may not significantly reduce metallic HAP emissions.

Finally, most of the particulate matter mass (98%,) is bigger than 1 micron. Ex. 7-16, Table 1.1-6 of AP-42. Indeed, the sum of the non-mercury metallic HAPs in stack gases reported in lb/MMBtu is less than 1% of the filterable PM reported in the same units. The other 99% of the particulate mass is mostly oxides of silica, iron, sodium, calcium, and potassium. These substances are affected by different chemical and physical mechanisms than the metallic HAPs, which are controlled by volatilization and condensation reactions that concentrate them in the very smallest particles with the largest surface area. Thus, particulate matter per se is too diverse and the target HAP fraction too small to serve as a surrogate for less than 1% of the whole.

As explained above, the EPA's proposed surrogate particulate matter limit could be met by removing the larger particles, without removing (or less efficiently removing) the smaller particles where the metallic HAPs are found. The removal efficiencies of the two most common particulate matter control devices within EPA's universe of best-performers – fabric filter baghouses and electrostatic precipitators – are much higher for big particles than small particles. The most commonly used particulate control devices, including the device proposed here to comply with MACT (a conventional baghouse designed to remove total filterable particulate matter), capture a large fraction of coarse particulates, but are far less effective in capturing finer particulates where the non-mercury metallic HAPs are found, thus providing low total particulate emissions but high metallic HAP emissions. An ESP and a baghouse designed to capture fine particulates might produce similar emissions of total particulates, but very different metallic HAP emissions.

4. There is No Correlation Between Total Particulate Emissions and Emissions of Non-Mercury Metallic HAP.

Using EPA's data in the record, we have attempted to verify the degree to which emissions of non-metal HAPs correlate with particulate matter. Focusing

on the best controlled (using PM as the surrogate) universe. The table below shows the correlation of each of the non-mercury metal HAPs with EPA's proposed surrogate, total particulate matter, and with each other. We only used data for units that had all metal HAPs reported (around 109 of the best controlled units).

Correlation of Emissions of Total Particulate Matter and non-Mercury Metal HAPs for Best Controlled Units

	Total_Particulate	*Antimony*	*Arsenic*	*Beryllium*	*Cadmium*	*Chromium*	*Cobalt*	*Lead*	*Manganese*	*Nickel*	*Selenium*
Total_Particulate	1.000										
Antimony	0.224	1.000									
Arsenic	0.177	0.924	1.000								
Beryllium	0.185	0.307	0.094	1.000							
Cadmium	0.226	0.220	0.057	0.759	1.000						
Chromium	0.124	0.015	-0.028	0.110	0.094	1.000					
Cobalt	0.136	0.110	-0.031	0.552	0.402	0.596	1.000				
Lead	0.199	0.900	0.959	0.145	0.089	-0.023	0.019	1.000			
Manganese	-0.001	0.172	-0.004	0.827	0.693	0.101	0.576	0.015	1.000		
Nickel	0.132	0.003	-0.035	0.093	0.093	0.917	0.560	-0.020	0.078	1.000	
Selenium	0.329	0.683	0.690	0.305	0.091	-0.048	0.018	0.686	-0.022	-0.039	1.000

As can be seen from the second column, none of the metals strongly correlates with total PM. Total PM cannot, therefore, be a surrogate for any of the non-mercury metal HAPs.

This is further demonstrated in tests of two separate filtration media used in the baghouse at Hawthorne Unit 5.[32] Membrane filtration bags resulted in

[32] R.E. Snyder, et al., Impact of Fabric Filter Media and SDA Operations on Multi-Pollutant Emissions, Presented at EPRI-DOE-AWMA-Mega Symposium, August 2006.

much lower filterable PM but allowed a substantial increase in condensable PM (the fraction where most of the metallic HAPs reside) compared to OEM needle felt bags. Such bag selection, to take one example, can allow the total PM standard to be met while allowing substantial increases in the target HAP emissions.

5. The Total PM Surrogate does not Permit or Support Future Residual Risk Standard Setting as Required by the Statute.

Residual risk standards, moreover, will require direct monitoring of each non-mercury metallic HAP, which a total PM standard does not support. The Clean Air Act requires EPA to develop and implement a program for future assessment of risks remaining ('residual risk') after facilities in a listed industry have implemented MACT standards. 42 U.S.C. § 7412(f). If necessary, EPA is required to issue regulations to reduce any residual risks in order to protect the public health with an "ample margin of safety, and if needed to prevent "an adverse environmental effect, taking into consideration costs, energy, safety and other relevant factors. " *Id.* §7412(f)(2)(A). EPA must issue risk-based regulations within eight (or nine) years after the promulgation of the MACT standard.

Cancer, chronic and acute health risks are estimated using emission rates of individual HAPs to calculate ambient concentrations, which are then used with cancer potency factor and reference exposure levels to calculate cancer risk and chronic and acute hazard indices. This requires direct measurement of emissions from MACT sources. Residual risk cannot be estimated from surrogates. While emission data can be obtained from a Section 114 request, this provides no information on actual emissions from the MACT-controlled sources.

6. Conclusion

For all of these reasons, EPA's proposal to allow compliance with a total PM limit as a surrogate for a MACT limit on all non-mercury metal HAPs has not been legally or technically justified either based on EPA's own testing, or on numerous studies published in refereed journals. Any use of particulate matter as a surrogate

for non-Hg HAP metals would, first, need to be limited to only those HAP that are consistently present in particulate matter. Second, it would need to be based on the fine fraction of PM (PM less than 2.5 microns in diameter), where the non-mercury HAPs reside.[33] As set forth above, including larger particulates disrupts the necessary relationship between the surrogate (particulate matter) and the regulated HAP (trace metals) and allows compliance with the standard while allowing elevated metal emissions.

At the very least, a lawful particulate matter standard as a surrogate for non-mercury metal HAPs must be set based on PM2.5 rather than total particulate matter without regard to particle size. EPA considered this issue, but decided to propose a limit on total PM because the test method for measuring PM2.5 (Method 201A) is only applicable for stack emissions without entrained water droplets, and thus PM2.5 can't be measured at a unit with a wet scrubber. 76 Fed.Reg. 25,039 (May 3, 2011). Measurement difficulties cannot, in any event, justify the use of a surrogate that does not properly represent the target HAP. EPA has enough information to propose (and indeed has proposed for 10 non-mercury metal HAPs) specific HAP-based emissions limits. Moreover, such difficulties may be overcome, by requiring any particulate matter surrogate to be based on PM2.5 for those units without wet scrubbers and PM10 for those units with wet scrubbers. EPA's Emission Measurement Center website states that when water droplets are present, Method 5 should be used instead of Method 201A, and consider the particulate matter catch as PM10 emissions.[34] Another alternative is to use Method 5 to measure filterable PM2.5 and to use Method 202 to measure condensables (and assume that all condensables are in the 2.5 micron size or smaller, which is typically the case). Given that EPA itself has acknowledged that the non-mercury metal HAPs are typically in the PM2.5 size range, any surrogate limit on particulate matter must limit PM2.5 emissions in order to properly act as a

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[33] Kilgroe, J.D. et al. *Control of Mercury Emissions from Coal-Fired Electric Utility Boilers: Interim Report*, EPA-. 600/R-01-109, December 2001. Ex. 7-22.

[34] *See* http://www.epa.gov/ttn/emc/methods/method201a.html#thrun.

surrogate for the maximum achievable control technology of non-mercury metal HAPs. Any difficulties in measuring various size fractions of particulate matter in situations involving presence of water droplets provides yet another reason for avoiding particulate matter (of any type) as a surrogate for metal HAPs, rather than embracing an admittedly insufficient surrogate.

D. EPA Has Not Justified Use of an HCl Limit or an SO2 Limit as a Surrogate for All Non-Metal Inorganic Acid Gas HAP

EPA has proposed to use a limit on HCl as a surrogate for all non-metal inorganic acid gas HAPs, which would presumably include HF, Cl_2, and hydrogen cyanide (HCN). 76 Fed.Reg. 25,039 (May 3, 2011). It appears that EPA is also assuming a limit on HCl would suffice as a surrogate for selenium when in the gaseous form of SeO_2. *Id.* EPA has also proposed to use a limit on SO2 as a surrogate for all of these acid gas HAPs – but only for EGUs with some sort of flue gas desulfurization unit in operation. *Id.* at 25,040. EPA has not provided sufficient justification to reasonably or lawfully use HCl or SO2 as a surrogate for all of these acid gas HAPs as discussed below.

1. The Non-Metal Inorganic HAPs Are Not All Invariably Present in Hydrogen Chloride Nor Are these HAPs Present in Sulfur Dioxide.

As noted above, in order to use a surrogate pollutant in MACT standard setting, the Agency must show that the HAP in question is "invariably present" in the surrogate pollutant. *Sierra Club I,* 353 F.3d at 984. This precondition is not met by EPA's proposed use of HCl and SO2 as surrogates for the acid gases emitted by coal and oil-fired EGUs. EPA did not provide any analysis of or discussion as to whether HF, Cl_2, HCN, or SeO_2 are invariably present in HCl or whether these HAPs and HCl are invariably present in SO2. They are not.

First, there is no reason to expect that these different pollutants will be "invariably present" since they are not formed (nor destroyed) by the same mechanisms. While HCl, HF, SO2, and to a certain extent, SeO2 all arise from precursors present in the fuel (i.e., coal, pet coke, etc.), they are not present in equal

proportions even for the same fuel. For example, even though HCl is formed from chlorine in the coal, HF from fluorine in the coal, and SO2 from sulfur in the coal, these precursors are all present in different chemical forms and proportions. Once in the boiler, some of the sulfur (depending on chemical form) ends up in the bottom ash but this is generally not expected for chlorine or fluorine. The remaining sulfur, chlorine, and fluorine then undergo reactions to convert to SO2, HCl, and HF in the firebox. HCN, on the other hand, is simply not formed via the same type of reactions as SO2, HCl, or HF. HCN is formed in the rich regions of the flame from fuel nitrogen but its formation mechanism is complex and there is no general relationship between coal nitrogen content and HCN formation. Thus, all of these acid gases cannot be lumped into the same category from a formation standpoint.

The rate at which these gases, once formed, can be destroyed or then emitted is also not correlated. Removal or destruction depends on the form of the compounds and their properties. For example, while all of these may be gaseous compounds, their solubility in various reagents (for example, water, lime-slurry, limestone-slurry, etc.) is not the same, even keeping process conditions constant (for example, pH and temperature). In an actual exhaust gas, there are usually competing reactions that make the removal picture even more complex. Thus, there is no reason to expect removal to be the same – and therefore, they cannot be expected to be "*invariably* present" in the emissions.

The table below shows, using EPA's data collected for this rulemaking, the correlation of emissions of SO2, HCl, HF, and HCN (no data were available for SeO2) from the various units in the floor analysis.

Correlations of Emissions of SO2, HCl, HF, and HCN

	SO2	*HCl*	*HF*	*HCN*
SO2	1.000			
HCl	0.510	1.000		
HF	0.116	0.284	1.000	
HCN	0.005	-0.020	-0.030	1.000

There is no correlation between these emissions. Even the 0.51 correlation coefficient between SO2 and HCl is not a very strong one. There is no correlation between SO2 and HF (0.116) or SO2 and HCN (0.005). And there is poor or no correlation between HCl and HF (0.284) and HCl and HCN (-0.02). EPA's proposed HCl or SO2 surrogates for the non-metal inorganic HAPs is not reasonable or lawful. EPA asserts it "has gathered sufficient data on HCl, HF, and HCN to establish individual emission limitations if warranted," 76 Fed. Reg. at 25,023, the Agency unreasonably and unlawfully instead relies on the HCl surrogate in most instances. EPA must finalize acid-gas specific floors.

2. The HCl or SO2 Control Technologies Do Not Indiscriminately Capture All Target HAP Emissions.

The second precondition for the use of a surrogate pollutant in MACT standard setting is that control of the surrogate must "indiscriminately capture" the air toxic along with the surrogate. *See Sierra Club I,* 353 F.3d at 984 (holding same for particulates and metal HAPs).

a. EPA's Pilot Scale Testing Does Not Demonstrate that High Levels of SO2 Removal or HCl Removal Indiscriminately Capture the Target HAPs.

EPA asserts that two tests it conducted at its Multi-Pollutant Control Research Facility (MPCRF) support the surrogacy relationships it proposes for acid gas HAPs. Those tests were run with eastern bituminous coal and a limestone-based wet FGD scrubber. 76 Fed.Reg. 25,039. EPA found consistently high levels of HCl and SO2 removal for both of the runs. For Cl_2, EPA observed 76% control in the first test run and 92% control in the second test run, whereas for HF EPA observed 92% control in the first run and 76% control in the second run. *Id.* Clearly there is a great deal of variability even in these test runs. . Clearly these two test runs fail to provide sufficient basis for EPA's broad claim that the HCl and SO2 control technologies *indiscriminately* capture all the acid gas HAPs emitted by solid fuel-fired EGUs. EPA would need to collect more data

from full-scale units showing more consistent correlations to support such conclusions.

b. The Available Data Presented by EPA Does Not Support the Concept that SO2 Controls Indiscriminately Capture All Non-Metal Inorganic HAPs Simultaneously.

EPA's testing and other test data indicate that SO2 controls do not achieve high levels of removal of these acid gas HAPs concurrently (even for HF and HCl, let alone HCN). For example, as discussed above, EPA's testing at its MPCRF showed that removal of Cl_2 was higher when removal of HF was lower, and vice versa. *See* 76 Fed.Reg. 25,039. A review of the ICR data shows similar results. For example, Springerville Unit 3 achieved 96% HF removal but only 70% HCl removal.[35] Wygen I achieved 80% HCl removal and 95% HF removal, and Wygen II achieved 47% HCl removal and 76% HF removal.

Lowering HCl emissions is not indiscriminately linked to lowered chlorine (Cl2) emissions. For chlorine, EPA only collected a limited amount of data. Of the 131 lowest HCl emitting units, there is only chlorine test data provided for 16 units. We analyzed the average chlorine emission rate for the 131 lowest HCl-emitting sources and compared it to the average chlorine emission rate for the subset of the lowest 65 HCl-emitting units, and when we did so, we found that chlorine emissions increased with decreasing HCl (from 2.58×10^{-4} lb/MMBtu to 3.20×10^{-4} lb/MMBtu).

c. EPA's Pilot Scale Testing Did Not Collect Any Data on Control of HCN Across SO2 Controls.

Far from showing that controlling SO2 always indiscriminately also controls the acid gas HCN, EPA did not provide *any* data on control of HCN across a wet scrubber. EPA collected sufficient data on HCN emissions in its ICR, to set an HCN-specific MACT standard, and should do so, as it does not

[35] *See* EPA's Spreadsheet entitled "Floor analysis coal HCl 31611" at "AcidGas_Coal." The uncontrolled HCl and HF emission rates were calculated for these units based on the chlorine and fluorine content of the coal provided in the spreadsheet and, with that data and the HCl and HF emission rates, the HCl and HF removal efficiencies could be calculated.

appear that EPA has evaluated whether HCN is controlled across SO2 control equipment at all, much less justified an SO2-HCN surrogacy relationship (especially in light of the non-correlation of acid gas emissions discussed above)

d. EPA's Pilot Scale Testing Did Not Evaluate SO2 Controls Other than a Wet Scrubber.

EPA did not do any evaluation of the relationship between acid gas removal and the use of a dry scrubber or any other other SO2 control technologies. Those alternative SO_2 control mechanisms may have poor, or no significant, effect on acid gas emissions.

3. SO2 Control Is Not the Only Factor that Accounts for Low Emissions of HCl, or of the other Acid Gases for Which EPA Proposes to Use SO2 as a Surrogate.

The third precondition for the use of a surrogate pollutant is that control of the surrogate must be the "only means by which facilities achieve reductions" in the air toxic in question. *Sierra Club I,* 353 F.3d at 984. The data collected by EPA, and the manner in which acid gases are formed, suggest that SO2 controls alone are not the only reason for low acid gas emissions.For example, chlorine levels in coal are a factor that can account for lower HCl emissions, independent of the SO2 removal efficiency of any SO2 controls. While SO2 controls can affect HCl emissions, a review of the ICR data collected by EPA shows that SO2 controls are not the "only means" by which lower acid gas emissions are achieved – those units burning the lowest chlorine coal (typically subbituminous, western bituminous, and lignite) can have lower HCl emissions than units burning higher chlorine coal without SO2 controls, Our review of available HCl test results shows that EGUs burning lower chlorine coals result in lower HCl emissions rates. For example, Clay Boswell Unit 2 achieved an HCl emission factor of rate of 0.0000011 lb/MMBtu and this EGU had a coal chlorine content by weight of 0.000028%.[36]

[36] See Energy and Environmental Research Center, University of North Dakota, "A Comprehensive Assessment of Toxic Emissions from Coal-Fired Power Plants: Phase I Results from the U.S. Department of Energy Study," September 1996, HCl

We also observed lower chlorine coals, as expected, were an important factor in obtaining lower HCl levels – regardless of other factors (such as the presence of SO2 controls). For example, by separating the lowest 131 HCl-emitting units' emissions data for those units that burn low chlorine coal (i.e. subbituminous, lignite and western bituminous) from the data for units that burn higher chlorine coal (i.e., bituminous coals), we found that the low chlorine coal units averaged lower HCl emissions than the units burning higher chlorine coal (1.94×10^{-4} lb/MMBtu compared to 2.35×10^{-4} lb/MMBtu),

In addition, there are other options for removing HCl that may not remove all acid gases (especially HCN). For example, chloride prescrubbers can remove HCl and likely also HF, but weaker acids like HCN would not likely be removed by such a prescrubber. Where HCN has been removed in other instances, reagents that are used include sodium hydroxide, which are general not used to control other pollutants from coal-fired units.

A scrubber is operated to primarily remove SO2 emissions, with the amount of reagent needed to meet SO2 emission limits dependent on the uncontrolled SO2 emissions coming into the scrubber. Hydrogen chloride removal is similarly based on the stoichiometric ratio of reagent to chlorine.[37] However, there is no correlation between sulfur content of the coal and chlorine levels in the coal. This is made clear by Exs. 7-23 and 7-24 which include raw data from the USGS COALQUAL database for subbituminous Powder River Basin coal (Ex. 7-23) and for bituminous Central Appalachian coal (Ex. 7-24).[38] Because there is no correlation between sulfur content and chlorine content of coal, a scrubber operated to achieve certain levels of

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emissions determined in lb/MMBtu from Table A-7 (at p A-7) and chlorine in coal from Table 4-7. Ex. 7-29.

[37] *See* Maezawa, Akinori et al., *Simulation of Removal of HCl Gas in a Spray Dry Tower*, Chem. Eng. Technol. *19* (1996), 550-552, Figure 2 at 552. Ex. 7-25.

[38] The data for these spreadsheets was downloaded from http://energy.er.usgs.gov/products/databases/CoalQual/. For the charts in Exs. 7-23 and 7-24 which plot chlorine versus sulfur content, only samples with chlorine and sulfur concentrations greater than zero were plotted, as it was assumed that zero concentration values meant that element was not tested for that coal sample.

SO2 may not be optimized for HCl removal. If the scrubber is operated to achieve of SO2 removal and the sulfur content of the coal stays the same but the chlorine content increases, then HCl emissions could increase in proportion to the increase in chlorine emissions could increase in proportion to the increase in chlorine The SO2 control is accordingly not the only factor affecting HCl emissions.

Options for removing individual acid gases vary, and they do not remove the other acid gases. Even in instances where gases might appear to be similar (such as HCl and HF, for example), actual removal is a complex function of operating conditions including reagent used, pH, temperature, ratio of reagent to gas flows, concentrations of these gases in the exhaust, manner in which the reagent is mixed, and the presence of other competing gases. Correlated removal is not the norm and this is clearly shown in the poor correlations of emissions of these gases described earlier using EPA's own data.

4. Conclusion

EPA has not legally or technically justified the use of either HCl or SO2 as surrogates for all of the non-metals inorganic acid gas HAP. Moreover, it appears that EPA is improperly conflating the establishment of a MACT emission limitation for acid gases with consideration of control methods. While it EPA may find those EGUs with the best SO_2 controls also are the lowest acid gas emitters, the proper approach as a matter of science and law is to establish separate MACT limits for each acid gas – and as noted above, EPA asserts it believes it has collected sufficient data to do so. The experience with case-by-case MACT for this industrial category since the 2008 vacatur of EPA's Clean Air Mercury Rule demonstrates that individual acid gas floors are eminently reasonable. There are examples of case-by-case MACT permits with separate emission limits for each acid gas (particularly separate limits for HCl and HF). Measurement methodologies for these HAPs are readily available. Thus, there are no experiential or technological limitations to the imposition of emission limitations for each acid gas HAP.

E. Summary: Use of Surrogate Pollutant Emission Limits Must Be Limited to Meet MACT.

EPA has not legally or technically justified the use of a limit on total PM for all of the non-mercury metal HAPs or limits on HCl or SO2 for all of the non-metal inorganic HAPs. While we realize EPA is attempting to minimize the testing, recordkeeping and reporting requirements by proposing surrogate emission limits, EPA also has to comply with the law on allowable surrogate emission limits to meet MACT.

EPA has not justified the use of a limit on total PM as a surrogate for metal HAPs. Similarly, EPA has not legally or technically justified the use of either a limit on HCl or SO2 as surrogates for the non-metal inorganic HAPs. At the minimum, EPA must adopt separate MACT standards for HCl, HF, HCN, and SeO_2.

VIII. EPA FAILED TO PROPERLY APPLY THE STATUTORY STANDARD IN SETTING ITS LIMITS

A. The Agency Must Use a Consistent Measure of "Actual Emissions" to Set the Floor

The statute requires EPA to establish new source standards that are no less stringent than "the emission control that is achieved in practice by the best controlled similar source," and existing source standards that are no less stringent than "the average emission limitation achieved by the best performing 12 percent of the existing sources." 42 U.S.C. § 7412(d)(3). The floor for both standards must reflect, in other words, "what the best performing sources actually achieve." *Cement Kiln Recycling Coalition v. Environmental Prot. Agency,* 255 F.3d 855, 862 (D.C. Cir. 2001). In setting its utility standards for mercury and HCl (but not PM), EPA has failed to consistently follow that command: it has used one measure of sources' 'actual performance' to select its best performing plants, and an entirely different measure of actual performance to set standards that reflect those plants' emissions.

When *selecting* its "best performing" units, EPA claims that plants' single lowest stack test properly represents those plants' actual performance. Memorandum from Jeffrey Cole to Bill Maxwell dated May 18, 2011 at 8-9 ("Floor Memo") (Docket no. EPA-HQ-OAR-2009-0234-9858). When *calculating floors* based upon those plants' test data, however, the Agency claims that the plants' 'actual emissions' are best represented by the average of all tests, further manipulated for variability. *Id.*

As a result, a handful of outlying test results substantially bias EPA's ultimate standards. For example, there were two mercury tests for the Indiantown Cogeneration plant with averages of 8.5384 E-09 lb/MMBtu and 5.49E-07 lb/MMBtu – the latter 64 times the former. Similarly, there were two tests for Spruance Genco, GEN4 with averages of 1.177E-08 lb/MMBtu and 1.6075E-06 lb/MMBtu (the latter almost 137 times the former). There

were 8 tests for BL England, the average of the lowest being 2.9649E-08 lb/MMBtu and the average of the highest being 2.434E-06 lb/MMBtu (the latter over 82 times the former). There were three tests for Scrubgrass Gen 1, the average of the lowest being 3.53E-08 lb/MMBtu and the average of the highest being 3.0E-06 lb/MMBtu (the latter almost 85 times the former). Lastly, there were also three tests for Cherokee Unit 4, the average of the lowest being 3.1654E-08 lb and the average of the highest being 1.12E-06 lb/MMBtu (the latter over 35 times the former).[1]

To test the sensitivity of this assumption, we set aside the highest average tests of the five units noted above and conducted the same variability adjustment with the remaining (75 rather than 80) tests for the top 40 sources. The resulting value (applying a 99% upper prediction limit) is 0.43 lb/TBtu instead of EPA's 1.18 lb/TBtu. The standard is thereby reduced by two thirds just by setting aside the highest outlying tests for 5 units (each of which was one or more orders of magnitude greater than the lowest tests at the same units). As noted above these outlying (and other older tests) were generally not conducted using Method 30B; the results likely reflect test variability rather than actual source emissions variability, and should be excluded on that basis.

EPA's chosen approach is, at any rate, beyond the agency's authority. The statute provides EPA some discretion in defining the measure of plants "actual performance"; it does not, however, allow the Agency to use two inconsistent definitions of that term. If a plant's actual emissions are best approximated by averaging all of that plants' test data, and then statistically adjusting that data to address possible variability – then the "best performing plants" are those with the lowest emissions according to that

[1] It appears that while the best tests were obtained using EPA Method 30B, others may have been obtained using the older EPA Method 29. Tests obtained using different methods should not be lumped together and assumed to reflect unit emissions variability.

measurement. If, on the other hand, a plant's actual emissions are best approximated by its single lowest test result, then the MACT floor must be defined using the single lowest test results of the best performing plant (or plants).

Any consistent approach would yield lower floors than those chosen by the Agency. To generate its primary mercury standard for coal fired units (burning fuel with a caloric content above 8300 Btu/lb), for example, if EPA used the single best test for each of the top 40 plants to define a plant's actual emissions both to select its best performing sources, and to measure those sources' emissions, the floor would be 0.05 lb/TBtu instead of the proposed 1.2 lb/TBtu – even EPA's variability adjustments and other manipulations.

Alternatively, if EPA used variability-adjusted average emissions to both select the best performing sources, and to measure their emissions, it would similarly generate lower standards. Units EPA identified as "best performing" sources would be replaced by others with lower and less variable historical data.[2] For example, EPA's mercury standard for existing units burning coal of less than 8300 BTU/lb is based upon 40 "best performing" units, selected on the basis of those units' lowest 3-run average mercury data (in lb/MMBtu, typically obtained via Method 30B testing). If EPA had begun by considering *all* of the available test data for the various units (say, by taking the average of all of the available data), determined the "best performing" units on that basis, many of EPA's claimed "best performers" would not qualify as such, including: Scrubgrass Generating Company (Gen 1); Spruance Genco (Gen 4); B L England (Unit 2); Cherokee (Unit 4); Martin Drake (Unit 7); and Indiantown Cogen (Unit 001). Other units, currently not in the best performing list, would become best performers, including:

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[2] In determining the variability adjusted average emissions, only emissions conducted pursuant to the same test method should be used, so that the variability reflects variability in emissions rather than test methods. The latter is irrelevant for standards, such as these, for which EPA has specified a single test method.

Hopewell (Units 1 and 2); Clover (Unit 2); PSEG Mercer (Unit 1); and possibly Piney Creek Project (Unit BRBR1); and San Juan (Unit 2). These units have far less variance (and thus lower "actual emissions," if actual emissions are best represented by variability-adjusted average emissions) than the units EPA selected as its best performers.

Instead, EPA used the lowest test result to select its best performers, but included all available tests for these "best performers," further adjusted for variability, in order to determine the floor. In so doing, it has failed to observe the statutory standard.

B. EPA's Variability Adjustments Result in Floors that Do Not Reflect the Average Emissions of the Best Performing Unit or Units

EPA set its existing source floors by, first, calculating the mean of all the test data submitted by the plants it selected as the best performing 12%. It then subjected that mean to a statistical manipulation intended to generate an "upper prediction limit" (UPL) at a confidence level of 99 percent. 76 Fed. Reg. at 25041. EPA asserts that this calculation results in a floor that a "best performing source can expect to meet 'every day and under all operating conditions.'" *Id.* (citation omitted).

That statistical adjustment is unwarranted. Section 112(d)(3) allows EPA to account for variability between the best performing units only by setting floors that reflect the "average" emission limitation these sources achieve. 42 U.S.C. § 7412(d)(3)(A). EPA has not supported its assumption that the best-performing sources vary to the maximal degree predicted by a 99% UPL; operating conditions (and other factors affecting emissions) are not randomly variable – much less randomly variable to the extreme predicted a 99% UPL. The UPL, by design, provides a number which exceeds the expected performance of all the "best-performing" unit or units. In using the UPL to set its existing floor limits, EPA has not, as a result, set its limits at the "average" emissions of the best performing 12% of existing sources. 42 U.S.C. § 7412(d)(3)(A). By definition, such an average would be below the

worst-case performance of approximately half of the units in EPA's "best-performing" category (assuming, as EPA has, a normal distribution). EPA has, moreover, impermissibly inflated its standards in a manner reflecting variation between sources, rather than variation in the performance of individual units, as well as variation in test methods that is unrelated to plants' actual emissions.

The practical effect of that manipulation is to heavily inflate floors. EPA's variability adjustment projects (allegedly worst-case) emissions well in excess of any actual emissions reported by the best-performing units. The most startling example is EPA's calculated mercury floor for coal-fired units designed to burn coal of less than 8300 Btu/lb – a floor that exceeds the actual emissions of all thirty sources in the category. Beyond the Floor Memorandum dated March 14, 2011, at 4 (Docket no. EPA-HQ-OAR-2009-0234-3004). While EPA prescribed a lower mercury limit for that category, it has otherwise – by ignoring Section 112's "beyond the floor" standards – refused to examine methods of improving upon the worst-case (or beyond) performance resulting from its variability analysis.[3] *See* Section VIII.D, below. In combination, those two choices eviscerate the statutory standard. According to the data provided by EPA, over 60% of the units for which it has information already meet its mercury floor of 1.2 lb/TBtu. Its hydrogen chloride and particulate matter limits are both set at levels exceeding the reported emissions of over 70% of the units in EPA's dataset.

1. The Agency Has Not Justified Its Assumption of a Normal Underlying Distribution or Reliance on the Central Limit Theorem

The formulas for the Upper Prediction Limit (UPL) used in EPA's analysis are based upon an assumption of normality of the underlying distribution, or the application of the Central Limit Theorem (CLT) when sample size exceeds N = 15. Floor Memo at p.4 (Docket no. EPA-HQ-OAR-

[3] EPA should, at a minimum, examine whether there are available means of reducing the variability of HAP emissions from utility power plants.

2009-0234-9858). Statistical experience with contaminant concentration data suggest that such data are rarely from a single normal distribution. Moreover, environmental data are typically highly skewed and much larger samples are needed before the CLT can be applied on the distribution of the sample mean.

The CLT assumes that the sample is from a single population with mean μ and standard deviation σ. Neither is the case here. For example, for the coal mercury (Hg) data set (for coal units in EPA's >8300 BTU/lb subcategory), has 80 data points from 40 of the "best performing" units and each result is the mean of 3 underlying test runs. The combined sample, therefore, is from 40 (or more) different sub- populations, each with its own mean and standard deviation (see Figure 1). The 80 data points for the 40 best performing units includes data available for the past 5 years at particular units. As discussed elsewhere in these comments, there are clear issues with including this historic data for the "best performing" sources since the older results in many cases, were collected using different methods and under different conditions, and are therefore unlikely to belong to the same population.

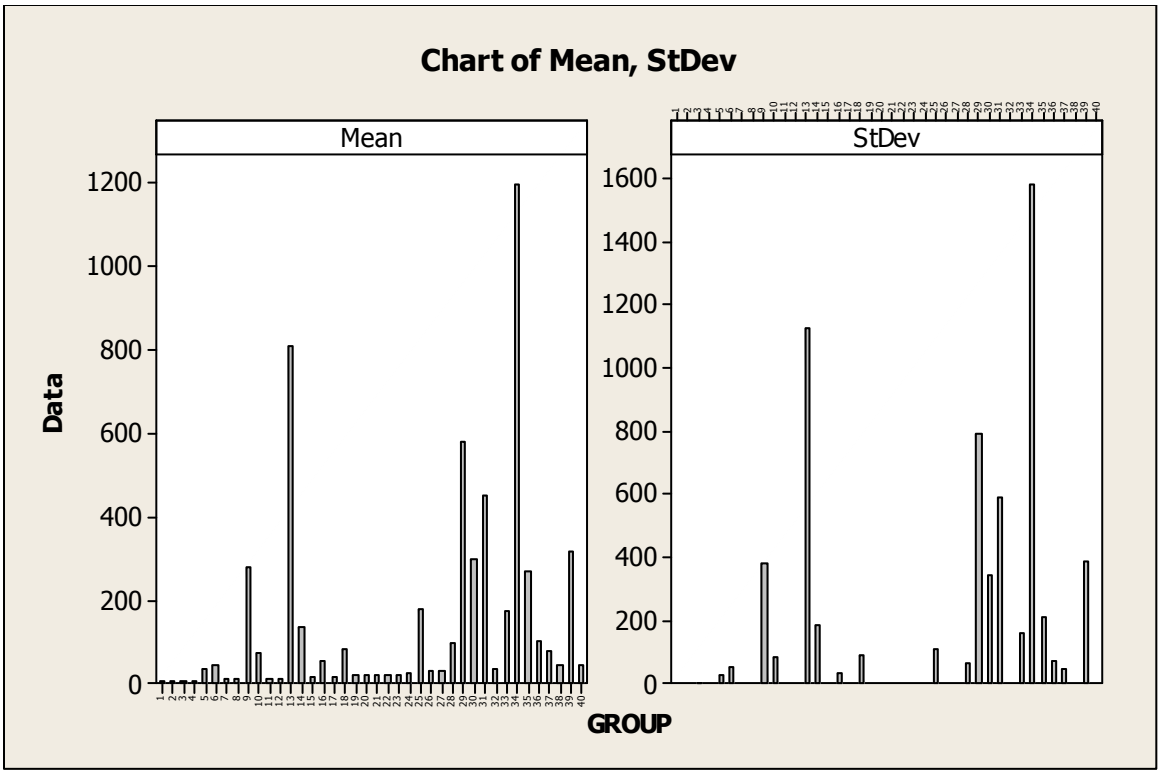

Figure 1: Bar chart of sample mean and sample sd of the 40 sub-populations in Coal_Hg data

We next ran the Kolmogorov-Smirnov test of normality on the Coal_Hg sample (see Figure 2). The P-value of the K-S test is less than .01, and the probability plot of the data clearly shows that Hg data is far from being normally distributed.

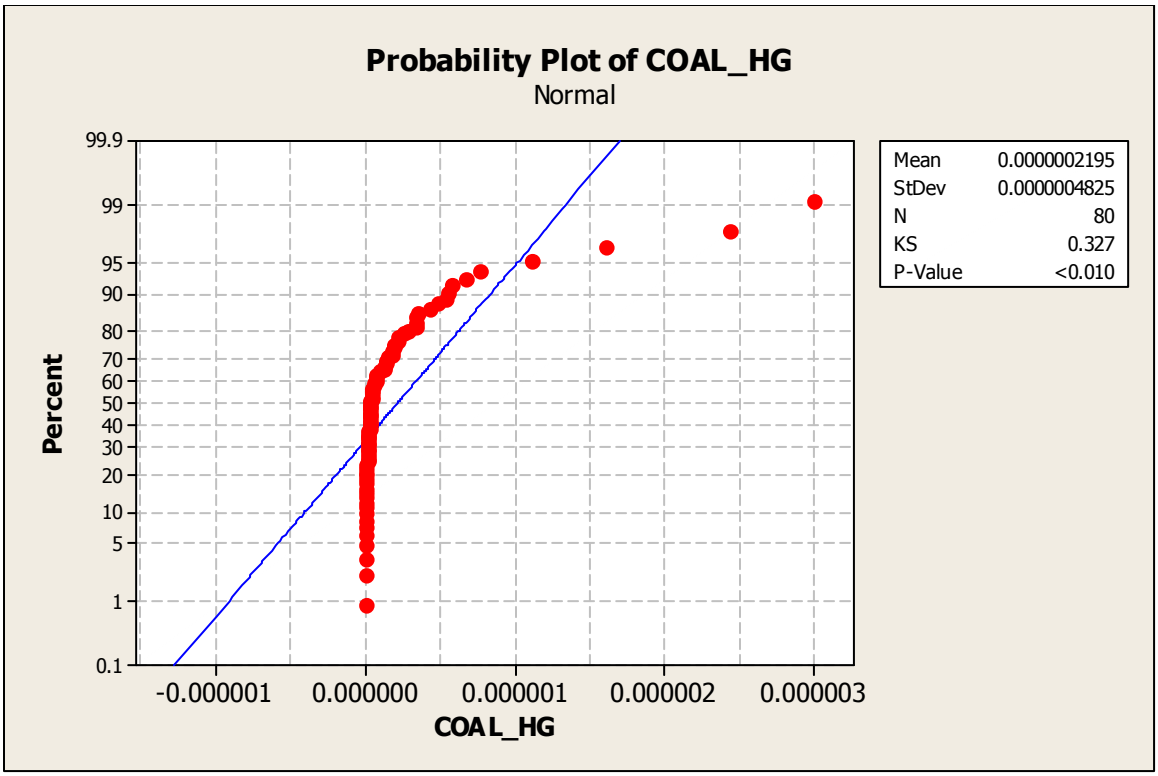

Figure 2: Probability plot of the Coal_Hg data

We also used the bootstrap method to see if the CLT applies to the Coal_Hg sample. The CLT verification method has the following steps: a) Generate a sample of size N with replacement from the Coal_Hg sample of size 80; b) Compute the mean of the bootstrap sample in Step 1. By repeating the steps (a) and (b) above 1000 times, we obtained sample means of 1000 bootstrap samples, each of size N. Figure 3 is the histogram and Figure 4 is normal Q-Q plot for bootstrap sample size of 15. Figure 5 is the histogram and Figure 6 is normal Q-Q plot for bootstrap sample size of 25.

Figures 3-6 demonstrate that the sample mean is not normally distributed for samples of sizes 15 and 25. Since each observation is the mean of 3 measurements, this shows that samples of sizes 45 to 75 are not large enough to guarantee CLT.

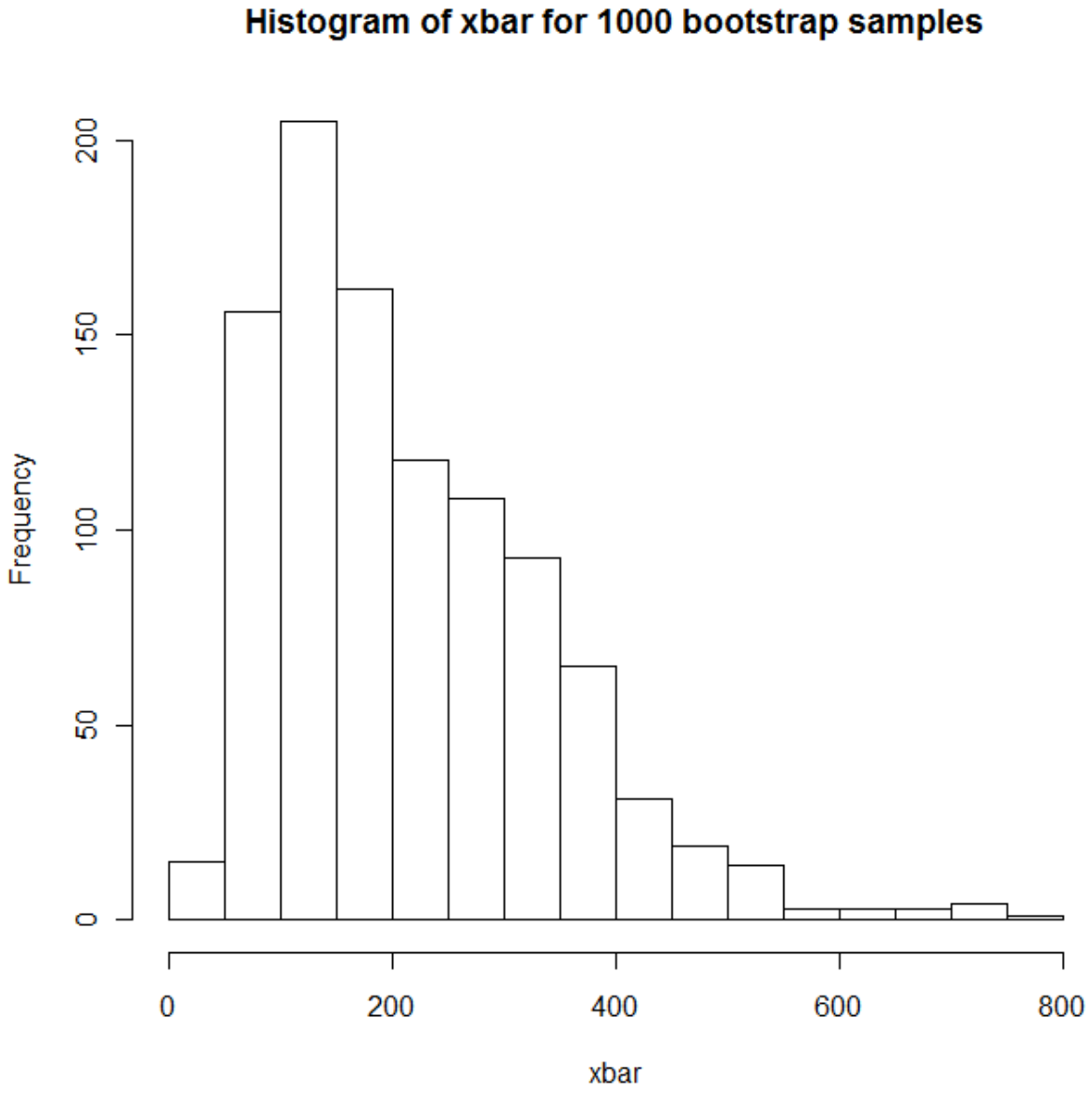

Figure 3: Histogram of xbar for 1000 Bootstrap Samples of size 15

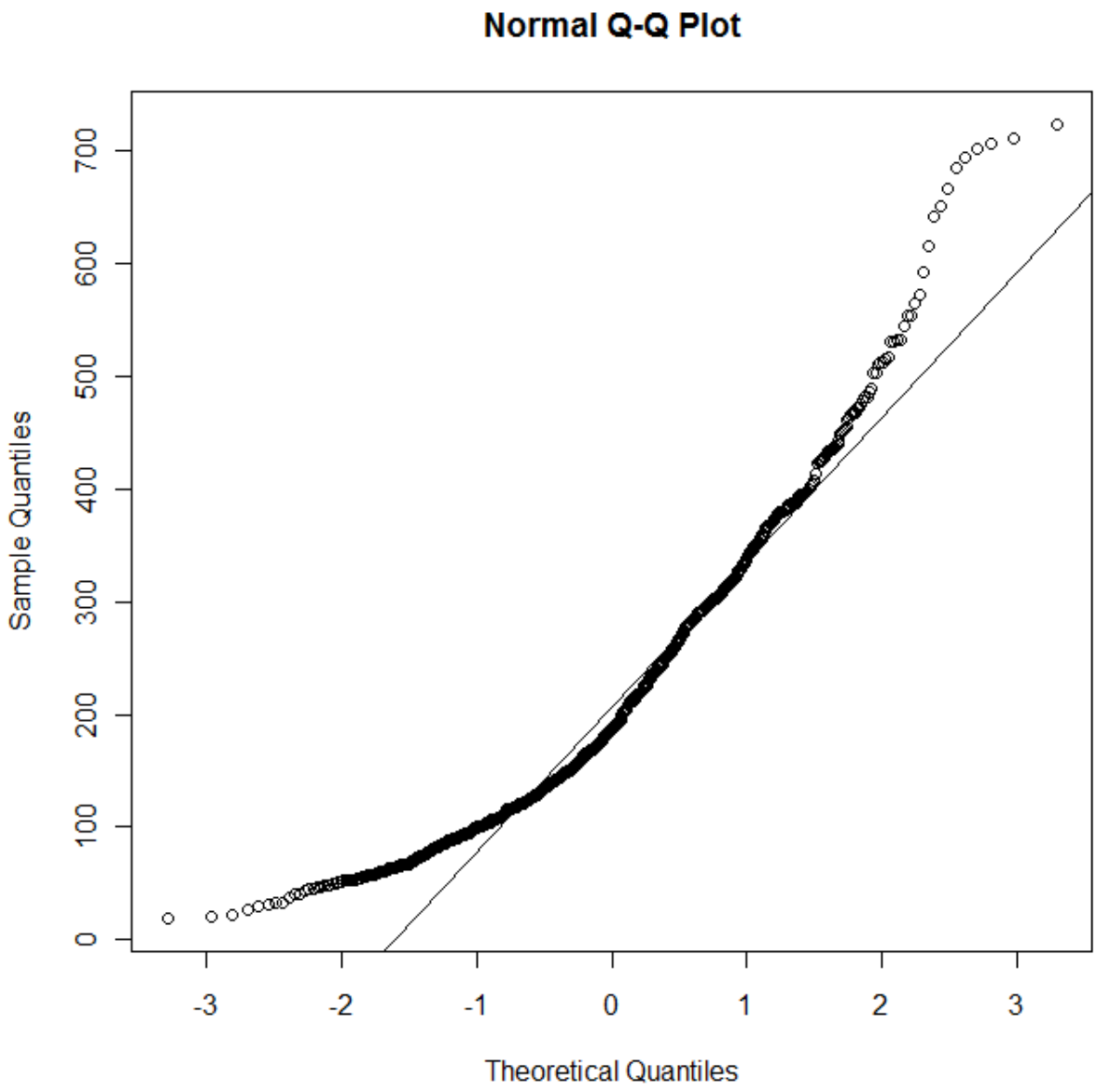

Figure 4: Q-Q Plot of xbar for assessing normality of sample mean

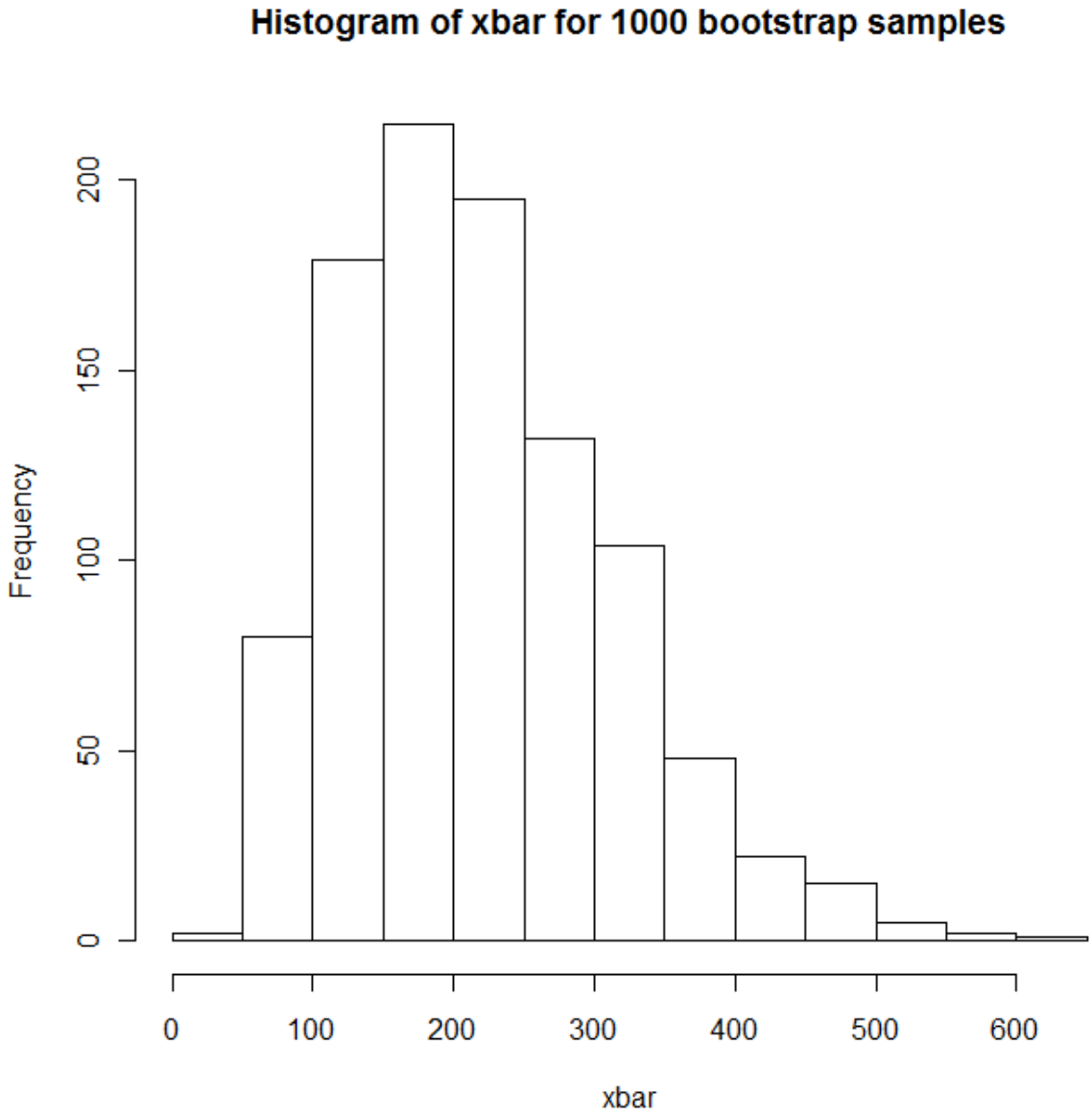

Figure 5: Histogram of xbar for 1000 Bootstrap Samples of size 25

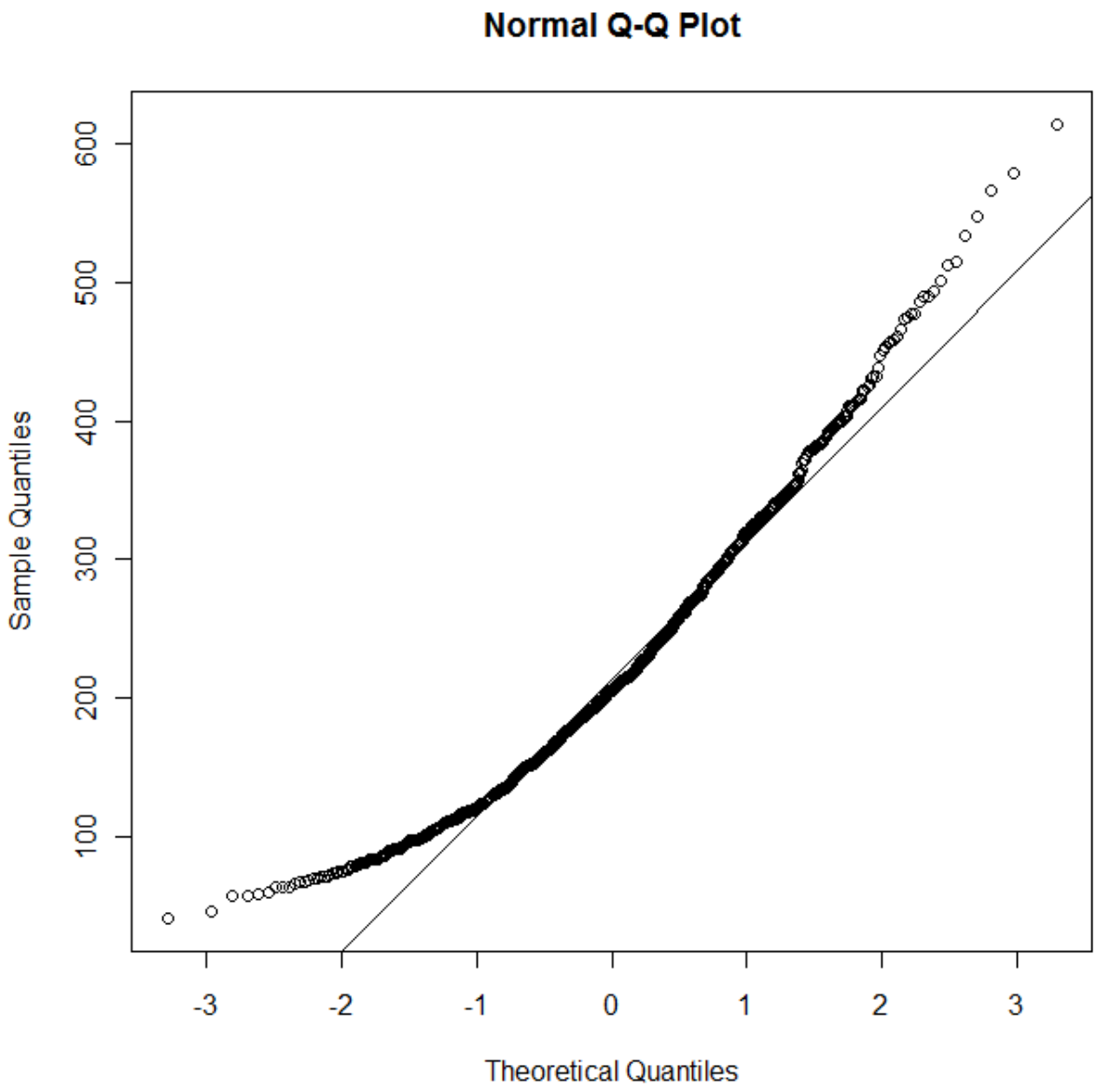

Figure 6: Q-Q Plot of xbar for assessing normality of sample mean

Based on the above, it is unlikely that the mechanical computation of the 99 UPL, even if were otherwise permissible, has any real meaning or significance. EPA should first determine the properties of the underlying distributions before computing such UPLs. For example, if we consider the best performing 40 units that belong in the existing-plant mercury floor calculation (for the coal >8300 BtU/lb subcatgory), and include only those results that were used to determine that these were the best performing units (i.e., the most recent ICR data – which were overwhelmingly collected using the same EPA Method 30B test method), we can calculate the various UPL values for this data set. We used EPA's approved statistical tool (ProUCL, available at http://www.epa.gov/esd/tsc/software.htm) to do the analysis. The results are as follows, for this data set: the best fit distribution for this data set was a gamma distribution and the calculated 99% UPL value was 7.51E-08 lb/MMBtu or 0.075 lb/TBtu. EPA's standard of 1.2 lb/TBtu is 16 times greater.

2. The Agency's Variability Assessment Is Distorted By Its Treatment of Results Below Detection Limits

In calculating the emission rates used to determine its floors, EPA assumed detection limit values were equal to the detection limit. When a unit's emissions are at or below the detection level, its emissions could be just below the detection level – or much lower. To account for such test results in developing emission factors, EPA has typically assumed emissions were at half the detection level, when there are other test results for the unit that measured above detection limits.[4] That approach would yield significantly

[4] *See* US EPA, Procedures for Preparing Emissions Factor Documents, EPA 454/R-95-015, November 1997, at 4-21, available at http://www.epa.gov/ttn/chief/efdocs/procedur.pdf.

lower limits.[5] Maximum likelihood estimation (MLE) methods, imputation methods, or the Kaplan-Meier methods would be more accurately account for below-detection-limit results.[6] Instead, EPA has assumed that emissions are equal to the detection limit of the test at that unit, thereby has overestimated the average emission rates of the best performing units.

C. The Agency Should Not Set Limits at Triple the Method Detection Limit

EPA seeks comment on an approach by which it would set standards at triple a "representative" Method Detection Limit (MDL), when-ever its calculations would otherwise yield a MACT floor below that triple-detection-limit threshold. 76 Fed. Reg. at 25,044. EPA's Floor Memorandum indicates that EPA has adjusted its new source standards for HCl and HF for coal, HCl for IGCC, and HCl, HF, Beryllium, and Cadmium standards for oil categories in this manner. Memorandum from Jeffrey Cole to Bill Maxwell dated May 18, 2011 ("Floor Memorandum") at 8-9 (Docket no. EPA-HQ-OAR-2009-0234-9858). EPA claims that this adjustment is necessary to address "measurement imprecision" associated with test results near the method detection limit. EPA should not adopt such an approach.

First, the record does not support the "measurement imprecision" suggested by the Agency. In its proposal, EPA notes that "[t]he expected measurement imprecision for an emissions value occurring at or near the MDL is about 40 to 50 percent. Pollutant measurement imprecision decreases to a consistent relative 10 to 15 percent for values measured at a level about three times the MDL." 76 Fed. Reg. 25,044. As support EPA cites the

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[5] *See* Helsel, D.R., "Fabricating Data: How Substituting Values for Non-Detects Can Ruin Results and What Can Be Done About It," Chemosphere Vol. 65, 2006. Ex. 9-33.

[6] See Helsel, D.R., "More Than Obvious: Better Methods for Interpreting Non-Detect Data," Environmental Science and Technology, October 15, 2005, p. 419. Ex. 9-34 (detailing flaws in substitution of detection limits or half-detection limits for non-detect results)

American Society of Mechanical Engineers, *Reference Method Accuracy and Precision (ReMAP): Phase 1, Precision of Manual Stack Emission Measurements,* CRTD Vol. 60, February 2001 (Docket no. EPA-HQ-OAR-2009-0234-2937). That document does not support EPA's statements. ReMAP notes that its purpose was to "determine the precision of pollutant emission measurements based on analysis of available simultaneous sample test data" for various pollutants, including those analyzed by EPA Method 26 for HCl.[7] The ASME ReMAP analyzed data using Method 26 and not Method 26A, which EPA used for HCl analysis in the ICR data collection. ReMAP uses the standard deviation of the distribution as a basis for estimating precision and selects two other parameters: (i) the anticipated range for 99 out of 100 future measurements; and (ii) the anticipated range for 99 out of 100 future triplicate measurements.[8] However, ReMAP includes a critical assumption: that in its analysis "the measurement method is being applied to a hypothetical stack with an average pollutant concentration that does not vary with time." It acknowledges that "[i]n real world applications, single and triplicate measurement results will indicate variation from both random errors and systematic errors (bias) in the measurement process as well as temporal variation in facility operation."[9] This assumption does not hold in the case of the current data set – we do indeed have both random and systematic errors as well as temporal variations.

With the caveats and assumptions discussed above, ReMAP found that while the "[relative standard deviation (RSD)] does increase when the method is applied to stacks with very low concentration," the "RSD is typically in the range of 5% to 10%." The RSD is the standard deviation divided by the average. In fact, ReMAP data for 99 out of 100 triplicate measurements of HCl over a wide range of concentrations show the following:

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[7] ReMAP, p. ES-1 (Docket no. EPA-HQ-OAR-2009-0234-2937).
[8] ReMAP, p. ES-1 and ES-2 (Docket no. EPA-HQ-OAR-2009-0234-2937).
[9] ReMAP, p. ES-2 (Docket no. EPA-HQ-OAR-2009-0234-2937).

True Stack HCl Concentration (mg/dscm)	99 out of 100 Triplicate Measurements	
	Lower Limit	Upper Limit
1	0.80	1.20
5	4.26	5.74
10	8.71	11.3
20	17.7	22.3
50	45.3	54.7
100	91.8	108.2

When the true concentration is 1 mg/dscm in the stack, the precision in that data set (i.e., its standard deviation) would predict the 99 percentile interval for triplicate future measurements to be 0.80-1.20 mg/dscm – i.e., around +/- 20% of the true value. When the true concentration at the stack is 100 mg/dscm, i.e., 100 times the previous case, the 99 percentile interval is 91.8-108.2, or around 8% or so. Over a very wide range of true concentrations, the variability is such that the prediction range varies by 8% to 20%. This does not support EPA's statement regarding imprecision of "40-50% . . . at or near the MDL."

Second, even if the claimed imprecision existed, Section 112 does not permit the Agency to substitute triple the detection limit for standards based on the actual performance of the best performing similar source (or sources). The Act requires new source standards to be no higher than the emissions of the "best performing similar source." 42 U.S.C. § 7412(d)(3). The Agency does not suggest – nor does the record – that the actual emissions of units reporting emissions below the detection limit are, in fact, triple the selected detection limit. Even if, as the Agency suggests, its emissions data from sources at or near a detection limit are imprecise by 40 to 50 percent, at most that source's actual emissions would be 50 percent higher than the reported detection limit for that source (it is equally likely that the actual value would be 50 percent lower). The Agency has, instead, substituted a number that is *triple* the detection limit obtained by a laboratory for (in most cases) a

completely different source. Likewise, where the Act requires existing source standards to be at least as stringent as the average emissions achieved in practice by the best performing 12 percent of existing sources, 42 U.S.C. § 7412(d)(3), the Agency has substituted a figure that does not reflect the actual emissions of *any* source within the category.[10]

D. The Agency's Beyond-the-Floor Analysis Does Not Meet Its Statutory Obligations

The Clean Air Act requires EPA to establish standards that require "the maximum degree of reduction in emissions . . . that the Administrator, taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements, determines is achievable for new or existing sources . . . ." 42 U.S.C. § 7412(d)(2). EPA has, for the most part, refused to apply the substantive requirements of that provision, instead setting its standards (with only two exceptions) according to the maximum "floors" set out in sections 112(d)(3). *See* 76 Fed. Reg. at 25,027 (proposing beyond-the-floor mercury standard for existing coal-fired units designed for coal less than 8,300 Btu/lb, and for new IGCC units).

In justification, EPA primarily asserts that it "could not identify better HAP emissions reduction approaches," aside from duplicate controls (an option EPA discards as too costly). 76 Fed. Reg. at 25,046. In its supporting materials, EPA provides some additional consideration of pollution reductions achievable through use of natural gas as a fuel, but dismisses such reductions as overly expensive. *See also* Beyond the Floor Memoranda dated March 14, 2011 (Docket no. EPA-HQ-OAR-2009-0234-3004), and March 15, 2011 (Docket no. EPA-HQ-OAR-2009-0234-2925),

[10] Nor can the Agency justify its floor adjustment by asserting an inability to measure emissions below its triple-maximum-detection limit floor. *See* Chapter IX.E, below.

That perfunctory analysis fails to justify EPA's standards according to the statutory criteria. Section 112's command to prescribe the "maximum degree of reductions," requires, at a minimum, that EPA identify and assess all available methods of reducing plants' pollution. *Cf.* 42 U.S.C. 7479(3) (defining "best available control technology limits" in similar terms). EPA instead noted only that the best performing sources, for mercury, utilized activated carbon injection (ACI) in conjunction with a fabric filer (FF), and that no superior removal methods existed. ACI is not, however, a "single" technology, but rather a generic approach for mercury reduction in coal-plant exhaust gas streams. Different injection systems use different types and amounts of carbon (per unit of flue gas volume). For example, utilities have used carbons of varying surface areas, and with different impregnated agents (such as bromine) to enhance mercury removal. Injection rates also affect mercury capture. Typical rates range from 1 lb/mmscf to over 10 lb/mmscf, with removal efficiency increasing accordingly. EPA should have considered, at a minimum, such alternatives within the range of applicable ACI systems.

Moreover, in requiring the "maximum achievable" limits, the statute requires EPA to identify the *maximum* reductions achievable using a particular technology. *See Alaska Dep't of Envtl. Conservation v. EPA*, 540 U.S. 461, 485-86 (2004) (noting, in interpreting other portions of Act, that "permitting authorities' discretion is constrained by the [Act's] strong, normative terms 'maximum' and 'achievable'"). That is especially important in light of EPA's extraordinarily aggressive adjustments in the name of variability. As a result of those adjustments, plants can and do achieve reductions well in excess of the reductions prescribed (as set forth in further detail below). At a minimum, the statutory standard requires EPA to investigate whether methods or techniques are available to improve upon that statistically extreme worst-case performance. 42 U.S.C. § 7412(d)(2) (requiring consideration of all "measures, processes, methods, systems or techniques" to reduce emissions).

Finally, the statute requires EPA to justify its standard by "taking into consideration" costs, the reductions achieved, non-air quality environmental impacts, and energy requirements. 42 U.S.C. § 7412(d)(2). EPA has provided no substantive discussion of those criteria to justify its standards. *See, e.g.,* 76 Fed. Reg. at 25,046 (noting only that switching to natural gas is more expensive that other control alternatives, without assessing reductions achieved, or other impacts).

The Agency's failure to provide an analytic basis tethering its limits to the statutory criteria is reflected in its inconsistent, and arbitrary, rationales for its decisions. EPA refused to enquire as to whether lower mercury emissions can be achieved by most coal-fired plants, offering as its rationale the absence of "other technology" than that used to establish the MACT floor. Yet it simultaneously prescribes a beyond-the-floor limit for units designed for coal of less than 8300 Btu/lb, because, *inter alia,* "the technology installed to achieve the MACT floor would be the *same* technology used to achieve the beyond-the-floor MACT limit." 76 Fed. Reg. at 25,046-47. It thereby applies the same rationale to essentially identical facts – to justify divergent decisions. Similarly, EPA's beyond-the-floor analysis for units designed for coal of less than 8300 Btu/lb concludes its mercury standard is cost-effective at a cost of $17,275/lb. Beyond the Floor Memo dated March 14, 2011 at 5 (Docket no. EPA-HQ-OAR-2009-0234-3004). Elsewhere, it refuses to examine available methods of reducing emissions without any detailed comparison of costs and reductions. *See, e.g,* 76 Fed. Reg. at 25,047-8 (refusing to consider combinations of HCl control systems or fuel switching based only on "significant additional cost" or "high cost" for reductions).

In its refusal to prescribe reductions beyond those of the best performing unit(s), EPA has failed to properly apply the statutory standard.

IX. EPA'S PROPOSED NESHAPS DO NOT REFLECT THE MAXIMUM ACHIEVABLE REDUCTION IN HAZARDOUS AIR POLLUTANTS

A. EPA's Mercury Limits Should Be Strengthened

1. EPA's Proposed Mercury Limits for Coal-fired EGUs with Design Coal Equal to or Greater than 8300 Btu/lb

EPA has subcategorized the MACT limits for mercury into two categories: coal-fired units designed for coal with heat value greater than or equal to 8,300 Btu/lb (">8300 Btu/lb") and coal-fired units designed for coal with heat value less than 8,300 Btu/lb ("<8300 Btu/lb").[1] This sub-section addresses EPA's proposed MACT standards for the category that covers most coal-fired EGUs –those units designed for coal with a heat value equal to or greater than 8,300 Btu/lb.

a) New Source Mercury Standard for Units Designed for Coal with Heat Value Equal to or Greater than 8300 Btu/lb

i. EPA's Proposed New Source MACT Floor for Mercury Fails to Reflect Emissions of the Best Controlled Similar Source

EPA has proposed a mercury standard for new coal-fired EGUs in the >8,300 Btu/lb category of 0.0002 lb/GW-hr.[2] EPA also determined the MACT floor emission rate in terms of lb/MMBtu to be 1.8466 x 10^{-8} lb/MMBtu or 0.018 lb/TBtu.[3] EPA's proposed standard is set at the level determined by EPA to be the floor.

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[1] *See*, e.g., 76 Fed.Reg. 25027 (May 3, 2011), Table 10.

[2] Note that EPA initially proposed a new source mercury MACT standard of 0.000010 lb/GW-hr for the >8300 Btu/lb subcategory in its May 3, 2011 proposed rulemaking. *See,* e.g., 76 Fed.Reg. 25027. However, in response to a submittal from the Utility Air Regulatory Group (UARG), EPA acknowledged some errors in the determination of this emission limit, and EPA revised the proposed new source limit to 0.0002 lb/GW-hr. *See* May 18, 2011 letter from EPA to Hunton & Williams (Docket no. EPA-HQ-OAR-2009-0234-16628), and EPA's spreadsheet entitled "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041).

[3] *Id.*

EPA ignored the two lowest emitting units in the >8,300 Btu/lb subcategory in its determination of new source MACT floor for mercury. Specifically, EPA ignored the Spruance Genco Units 2 and 3. EPA's justification for ignoring the Hg emission rates achieved at these two units was that "both are of a unique size and design that most likely will not be representative of newly built units."[4] EPA has not, however, demonstrated that the Spruance Genco units,(both of which are are stoker fired units) are dissimilar from the remaining units in the category as far as mercury emitting characteristics are concerned. A "similar source" is:

> . . .a stationary source or process that has comparable emissions and is structurally similar in design and capacity to a constructed or reconstructed major source such that the source could be controlled using the same control technology.

EPA did not explain if, or why, the size or design of the Spruance Genco units affect the application of those units' mercury control technologies to other units.

There are seven other units that are achieving mercury emission rates similar to those of the Spruance units (i.e., 2.63×10^{-9} to 8.54×10^{-9} lb/MMBtu[5]). These lowest emitting units tend to burn bituminous coal, except for one unit burning coal refuse (Seward). Almost all of the units are burning coal with similar mercury content.[6] Bituminous coals are known for having high levels of chlorine; chlorine helps oxidize elemental mercury, enables the mercury to adhere to particles, and to be captured in downstream

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[4] *See* May 18, 2011 Memo with Subject "National Emission Standards for Hazardous Air Pollutants (NESHAP) Maximum Achievable Control Technology (MACT) Floor Analysis for Coal- and Oil-fired Electric Utility Steam Generating Units – REVISED" ("MACT Floor Memo") at 11 (Docket no. EPA-HQ-OAR-2009-0234-9858).

[5] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Hg_New_>8300 Btulb_MMBtu."

[6] *Id.*

scrubbers and particulate control devices.[7] The coal refuse utilized at the Seward units also has high chlorine levels.[8] All of these units have baghouses for particulate control. Further, the lowest emitting units all have dry scrubbers or are fluidized bed combustors which inject lime into the combustor (with the same effect as a scrubber).

The Spruance units are comparable to other coal-fired EGUs, and can be controlled with the same mercury controls as other coal-fired EGUs (and, in fact, are controlled in a similar manner as the other top ranked EGUs). While the Spruance units are smaller in size than many other units (57 MW), EPA has not explained why smaller size affects a plant's ability to control mercury emissions. EPA has, accordingly, failed to provide adequate justification for ignoring the lowest two emitting coal-fired EGUs in determining the new source MACT floor for mercury.

After EPA determined the MACT floor, EPA accounted for variability in the lb/MW-hr emission rate achieved at the EGU EPA considered to be the top ranked EGU (Nucla Unit 1) by determining the 99th percentile UPL. Not only did EPA determine the 99th percentile UPL emission rate for Nucla Unit 1, EPA then rounded up that value in coming up with a new source MACT floor emission limit. Specifically, EPA determined the average lb/MW-hr emission rate of the best controlled similar source to be 5.0036×10^{-8} lb/MW-hr, and then EPA determined the 99th percentile UPL of that source's data to be 1.7324×10^{-7} lb/MW-hr.[9] EPA then rounded up this value to the nearest 10 to arrive at a floor value of 2×10^{-7} lb/MW-hr or 0.0002 lb/GW-hr. EPA has

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[7] *See* March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule at 76 (Docket no. EPA-HQ-OAR-2009-0234-3048).

[8] *See* EPA spreadsheet with filename "floor_analysis_coal_hcl_031611.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-3036) at the worksheet entitled "AcidGas_coal."

[9] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Summary."

not provided adequate justification for going beyond the 99th percentile UPL in its determination of the MACT floor emission rate for mercury. In fact, there is no technical justification for rounding up any of the floor limits.

A long-term averaging time with compliance determined by mercury CEMs can effectively account for variability in emissions. Such an approach would be preferable to the 99th percentile UPL analysis, which goes well beyond predicting the worst reasonably foreseeable conditions. An adjusted averaging time will adequately account for the worst reasonably foreseeable circumstances while at the same time more accurately reflecting the average mercury emission rate of the lowest emitting EGU in the <8300 Btu/lb subcategory. In addition, by requiring use of mercury CEMs and imposing a long averaging time, EGU owners will be more vigilant about the EGU's mercury emissions on a day in-day out basis to make sure the mercury controls are being operated in a manner to ensure continuous compliance with the MACT limits.

ii. EPA Did Not Adequately Justify Why It Did Not Evaluate a Beyond the Floor Mercury MACT Limit for New Sources

EPA did not evaluate whether mercury emission rates lower than its determination of MACT floor could be met at coal-fired EGUs in the >8,300 Btu/lb subcategory. EPA justifies that decision asserting that the agency could not identify any control technologies that could achieve greater emission reductions of HAP than the control technologies they expected to be used to meet the MACT floor level of control.[10] That is not the appropriate test to follow in determining whether to evaluate beyond the floor MACT requirements. *See* 42 U.S.C. §7412(d)(2) (requiring maximum achievable reduction, and requiring consideration of costs, reductions, non-air-quality impacts, and energy impacts).

Given that there are various "control methods" in play that determine the amount of mercury emitted by a coal-fired EGU, EPA cannot simply

[10] *See* 76 Fed.Reg. 25046 (May 3, 2011).

assume that the best controlled source of mercury could not reduce its emissions even more than it already is. For example, EPA's determination of best performing similar source is Nucla Unit 1 which is a fluidized bed boiler with SNCR and a fabric filter.[11] This unit does not have activated carbon injection. In fact, most of the lowest mercury emitting units do not have activated carbon injection. Further, for those EGUs that do have activated carbon injection, this mercury control technology can be operated at varying levels of mercury control. Thus, in evaluating whether to propose a more stringent emission rate than the MACT floor, EPA cannot simply assume that new units cannot lower mercury emissions any lower than the MACT floor. EPA should perform a beyond the floor analysis to ensure that it is setting a MACT emission limit for new sources reflective of the maximum achievable reduction in mercury emissions.

a) Proposed Existing Source MACT Standards for Coal-Fired Units in the >8300 Btu/lb Subcategory

i. EPA's Proposed Existing Source MACT Floor for Mercury

To determine the mercury MACT floor for existing sources for the subcategory >8300 Btu/lb coal, EPA took the average of the mercury emission rates for the top performing 12% of the 330 EGUs for which it had mercury data – i.e., the lowest emitting 40 EGUs.[12] In response to a letter from the Utilities Air Regulatory Group (UARG), EPA issued a revised MACT floor memo as well as a revised mercury MACT floor spreadsheet that indicated a higher mercury MACT floor for existing sources than that previously presented by EPA in its May 3, 2011 proposed rulemaking. The table below

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[11] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Hg_New_>8300 Btulb_MMBtu."

[12] *See* May 18, 2011 National Emission Standards for Hazardous Air Pollutants (NESHAPs) Maximum Achievable Control Technology (MACT) Floor Analysis for Coal- and Oil-Fired Electric Utility Steam Generating Units – REVISED at 3. (Docket no. EPA-HQ-OAR-2009-0234-9858.)

shows the differences between EPA's existing source MACT floor determination issued March 16, 2011 and the existing source MACT floor determination issued May 18, 2011.

Changes in EPA's Existing Source Mercury MACT Floor Determination Coal>8300 Btu/lb

Mercury- Coal>8,300 Btu/lb	**3-16-11 Existing Source MACT Floor Determination[13]**	**5-18-11 Existing Source MACT Floor Determination[14]**
Mean of top 40 EGUs (lb/MMBtu)	6.8578×10^{-9} lb/MMBtu	2.1250×10^{-8} lb/MMBtu
UPL (lb/MMBtu)	8.4657×10^{-7} lb/MMBtu	1.1812×10^{-6} lb/MMBtu
Floor Value (lb/TBtu)	1 lb/TBtu	1.20 lb/TBtu
Mean of top 40 EGUs (lb/MW)	1.2129×10^{-6} lb/MW	2.0899×10^{-6} lb/MW
UPL (lb/MW)	7.9161×10^{-6} lb/MW	1.2329×10^{-5} lb/MW
Floor Value (lb/GWh)	0.008 lb/GWh	0.013 lb/GWh

We could not find an explanation from EPA regarding the change in the existing source MACT floor, other than the UARG letter and EPA's response. UARG pointed out that EPA incorrectly converted emission rates from lb/MWh to lb/GWh.[15] UARG stated that at least half of the 40 units identified as best performing have mercury emission rates 1000 times higher than assumed by EPA in its existing source MACT floor analysis.[16] EPA's May 18, 2011 response to UARG acknowledges discrepancies in the recalculations of mercury emissions data and states that the revised MACT

[13] From EPA Spreadsheet with Filename "floor_analysis_coal_hg_031611.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-3037) at Summary tab.
[14] From EPA Spreadsheet with Filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at Summary tab.
[15] *See* May 6, 2011 letter from Hunton & Williams on behalf of UARG to EPA at 2 (Docket no. EPA-HQ-OAR-2009-0234-9859).
[16] *Id.* at 3.

floor analysis for existing coal fired power plants increased from 1.0 to 1.2 lb/TBtu.[17]

A comparison of the March 16, 2011 spreadsheet to the May 18, 2011 spreadsheet shows that the lb/MMBtu mercury emission rates were changed for at least the 13 top ranked units in EPA's March 16, 2011 spreadsheet, including Deepwater Unit 1, Dallman Units 31 and 32, Will County Unit 4, Joliet 9 Unit 5, Escalente, TS Power Plant, Waukegan Unit 8, Dallman Unit 33, Crawford Unit 7, Joliet 29 Unit 8, St. Nicholas Cogen Project Unit 1, and Joliet 29 Unit 7. For all of these units except Waukegan Unit 8, EPA increased both the lb/MMBtu and the lb/MW emission rates of these units by a factor of 1,000 in the May 18, 2011 ranking. The Waukegan Unit 8's mercury emissions rate was increased by a factor of 425 in the May 18, 2011 ranking. These changes in these units' emissions (and presumably several others, as we did not check each unit), resulted in a change in the mean emission rate of the lowest emitting 40 units from 1.0 lb/TBtu to 1.2 lb/TBtu.

After determining the 1.2 lb/TBtu average emission rate of the lowest mercury-emitting 40 EGUs, EPA applied various factors to account for variability and also converted the data to a lb/MW-hr emission limit as an alternative compliance limit to a lb/TBtu. As a result of those manipulations, EPA's proposed MACT floor limits for existing sources in the >8300 Btu/lb subcategory fails to adequately reflect the mercury emissions levels emitted by the top performing 12% of coal-fired EGUs.

(1) EPA Should Consider Other Approaches to Accounting for Variability in Setting a Mercury Emission Limit Which Accurately Reflects the Mercury Emissions Achieved by the Best Performing EGUs

To account for variability in the emissions of the top performing 12% of EGUs, EPA determined the 99th percentile Upper Prediction Limit (UPL) to the test data for the lowest emitting 40 EGUs. As noted elsewhere, that high

[17] *See* May 18, 2011 EPA letter to Hunton &Williams at 1 (Docket no. EPA-HQ-OAR-2009-0234-16628).

UPL inappropriately inflates the proposed standards. Below, we offer the following comments specific to applying this approach to the mercury MACT floor determination.

In setting an emission rate reflective of the MACT floor, EPA has, as we understand it, sought to determine the emissions rate achieved by the best controlled similar source under the worst reasonably foreseeable circumstances. In a November 2003 memo to the Utility MACT Project File, EPA explained its approach to variability, within that framework. Specifically, EPA stated "there are two fundamentally different approaches to incorporating variability into the proposed [MACT] rule: (1) including variability in the MACT floor calculation; *or* (2) including variability in the compliance method."[18] EPA further stated:

> Addressing variability in the compliance method would involve allowing an averaging time for compliance that would accommodate variations in pollutant emissions over time. For example, averaging over a month or year of data will provide opportunity for variations in the amount of a constituent in the fuel to be accommodated without exceeding the emission limitation.[19]

Use of a long-term average evens out the ups and downs or variability in measured data. This is shown in Figure 7.1 from Ex. 9-3, which graphically displays the same data set on an instantaneous basis (as measured by a CEMS), on a one-hour basis, and on a four-hour basis. This chart shows that the longer 4-hour averaging time results in a straight line as a function of time. The shorter term data varies more sharply.

Long term testing at coal-fired electric utility steam generating units with mercury controls shows very little variability in mercury emissions; a long averaging time could readily address the few excursions that may occur

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[18] 11/26/03 Memorandum from William Maxwell to Utility MACT Project Files at 2 (9-2).
[19] *Id.*

in mercury emissions. For example, the Hardin Station is equipped with a dry scrubber, baghouse and ACI system and burns subbituminous coal.[20] Once carbon injection started, the Hardin station's Hg CEMs showed only a few elevated mercury concentrations over a 10 month period.[21] Long term mercury testing has also been conducted for the Toxecon installation for mercury control at Units 7-9 of the Presque Isle power plant in Michigan. Summaries from various presentations and reports on the long term operation of the Toxecon mercury controls shows the units consistently achieve over 90% mercury control based on monthly averages.[22]

EPA's approach to account for variability in emissions at the 12% best performing units results in a MACT floor determination that fails to reflect the average emissions of the best performing units. Specifically, EPA determined the 99th percentile UPL mercury emission rate to be 1.1812×10^{-6} lb/MMBtu.[23] This is over 55 times higher than the *actual* average emission rate (i.e., 2.1250×10^{-8} lb/MMBtu) of EPA's data for the lowest emitting 40 EGUs. Of all the test results presented in EPA's mercury MACT floor spreadsheet from the lowest emitting 40 EGUs[24], only two test results were over 1.1812×10^{-6} and the majority was at least an order of magnitude lower than 1.1812×10^{-6}lb/MMBtu. Further, in the entire 330 EGU mercury

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[20] *See* Amrhein, Jerry, *Results of a Long Term Mercury Control Project for a PRB Unit with an SCR, Spray Dryer and Fabric Filter*, 11th Annual EUEC Conference, January 30, 2008, Ex. 9-4.

[21] *Id. See* top graph on 17th slide, HgT out (magenta line) and Hg0out (blue line). Note that, for the most part, the Hg0 and HgT are identical and are represented in the graph with one line for Hg0 out (typically less than 0.5 $\mu g/m^3$).

[22] *See Toxecon Retrofit for Mercury and Multi-Pollutant Control on 3 90-MW Coal Fired Boilers*, April 2009, Ex. 9-5; s*ee also* Exs. 9-6 through 9-10.

[23] *See* EPA Spreadsheet with Filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at Summary tab.

[24] *Id.* at Hg_Avg_>8300 Btulb_MMBtu tab. For some EGUs, several test results were provided.

emissions dataset, more than half of the EGUs (153 units) had minimum mercury emission rates lower than EPA's 99th percentile UPL.

(2) EPA's Mercury MACT Floor Limit in Units of lb/MW-hr Is Flawed

EPA determined a mercury MACT floor limit in terms of lb/MW-hr as well as lb/TBtu. EPA has not specified how it determined the lb/MW-hr MACT floor limit. It appears that EPA first converted mercury emissions in terms of lb/MMBtu to lb/MW-hr for each coal fired EGU based on a unit-specific heat rate. EPA then calculated the unit-specific heat rate by dividing the total generating capacity of the unit in MW by the total maximum heat input in MMBtu/hr.[25] If so, EPA has failed to accurately determined the necessary heat rates.

With respect to the total maximum heat input data, many companies may be reporting the maximum possible heat rate of the boiler rather than typical maximum heat input need to achieve MW capacity. For example, for Seward Unit 1, EPA indicated the total maximum heat input was 6,200 MMBtu/hr, whereas EPA's Clean Air Markets Database identifies the maximum heat input to this boiler as 3,180MMBtu/hr.[26] For Valley Units 1, 2 and 3, EPA indicated that the total maximum heat input for each unit was 1,736 MMBtu/hr whereas the Clean Air Markets Database identifies the maximum heat input to these boilers to be 1000, 959, and 1192 MMBtu/hr, respectively.[27]

Many of the calculated unit heat rates given in EPA's spreadsheet for the mercury MACT floor analysis are entirely implausible – such as unit heat rates as low as 4.65 MMBtu/MWh or as high as 13.07 MMBtu/MWh. Further, even if the data EPA was using was accurate and reflective of maximum heat

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[25] *Id.* at "Hg_Avg_>8300Btulb_MMBtu" tab.
[26] *Id.* and see http://camddataandmaps.epa.gov/gdm/index.cfm for Clean Air Markets Database data.
[27] *Id.*

input at maximum generating capacity, EPA's approach to determining heat rate fails to reflect the heat rate the unit operates at during lower loads or differences during the summer or winter.

Regardless, the alternative lbMW-hr MACT are intended to encourage efficiency. Instead of determining a mercury MACT floor limit based on EPA's calculations of lb/MW-hr emission rates, EPA should simply convert the average mercury emission rate in lb/MMBtu to lb/MWh (or lb/GW-hr) based on a reasonable heat rate (at a minimum, improved heat rates should be required as a "beyond the floor" method of reducing emissions). The alternative lb/MW-hr limits for both total particulate matter and HCl reflect an assumed heat rate of 10,000 Btu/kW-hr. This reflects approximately 34% thermal efficiency. However, a comparison of EPA's existing source mercury MACT floor determinations in lb/MMBtu to lb/GW-hr shows that the lb/GW-hr limit reflects a heat rate of 10,438 Btu/kW-hr or 32.7% thermal efficiency. Not only is this heat rate higher than the assumed heat rate for the conversions of the HCl and total PM MACT limits to units of lb/MW-hr, this heat rate is even higher than the average heat rate of the coal-fired EGU fleet of 10,400 Btu/kW-hr.[28]

According to data compiled by the Center for Integrative Environmental Research at the University of Maryland, the top 50 performing EGUs in 1998 had average heat rates of 9,854 Btu/kW-hr based on data from the U.S. Energy Information Administration.[29] This reflects an efficiency being achieved at the most efficient EGUs of 34.6%, and it was being achieved over ten years ago. Lower heat rates have been achieved in

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[28] *See* Sargent & Lundy Report, Coal-Fired Power Plant Heat Rate Reductions, SL-009597, January 22, 2009, at 1-1, which states that the average annual heat rate of the existing coal-fired EGU fleet in the US is 10,400 Btu.kW-hr. Attached as Ex. 9-1.

[29] *See* April 17, 2001 Review of Potential Efficiency Improvements at Coal-Fired Power Plants, at 2. Attached as Ex. 9-11.

recent years through boiler, turbine and other plant modifications.[30] EPA should not assume a heat rate any higher than 9,854 Btu/kW-hr in developing a mercury MACT limit in terms of lb/GWH-hr to comply with the goal of rewarding energy efficiency. Converting EPA's 99th percentile UPL value of 1.2 lb mercury/TBtu heat input, a more appropriate mercury floor emission limit in terms of lb/GW-hr would be 0.0118 lb/GW-hr. Or, if EPA were to adopt a mercury MACT floor of 2.125×10^{-2} lb/TBtu applicable over a rolling 12 month average as we recommend above (rather than determining the 99th percentile UPL), an appropriate alternative limit would be 0.0002 lb/GW-hr. This would much more accurately reflect the actual average mercury emissions achieved by the 12% best performing EGUs and the alternative limit would much more likely encourage energy efficiency.

(3) EPA Has Appropriately Assumed that the Lowest Emitting 12% of the EGUs for Which it has Mercury Emissions Data Reflect 12% of the Coal-Fired EGUs with Design Coal Equal to or Greater than 8300 Btu/lb

Although there are flaws in EPA's mercury MACT floor determination and we believe that the mercury MACT limit for existing sources should be lower than the floor proposed by EPA, we do think it was appropriate for EPA to determine the average of the lowest 12% of the EGUs for which it had mercury emissions test data (i.e., the lowest emitting 40 units out of the 330 EGUs for which EPA has test data). EPA could only justify relying on the average of a larger number of EGUs if EPA knew with certainty that it had captured the lowest mercury-emitting units of all the coal-fired EGUs in the >8300 Btu/lb subcategory in the U.S.

Because there are numerous factors that can influence the mercury emissions rate from a coal-fired EGU, it would be virtually impossible for EPA to know with any certainty that it had captured the emissions of the

[30] *See* Sargent & Lundy Report, Coal-Fired Power Plant Heat Rate Reductions, SL-009597, January 22, 2009 (Ex. 9-1).

lowest emitting coal-fired EGUs without testing all of the EGUs. Mercury can take three different forms in the flue gas – elemental mercury that is usually emitted as Hg^0, Hg^{+2}, and particle bound mercury Hg^p. As EPA has acknowledged, the amount of mercury that is removed is dependent on the form of the mercury in the flue gas. Characteristics of the coal, such as high chlorine levels, can help oxidize the mercury so that the mercury more readily adheres to particles to be collected in scrubbers or particulate control devices. Selective catalytic reduction (SCR) systems, used primarily for NOx control, can also help to oxidize the mercury. Characteristics of the boiler can also impact the form of the mercury, impacting the removal efficiency of mercury in the downstream controls. Electrostatic precipitators (ESPs) can provide good mercury removal depending on the form of the mercury in the flue gas, although baghouses typically do a much better job. Activated carbon injection, especially halogenated activated carbon, can achieve very high levels of mercury control. But even units without carbon injection can achieve high levels of mercury reduction, depending on the characteristics of the coal, boiler and the pollution controls. These various factors that influence mercury emissions are discussed in the preamble to EPA's proposed MACT rule. *See* 76 Fed.Reg. 25014 (May 3, 2011). In addition, the concentration of mercury in the coal also has an impact on the amount of mercury emitted. Because there are so many different variables that account for mercury emission rates from coal-fired EGUs, EPA cannot be assured that it has collected data on the lowest mercury emitters. In fact, a review of the lowest mercury-emitting 40 units for which EPA has emissions data shows a wide variety of unit sizes, coal types, and pollution controls.

Due to all of these factors that influence mercury emissions, EPA is entirely justified in assuming that 12% of the 330 EGUs for which EPA has collected mercury emissions (or the lowest emitting 40 EGUs) are reflective of 12% of the 1,061 EGUs in the >8300 Btu/lb subcategory.

ii. Beyond the Floor for Existing EGUs: EPA is Obligated to Evaluate Beyond the Floor Mercury Emission Limits for Coal-Fired EGUs with Coal > 8300 Btu/lb

EPA did not undertake any meaningful evaluation of control technologies or methodologies that would enable units to achieve mercury emission reductions beyond EPA's proposed mercury floor emissions rates. EPA justifies that refusal by claiming that it could not identify any control technologies that could achieve greater emission reductions of HAP than the control technologies they expected to be used to meet the MACT floor level of control.[31] That does not suffice; the record indicates that methods exist to reduce mercury emissions below EPA's proposed standard. The law requires EPA to assess such reductions.

(1) Several States Have Required Lower Mercury Emission Limits for Existing Coal-Fired EGUs than EPA's Proposed MACT Standard for Existing Coal-Fired EGUs

EPA proposed a mercury MACT standard of 1.20 lb/TBtu or 0.013 lb/GW-hr for existing coal-fired EGUs in the >8300 Btu/lb subcategory.[32] As EPA itself has noted in its March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule at pages 3-8 (Docket no. EPA-HQ-OAR-2009-0234-3048), many states have adopted more stringent numerical mercury emission limits for existing coal-fired EGUs, typically applicable to those EGUs >25 MW in size. For example, Arizona, Colorado, Connecticut, and Delaware have emission limits for EGUs of 0.0087 lb/GW-hr or 90% mercury removal to be met in 2008 (Connecticut), 2013 (Delaware), and 2017 (Arizona and Colorado). This numerical limit is 33% lower than EPA's proposed 0.013 lb/GW-hr mercury limit. Massachusetts has even lower mercury limits of 0.00250 lb/WH-hr or a 95%

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[31] *See* 76 Fed.Reg. 25046 (May 3, 2011).
[32] *See* EPA Spreadsheet with Filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at Summary tab.

mercury removal requirement to be met by 2013 at its Brayton Point, Mystic Generating Station, Somerset Station, Mount Tom, Canal and Salem Harbor power plants. Montana has a 0.9 lb/TBtu mercury limit to be met at all non-lignite coal units by 2010. New York has a 0.60 lb/TBtu mercury limit for all coal-fired power plants developed after November 15, 1990. Oregon has a 0.6 lb/TBtu mercury limit or a 90% removal requirement for all existing coal-fired EGUs >25 MW to be met by 2012. Last, Wisconsin has a 0.0080 lb/GW-hr mercury limit or a 90% mercury removal requirement for all coal-fired EGUs that are greater in size than 150 MW to be met by 2015. Other states that have adopted 90% mercury removal requirements for existing EGUs include Illinois, Maryland, Michigan, Minnesota, New Jersey, and Utah. New Jersey has required coal-fired EGUs >25 MW to comply with a 90% mercury removal requirement since 2007.

Those state requirements, and the plants meeting them, demonstrate the achievability of additional mercury reductions. EPA is obligated to evaluate these lower mercury emission limits as part of its national MACT rulemaking to ensure that its proposed emission limits reflect the maximum degree of emission reductions that can be achieved, taking into account costs of control and any non-air quality, environmental, and energy impacts.

(2) EPA Has Already Determined that 90% Mercury Removal is Achievable and Cost Effective, But EPA's Proposed Mercury Emission Limits Do Not Require 90% Mercury Removal at all EGUs

In EPA's Integrated Planning Model (IPM) used to evaluate costs and benefits for the proposed MACT rule, EPA assumed a mercury emission reduction level of 90% with the use of brominated activated carbon injection required at most coal-fired EGUs.[33] However, EPA's proposed MACT floor

[33] *See* March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule at pages 76-82 (Docket no. EPA-HQ-OAR-2009-0234-3048). The only EGUs that EPA did not model with

emission limit of 1.2 lb/TBtu for the >8300 Btu/lb subcategory only reflects 90% mercury removal for some coals; it reflects much less than 90% mercury removal for other coals. In Table 5-11 of Chapter 5 of EPA's August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model (at page 5-17), EPA identified various coal types by sulfur grade and uncontrolled mercury emission factors based on mercury concentration in the coal. In the table below, we have reprinted that information with the exception of the lignite coals that we assume would be covered under EPA's <8300 Btu/lb subcategory, and we have also included calculations of the % removal that the 1.2 lb/TBtu MACT floor emission limit reflects from mercury in these various coals.

Uncontrolled Mercury in the Coal For Various Coal Types and Clusters[34] and Percent Removal Required to Comply with EPA's Proposed 1.2 lb/TBtu Existing Source Mercury MACT Limit.

Coal Type by Sulfur Grade	**Cluster #1**		**Cluster #2**		**Cluster #3**	
	Hg lb/TBtu	**% Removal to Comply with 1.2 lb/TBtu**	**Hg lb/TBtu**	**% Removal to Comply with 1.2 lb/TBtu**	**Hg lb/TBtu**	**% Removal to Comply with 1.2 lb/TBtu**
Low Sulfur Eastern Bit (BA)	3.19	62.4%	4.37	72.5%	---	
Low Sulfur Western Bit (BB)	1.82	34.0%	4.86	75.3%	---	
Low Med Sulfur Bit	5.38	77.7%	8.94	86.6%	21.67	94.5%

ACI to meet a 90% mercury removal rate were those units that were already likely achieving 90% or greater mercury removal as a cobenefit of SO2, NOx and PM control technologies. *See* Section 5.4.3 and Table 5-16 of March 2011 Documentation Supplement (Docket no. EPA-HQ-OAR-2009-0234-3048).

[34] Data on uncontrolled mercury and coal types is from Table 5-11 of Chapter 5 of EPA's August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model (at page 5-17) (Docket no. EPA-HQ-OAR-2009-0234-3049).

(BD)						
Medium Sulfur Bit (BE)	19.53	93.9%	8.42	85.7%	---	
High Sulfur Bit (BG)	7.10	83.1%	20.04	94.0%	14.31	91.6%
High Sulfur Bit (BH)	7.38	83.7%	13.93	91.4%	34.71	96.5%
Low Sulfur Subbit (SA)	4.24	71.7%	5.61	78.6%	---	
Low Sulfur Subbit (SB)	6.44	81.4%	---		---	
Low Medium Sulfur Subbit (SD)	4.43	72.9%	---		---	

The proposed 1.2 lb/TBtu mercury emission limit would only require 90% mercury control or better at those EGUs burning low - medium sulfur bituminous coal in Cluster #3, medium sulfur bituminous coal in Cluster#1, and high sulfur bituminous in Clusters #2 and #3. There are numerous coal-fired EGUs for which the 1.2 lb/TBtu mercury emission limit won't require anywhere near 90% mercury removal, including those units that burn all grades of subbituminous coals, low sulfur western bituminous coals, and low –medium sulfur eastern bituminous coals.

The EPA's proposed 1.2 lb/TBtu mercury MACT limit only reflects 90% mercury removal or greater for those coals with uncontrolled mercury content of 12.0 lb/TBtu or higher. Based on a review of background data for EPA's IPM, one can determine that the 1.2 lb/MMBtu limit would only reflect 90% control or more for those plants that burn certain medium to high sulfur coals from the Appalachian coal regions, specifically including Alabama Southern Appalachian coal, eastern Kentucky and Pennsylvania Central Appalachian

coal, and Maryland and Ohio Northern Appalachian coals.[35] For the >8300 Btu/lb subcategory, coal from these states accounts for only about 25% on a heat input basis of all the bituminous and subbituminous coals utilized at EGUs in the United States.[36] An even smaller amount of these states' coal constitute the higher mercury coals for which EPA's proposed 1.2 lb/TBtu mercury limit would equate to 90% control or more.[37]

Although EPA modeled 90% mercury control for its policy case in the IPM, its proposed mercury MACT floor limit will not require that 90% mercury removal be achieved at a majority of the coal-fired EGUs in the >8300 Btu/lb subcategory. EPA's IPM modeling and its Regulatory Impact Analysis based on the IPM modeling suggest the availability of 90% mercury removal, which should be assessed within EPA's beyond the floor analysis for the >8300 Btu/lb subcategory.

Ninety percent mercury control or greater from the level of mercury in the coal is achievable. Several EGUs achieve such levels of mercury control as a co-benefit of criteria pollutant controls. In its 1998 Information Collection Request in which EPA collected mercury emissions data for several coal-fired EGUs, EPA found that bituminous coal-fired units with baghouses averaged

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[35] *See* Table 9-5 of EPA's March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule (Docket no. EPA-HQ-OAR-2009-0234-3048).

[36] This is based on the U.S. Energy and Information Administration's 2010 Cost and Quality of Fuels for Electric Plants, Table 16 Origin and Destination of Coal to Electric Plants by State: Total (All Sectors), 2009, available at http://www.eia.gov/cneaf/electricity/cq/cq_sum.html. Ex. 9-12 includes a copy of that table and calculations of the coal from each used by electric plants compared to the total of all bituminous and subbituminous coals (i.e., coals that would fall into the >8300 Btu/lb subcategory).

[37] As previously stated, only the medium to high sulfur coals in the states of AL, KY, MD, OH and PA have uncontrolled mercury contents of 12.0 lb/TBtu or higher, and for Kentucky, only medium to high sulfur coals from the eastern portion of that state have uncontrolled mercury content of 12.0 lb/TBtu or higher. *See* Table 9-5 of EPA's March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule (Docket no. EPA-HQ-OAR-2009-0234-3048).

90% mercury removal and those bituminous coal-fired units with wet scrubbers and baghouses averaged 98% removal.[38] The 1998 ICR data also showed that CFB boilers with baghouses achieved high levels of mercury control, well in excess of 90%.[39] EPA has found the same for fluidized bed boilers in the mercury data it collected under its recent ICR.[40]

For those EGUs that don't already achieve 90% or greater mercury removal based on a co-benefit of existing design and controls, there are many options available to achieve 90% or greater mercury removal. Activated carbon injection is the most widely tested control technology that is specifically designed for mercury removal. There have been numerous studies showing that high levels of mercury removal can be achieved with this technology. For example, testing of mercury removal at the Holcomb Station Unit in Kansas showed significant increases in mercury removal with the addition of activated carbon and other sorbent injection. This pulverized coal boiler burns subbituminous coal from the Powder River Basin and is equipped with a spray dry absorber and a baghouse. Without ACI, these controls removed less than 25% of the mercury, but with ACI overall mercury removal improved with each type of sorbent tested and even at low sorbent injection concentrations. The mercury removal efficiencies with the existing controls and the different sorbents and injection concentrations tested achieved 28 – 99% mercury removal. Ex. 9-15.[41]

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[38] *See* EPA, Performance and Cost of Mercury and Multi-Pollutant Emission Control Technology Applications on Electric Utility Boilers, EPA-600/R-03/110, October 2003, at 7. Ex. 9-13.
[39] *See* 1998 ICR Summary Spreadsheet entitled "Hg Data.xls" at Column S "Fr Remove Coal-Stack." Ex. 9-14.
[40] *See* EPA Spreadsheet with Filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at "Hg_>8300 Butlb" tab.
[41] *See* Sharon Sjostrom et al., *Full-Scale Evaluation of Mercury Control by Injecting Activated Carbon Upstream of a Spray Dryer and Fabric Filter*, presented at US EPA/DOE/EPRI Combined Power Plant Air Pollutant Control Symposium: The Mega Symposium, Washington, D.C., August 30 – September 2, 2004, at 7, 10. Ex 9-15.

In addition, over a year of continuous mercury CEMS data is available for the WE Energies Presque Isle facility in Michigan, which burns subbituminous coal, and these data demonstrate that over 90% mercury control has been achieved on a continuous basis. This site is a Department of Energy test site, and the data is thus publicly available. Some of this data has been summarized in presentations and published articles. Exs. 9-6,[42] 9-7,[43] 9-8,[44] 9-9,[45] and 9-10.[46] Furthermore, at least two other full-scale, long-term mercury control demonstrations have been reported to continuously achieve 90%+ mercury control – at Rocky Mountain Power (Hardin) in Montana, Ex. 9-4, and at Comanche Station in Colorado, Ex. 9-16, both of which burn PRB coal.

For bituminous coal-fired units with ESPs, the TOXECON configuration has been used with great success. This technology uses activated carbon injection and a downstream polishing baghouse. The E.C. Gaston Unit 3 facility is an example of an EGU that achieved high levels of mercury control with activated carbon in the TOXECON configuration. This unit is a pulverized coal boiler burning bituminous coal that is equipped with a hot-side electrostatic precipitator and a downstream compact hybrid particulate collector (COHPAC) fabric filter. It measured little to no mercury removal across the ESP or across the COHPAC before injection of activated carbon, but with ACI, mercury removal ranged from approximately 30 to

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[42] *TOXECON™ Retrofit for Mercury and Multi-Pollutant Control, NETL Mercury Control Technology*, December 13, 2006, Pittsburgh, PA.
[43] *TOXECON™ Clean Coal Demonstration for Mercury and Multi-Pollutant Control*, DOE/NETL Mercury Control Conference 2007, Pittsburgh, PA.
[44] *TOXECON™ Clean Coal Demonstration for Mercury and Multi-Pollutant Control*, EUEC 2008, Tucson, AZ.
[45] Derenne, Steven et. al., *TOXECON™ Demonstration for Mercury and MultiPollutant Control at We Energies*, Paper #08-A-79-MEGA-AWMA.
[46] *TOXECON™ Tests at PIPP Continue Successfully*, PRECIP Newsletter No. 397, February 2009.

90%+ depending on the sorbent used and the injection concentration. Ex. 9-17,[47] Ex. 9-18.[48]

The use of halogenated sorbents has similarly been shown to be effective at removing mercury at both subbituminous as well as lignite-fired power plants. Testing of halogenated sorbents was conducted at the subbituminous coal-burning Holcomb Station Unit 1 in Garden City, Kansas. The halogenated sorbent injected upstream of the dry scrubbers achieved greater than 90% removal at an injection rate of 4.0 lb/MMacf.[49]

As previously stated, EPA assumed brominated activated carbon would be used in its cost analysis for mercury MACT. Brominated Powdered Activated Carbon (B-PAC™) is a halogenated sorbent that has been tested at least at seven different power plants, including four full-scale tests.[50] Mercury removal rates ranged from 70% to 98% across a wide variety of coals and configurations and at low sorbent injection rates.

Full-scale tests with brominated activated carbon were conducted at Detroit Edison's St. Clair Power Plant, which typically burns 85% subbituminous coal blended with 15% bituminous coal and is currently equipped with a cold-side ESP. Greater than 90% mercury removal overall

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[47] *See* C. Jean Bustard et al., Full-Scale Evaluation of Mercury Control with Sorbent Injection and COHPAC at Alabama Power E.C. Gaston, published in *J. Air & Waste Manag. Assoc.*, 2002 Aug: 52(8): 918-26.

[48] Michael D. Durham, Update on Full-Scale Activated Carbon Injection for Control of Mercury Emissions, Presentation to Utility MACT Working Group, August 8, 2002, Washington, D.C., at Slide 13.

[49] Sjostrom *et al.,* "Full-Scale Evaluation of Mercury Control by Injecting Activated Carbon Upstream of a Spray Dryer and Fabric Filter on PRB Coal," presented at PowerGen, Orlando, FL, November 29-December 2, 2004, ADA-ES Pub. No. 04008 at 11-12. Ex. 9-19.

[50] Nelson *et al.*, "Accumulated Power-Plant Mercury-Removal Experience with Brominated PAC Injection," presented at the Combined Power Plant Air Pollutant Control Mega Symposium, Washington, D.C., August 30 – September 2, 2004. Ex. 9-20.

was achieved at a B-PAC injection rate of 3.0 lb/MMacf.[51] The results were even better when 100% subbituminous coal was fired. Even more impressive were the results from a longer term test at this facility. An average of 94% mercury removal was achieved over 30 days of B-PAC injection at an injection rate of 3.0 lb/MMacf.[52]

The level of mercury removal achievable with ACI is generally based on two factors: the carbon injection rate and the particulate control device(s). With respect to the activated carbon injection rate, the amount of mercury removed typically increases with an increase in the amount of activated carbon injected, up to a point. The primary impediment to higher amounts of sorbent injection are simply the costs of the sorbent. Regarding the particulate control device, mercury emissions testing experience has shown that fabric filters are more effective in removing mercury than ESPs , because the buildup of sorbent on the bags provides more avenues for mercury adsorption as the flue gas passes through the baghouse and also because baghouses provide longer gas residence times in comparison to an ESP.[53] A lower cost option to installation of a full-scale baghouse is to install a compact hybrid particulate air collector (COHPAC), which is a polishing baghouse added downstream of an existing ESP.

In projecting costs for ACI to achieve 90% control in its IPM policy case run, EPA assumed a higher carbon injection rate for units with ESPs as

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[51] McCoy *et al.*, "Full-Scale Mercury Sorbent Injection Testing at DTE Energy's St. Clair Station," presented at the Combined Power Plant Air Pollutant Control Mega Symposium, Washington, D.C., August 30 – September 2, 2004, at 8. Ex. 9-21.

[52] Discussed in ex. 9-54, December 30, 2004 letter to Bill Maxwell, U.S. EPA, from Sid Nelson Jr., President, Sorbent Technologies, Corporation, Part I of comments submitted on EPA's Notice of Data Availability for the Proposed National Emission Standards for Hazardous Air Pollutants.

[53] *See* discussion at Institute of Clean Air Companies, Mercury Control with Fabric Filters from Coal-Fired Boilers, at 1 (Ex. 9-22).

compared to baghouses.[54] Further, EPA assumed installation of a fabric filter was required for EGUs in three scenarios: 1) EGUs with ESPs that cannot handle the increased particulate loading from the ACI, 2) when flue gas conditioning is needed with the ESP, and 3) when Powder River Basin coals are burned.[55]

The pollution controls needed to achieve a 90% reduction in mercury at each EGU will provide numerous benefits to public health and the environment, not only in reduced mercury and in reductions in the myriad of health and environmental impacts that mercury poses, but also in reductions of fine particulates, which adversely impact public health and cause regional haze, the reductions of metal HAPs, among other pollutant reductions that a stringent MACT rule will result in. EPA's analysis shows these extensive environmental improvements, with EPA's projections of the net benefit of the MACT rule estimated to be $48 to $130 billion based on 2007 dollars.[56] Those benefits strongly suggest that a beyond the floor MACT level of mercury control representing 90% removal would be appropriate, under the governing legal standard.

b. EPA's Proposed MACT Limits for Mercury at Coal-fired EGUs With Design Coal Less than 8300 Btu/lb

EPA has not justified its decision to subcategorize the mercury MACT determinations for the group of coal-fired EGUs designed for coal with heat value less than 8300 Btu/lb.[57] The boundaries of the category are themselves

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[54] *See* Appendix 5-3 to EPA's March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule: Sargent & Lundy, IPM Model – Revisions to Cost and Performance for APC Technologies, Mercury Control Cost Development Methodology, Final, March 11, 2011, at 6, available online at http://www.epa.gov/airmarkt/progsregs/epa-ipm/docs/append5_3.pdf.
[55] *Id.* at 7.
[56] *Id.*
[57] All of the units in this subcategory burn lignite coal; a subcategory based on lignite (or any other particularly high-HAP fuel) would not, however, be

poorly defined; EPA provides no design characteristics to separate these plants from others merely capable (but not designed for) burning such low-heat-value coals. Even if such a subcategory were justified, however, EPA has not properly supported its proposed standard for such units.

i. Proposed New Source MACT Standards for Units Designed for Coal with Heat Value Less than 8300 Btu/lb

(1) EPA's Proposed New Source MACT Floor for Mercury Fails to Reflect Emissions of the Best Controlled Similar Source

EPA has proposed a mercury MACT standard reflective of the MACT floor for new coal-fired EGUs in the <8,300 Btu/lb category of 0.04 lb/GW-hr.[58] EPA also determined the MACT floor emission rate in terms of lb/MMBtu to be 1.0232 x 10^{-6} lb/MMBtu or 1.02 lb/TBtu.[59] The standard is set at the rate EPA determined to be the floor.[60]

(a) EPA Failed to Take Into Account the Fact that the Best Controlled Source in the <8300 Btu/lb Subcategory Had Test Results That Measured Below Detection Limits

EPA found that the best controlled source in the <8300 Btu/lb subcategory was the Sandow Station Unit 5B. According to EPA's mercury MACT floor spreadsheet, this unit's three mercury test results were below the detection level of the test method used.[61] When a unit's emissions are at

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appropriate; the statute requires that EPA include substitution of cleaner fuels among the methods of reducing hazardous pollution, and the Agency may not use its authority to create subcategories to sidestep that obligation. *See Natural Resources Defense Council v. Environmental Protection Agency,* 489 F.3d 1364, 1372-73 (D.C. Cir. 2007) (EPA may not create subcategories in manner that violates statutory requirements).

[58] *See* EPA's spreadsheet entitled "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at Summary tab.

[59] *Id.*

[60] *See* 76 Fed.Reg. 25046 (May 3, 2011).

[61] *See* EPA's spreadsheet entitled "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at "Hg_Avg_<8300Btulb_MMBtu" tab.

or below the detection level, its emissions could be at the detection level or lower. To account for such test results in developing emission factors, EPA has typically assumed emissions were at half the detection level when there are other test results for the unit that measured above detection limits.[62] Had EPA followed the same approach here, the average of the test results at Sandow Station Unit 5B would have been lower. Instead, EPA has assumed that actual mercury emissions were equal to the detection limit of the test at that unit. By doing so, EPA may have overestimated the average mercury emission rate being achieved at this unit.

(b) EPA's Proposed New Source MACT Floor Limit Goes Well Beyond Accounting for Variability in Emissions at the Best Controlled Source and Also Fails to Reflect the Thermal Efficiency of a New EGU

After EPA determined the MACT floor in terms of lb/MMBtu, EPA accounted for variability in the top ranked EGU in the <8300 Btu/lb subcategory by determining the 99th percentile UPL value. EPA then did the same analysis for mercury emissions in terms of lb/MW-hr. Elsewhere in this comment letter, we provide a critique of using that metric to reflect variability in emissions. However, not only did EPA determine the 99th percentile UPL emission rate in terms of lb/MW-hr, EPA then 'rounded' up that value in coming up with a new source MACT floor emission limit EPA has provided for absolutely no justification for that increase. Further, a comparison of the proposed mercury MACT floor limit in terms of lb/GW-hr to the 99th percentile UPL mercury emission rate in terms of lb/MMBtu reflects an unreasonably high thermal efficiency that does not reflect the design and operation of a new EGU. The end result is that EPA's proposed 0.04 lb/GW-hr

[62] *See* US EPA, Procedures for Preparing Emissions Factor Documents, EPA 454/R-95-015, November 1997, at 4-21, available at http://www.epa.gov/ttn/chief/efdocs/procedur.pdf.

falls well short of the mercury emissions achieved at the best controlled source in the <8300 Btu/lb subcategory.

Specifically, EPA determined the average lb/MW-hr emission rate of Sandow Station Unit 5B to be 1.0726 x 10^{-5} lb/MW-hr, and determined the 99th percentile UPL of that source's data to be 3.4543 x 10^{-5} lb/MW-hr.[63] EPA then increased this value to arrive at a floor value of 4 x 10^{-5} lb/MW-hr or 0.04 lb/GW-hr. EPA has not provided adequate justification for going beyond the 99th percentile UPL in its determination of the MACT floor emission rate for mercury.

New coal-fired EGUs are typically designed to be more efficient with lower heat rates than typical existing coal-fired EGUs. For this subcategory of coal with heat value <8300 Btu/lb, circulating fluidized bed boilers are typically used in new source applications for such lower grade of coals. Supercritical circulating fluidized bed boilers are available today with net thermal efficiencies exceeding 41%.[64] Even with use of lignite coal, the thermal efficiency of a new EGU should be at least 38% (or a heat rate of 9000 Btu/kW-hr). The lb/GW-hr limit equivalent to EPA's 99th percentile UPL mercury emissions rate of 3.295 x 10^{-6} lb/MMBtu assuming a heat rate of 9,000 Btu/kW-hr would be 0.0297 lb/GW-hr. At the very minimum, EPA should not assume a heat rate of any higher than that achieved at the Sandow Station Unit 5B given that the Sandow Station Unit 5B is a recently built unit.

(c) EPA Should Consider Other Approaches to Accounting for Variability in Setting a Mercury MACT Floor Emission

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[63] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Summary."

[64] *See* Utt, James et al., Utility CFB Goes "Supercritical" – Foster Wheelers' Lagisza 460 MWe Operating Experience and 400-600 MWe Designs, presented at Coal-Gen 2009, Charlotte, NC, August 19-21, 2009, at 1 (Ex. 9-23).

Limit to More Accurately Reflect the Mercury Emissions Achieved by the Best Performing EGU.

In our comments on EPA's MACT floor determination for existing EGUs in the >8300 Btu/lb subcategory, we provide comments on the use of a long term averaging time limit with compliance determined by mercury CEMs to account for variability in emissions at the best controlled source, rather than apply a 99th percentile UPL analysis to reflect variability (which we contend goes well beyond predicting the worst reasonably foreseeable conditions). We incorporate those comments by reference here. Such an approach will adequately account for the worst reasonably foreseeable circumstances while at the same time more accurately reflecting the average mercury emission rate of the lowest emitting EGU in the <8300 Btu/lb subcategory. In addition, by requiring use of mercury CEMs and imposing a long averaging time, EGU owners will be more vigilant about the EGU's mercury emissions on a day in-day out basis to make sure the mercury controls are being operated in a manner to ensure continuous compliance with the MACT limits.

(2) EPA Did Not Adequately Justify Why It Did Not Evaluate a Beyond the Floor Mercury MACT Limit for New Sources in the <8300 Btu/lb Subcategory

EPA did not evaluate whether mercury emission rates lower than its determination of MACT floor could be met at coal-fired EGUs in the <8,300 Btu/lb subcategory. EPA suggests that it could not identify any control technologies that could achieve greater emission reductions of HAP than the control technologies they expected to be used to meet the MACT floor level of control.[65] That is not the appropriate test to follow in determining whether to evaluate beyond the floor MACT requirements.

[65] *See* 76 Fed.Reg. 25046 (May 3, 2011).

Various control methods are available to reduce the amount of mercury emitted by a coal-fired EGU. Activated carbon injection systems can be operated to achieve varying levels of mercury control, based on the amount of sorbent injected. EPA has noted this in its justification to require a beyond the floor analysis for existing sources in the <8300 Btu/lb subcategory.[66] And heat rate, as described above, affects mercury output. Emissions may be reduced without additional controls, by altering these operational parameters.

Further, because of the factors that EPA applied to reflect variability of the best performing unit in the <8300 Btu/lb subcategory, EPA's proposed MACT floor limit fails to reflect the emissions that have been demonstrated to be achievable at the best controlled similar source in this subcategory. EPA's determination of best performing similar source is Sandow Station Unit 5B which is a fluidized bed boiler with SCR, dry scrubber, ACI, and a fabric filter.[67] This EGU is achieving greater than 95% mercury removal, but EPA's proposed MACT floor emission limit for new sources reflects 87% or less removal efficiency.

As discussed above in our comments on beyond the MACT floor requirements for existing EGUs in the >8300 Btu/lb subcategory, EPA's Regulatory Impact Analysis suggests that 90% mercury removal is achievable and cost effective.[68] Ninety percent control should be readily achievable at

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[66] *Id.* Specifically, EPA states: "EPA has learned that the units of this design that were using ACI during the testing were using ACI to meet their permitted Hg emission levels. However, EPA believes that the control level being achieved is still not that which could be achieved if ACI were used to its fullest extent."

[67] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Hg_New_>8300 Btulb_MMBtu."

[68] *See* EPA's March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report at 1-1 (Docket no. EPA-HQ-OAR-2009-0234-3051). EPA assumed 90% mercury removal in its IPM, *see* Table 9-5 of EPA's March 2011

new coal-fired EGU designed for fuel with heat value less than 8300 Btu/lb. As previously stated, circulating fluidized bed boilers are typically used for burning lower grade coals in new source applications. At the minimum, such a new coal-fired EGU would also be equipped with at least a dry scrubber and a baghouse, and possibly an SCR system – all to meet best available control technology and NSPS requirements. This combination of controls should achieve a fairly high level of mercury removal as a cobenefit, especially with an SCR to assist in oxidizing the mercury. With the addition of an ACI system using halogenated sorbents, 90% mercury removal from the mercury in the coal should be readily achievable. Indeed, this is the set of controls used at both Sandow Station Units 5A and 5B and these units are achieving 95-96% mercury removal based on the data collected by EPA.

For all of these reasons, EPA has not justified its decision to forego a beyond the floor MACT analysis for new sources in the <8300 Btu/lb subcategory.

ii) Proposed Existing Source MACT Standards for Coal-Fired Units in the <8300 Btu/lb Subcategory

1) EPA's Proposed Existing Source MACT Floor for Mercury Fails to Reflect the Mercury Emissions Rate Actually Achieved by the Best Performing 12% of EGUs in the <8300 Btu/lb Subcategory

As it did to set its parallel standard in the broader coal-fired category, EPA set its mercury standard for existing units in the <8300 Btu/lb subcategory EPA: (a) assumed that emissions below the detection limit were at the detection limit; (b) applied a 99% UPL to its data, and (c) 'rounded' that figure further upwards, despite any plausible imprecision in its results. As set forth elsewhere in these comments, each of those decisions departs from the statutory requirements.

Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule (Docket no. EPA-HQ-OAR-2009-0234-3048).

(3) EPA's Proposed Existing Source MACT Emission Limit Fails to Reflect the Maximum Degree of Mercury Emission Reductions that is Achievable For the <8300 Btu/lb Subcategory

EPA has proposed a beyond the floor mercury MACT limit for the <8300 Btu/lb subcategory of coal-fired EGUs of 4.0 lb/TBtu or 0.04 lb/GW-hr.[69] These emission limits do not reflect the maximum degree of mercury emission reductions achievable at coal-fired EGUs in the <8300 Btu/lb subcategory.

In EPA's IPM used to evaluate costs and benefits for the proposed MACT rule, EPA assumed a mercury emission reduction level of 90% with the use of brominated activated carbon injection required at most coal-fired EGUs.[70] However, EPA's proposed MACT floor emission limit of 4.0 lb/TBtu for the <8300 Btu/lb subcategory does not reflect 90% mercury removal for the coals that would fall into the <8300 Btu/lb category (primarily lignite). In Table 5-11 of Chapter 5 of EPA's August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model (at page 5-17), EPA identified various coal types by sulfur grade and uncontrolled mercury emission factors based on mercury concentration in the coal. In the table below, we have reprinted that information for the lignite coals, and we have also included calculations of the % removal that the 4.0 lb/TBtu MACT emission limit reflects from mercury in these various coals.

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[69] *See* 85 Fed.Reg. 25127 (May 3, 2011).

[70] *See* March 2011 Documentation Supplement for EPA Base Case v.4.10_PTox-Updates for the Proposed Toxics Rule at pages 76-82 (Docket no. EPA-HQ-OAR-2009-0234-3048). The only EGUs that EPA did not model with ACI to meet a 90% mercury removal rate were those units that were already likely achieving 90% or greater mercury removal as a cobenefit of SO2, NOx and PM control technologies. *See* Section 5.4.3 and Table 5-16 of March 2011 Documentation Supplement (Docket no. EPA-HQ-OAR-2009-0234-3048).

Uncontrolled Mercury in the Coal For Coals <8300 Btu/lb[71] and Percent Removal Required to Comply with EPA's Proposed 4.0 lb/TBtu Existing Source Mercury MACT Limit.

Coal Type by Sulfur Grade	**Cluster #1**		**Cluster #2**	
	Hg lb/TBtu	**% Removal to Comply with 4.0 lb/TBtu**	**Hg lb/TBtu**	**% Removal to Comply with 4.0 lb/TBtu**
Low Medium Sulfur Lignite (LD)	7.51	46.7%	12.00	66.7%
Med Sulfur Lignite (LE)	13.55	70.5%	7.81	48.8%
High Sulfur Lignite (LE)	14.88	73.1%	----	

As can be seen from this table, the proposed 4.0 lb/TBtu mercury emission limit would not even 75%, mercury control for any of the various types and clusters of lignite.

Ninety percent mercury control been demonstrated to be achievable, even at EGUs burning coal with heat value <8300 Btu/lb. Many EGUs including those that burn lignite coal achieve some level of mercury control as a co-benefit of criteria pollutant controls. For example, of the EGUs in the <8300 Btu/lb subcategory for which EPA has data, three fluidized bed boilers burning lignite and equipped with baghouses but no mercury-specific controls achieved mercury removal rates of 54% to 75%.[72]

There are several options available to raise these levels of mercury removal to 90% or more, including the addition of activated carbon injection.

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[71] Data on uncontrolled mercury and coal types is from Table 5-11 of Chapter 5 of EPA's August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model (at page 5-17) (Docket no. EPA-HQ-OAR-2009-0234-3049).

[72] *See* EPA spreadsheet with filename "floor_analysis_coal_hg_051811.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-10041) at the worksheet entitled "Hg_New_>8300 Btulb_MMBtu" – specifically, Twin Oaks Power One Unit 2 and Red Hills Generating Facility Units 2 and 1.

EPA has data for three such units with ACI that burn lignite. Two are CFB boilers with SCR, dry scrubbers and baghouses (Sandow Station Units 5A and 5B) and one is a pulverized coal boiler with SCR, a baghouse, and a wet scrubber (Oak Grove Unit 1).[73] These three units all achieved well in excess of 90% mercury control with this pollution control equipment.

The mercury emissions from lignite burning EGUs can be more difficult to capture in comparison to the mercury control achieved at EGUs burning other types of coals (especially those that burn bituminous coal). Lignite coals are typically much higher in mercury content than other coals. A high percentage of the mercury in the flue gas of lignite boilers is in elemental mercury form, which is more difficult to capture in downstream sulfur dioxide and particulate controls. One key approach to improving mercury reduction at lignite-fired power plants is to increase the oxidation of the mercury so that it is more reactive to be more readily captured in downstream pollution controls. Another important factor to improve mercury removal is the addition of a baghouse, either full-scale or via a downstream polishing baghouse such as a COHPAC™ configuration.

The use of halogenated sorbents greatly enhances the oxidation of elemental mercury and also provide particles for the oxidized mercury to react with and adhere to. For example, iodine-impregnated carbon was utilized at the lignite burning Stanton Station Unit 10, a pulverized coal-fired boiler with an ACI system, spray dryer, and baghouse; the system achieved 96% mercury removal.[74] Brominated activated carbon was also tested at Stanton Unit 10, and 95% mercury removal was achieved with this sorbent.[75]

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[73] *Id.*

[74] *See* Sjostrom, Sharon et al., Full-Scale Evaluation of Mercury Control at Great River Energy's Stanton Station using Injected Sorbents and a Spray Dryer/Baghouse, 2002, at 11, 13. (Ex. 9-24).

[75] *See* Machalek, Tom et al., Full-Scale Activated Carbon Injection for Mercury Control in Flue Gas Derived from North Dakota Lignite, at 6 (Ex. 9-25).

At the NRG Limestone power plant, which burns a blend of 30% subbituminous and 70% lignite coal, the addition of calcium bromide in conduction with sorbent provided for greatly increased mercury removal. The two units tested at this plant each are equipped with cold-side ESPs, wet scrubbers, and activated carbon injection systems. With the activated carbon injection and the addition of calcium bromide, 75-85% mercury removal was achieved.[76] However a portion of these units' flue gas bypasses the wet scrubbers; the elimination of the bypass should improve mercury removal efficiency.[77] Similar results were observed with the injection of calcium chlorine at the Limestone units.[78] Again, if the scrubber bypass were eliminated, this level of mercury control would presumably increase.

The Big Brown power plant burns Texas lignite blended with subbituminous Powder River Basin coal (typically 70% lignite/30% Powder River Basin coal), and is equipped with a COHPAC™ system (i.e., a cold side ESPs followed by a polishing baghouse). The plant achieved 90% mercury removal with activated carbon, and at a much lower carbon injection rate with enhanced activated carbon.[79]

The Mer-Cure™ process, a proprietary, carbon-based sorbent, similarly accelerates mercury oxidation as well as capture mercury.[80] Ninety percent removal of mercury was achieved at Leland Olds which burns North Dakota lignite and is equipped with an ESP.[81]

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[76] *See* Dombrowski, Katherine, Mercury Control for Plants Firing Texas Lignite and Equipped with ESP-Wet FGD, March 2010 at ES-1 (Ex. 9-26).
[77] *Id.*
[78] *See* Mercury Reduction Technology Shows Promise for Texas Lignite, March 1, 2005, Power-Gen Worldwide. Ex. 9-27.
[79] *See* Pavlish, John, Field Testing of Activated Carbon Injection Options for Mercury Control at TXU's Big Brown Station, presented at DOE NETL Mercury Control Technology Conference, December 11-13, 2007, at Slides 7 and 24 (Ex. 9-28).
[80] *See* Mer-Cure™ Demonstrated at Leland Olds, McIlvaine Company Precip Newsletter, January 2008. Ex. 9-29.
[81] *Id.*

All of the above options can achieve mercury emissions below those proposed by EPA. Lignite-fired EGUs can also choose the option of blending lower mercury subbituminous coal in combination with ACI and the addition of a baghouse.[82] EPA's proposed beyond the floor mercury limit for the <8300 Btu/lb subcategory does not reflect even 70% mercury removal from uncontrolled mercury levels in most lignite coals; better rates have been demonstrated, as set forth above.

B. EPA's Proposed Acid Gas MACT Emission Limits

As discussed above, EPA has not justified its use of HCl as a surrogate for all or any of the acid gases but itself. Nor has EPA justified the use of SO_2 as a surrogate for all or any of the acid gases. EPA should therefore impose separate MACT limits for HCl, HF, HCN, Cl_2 and SeO_3. That flaw to one side, below we provide our review and comments on EPA's proposed numerical MACT limits for HCl and SO2.

1. EPA's Proposed Acid Gas Limits for Coal-Fired Units

a. Determination of HCl MACT Floor for Existing Sources

According to EPA, there are 1091 coal-fired EGUs nationwide; accordingly, the best performing 12% of those sources should include 131 EGUs.[83] We understand that EPA determined the existing source MACT floor for HCl as follows: Through its 2009 Information Collection Request (ICR), EPA obtained and/or required emission testing at approximately 256 EGUs (based on the HCl data provided in EPA's HCl MACT Floor Spreadsheet). EPA then ranked those units' emissions from lowest HCl emission rates to highest emission rates. EPA determined the average HCl emission rate of the top performing 131 units (which is 12% of the universe of

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[82] *See* EPA's Emission Reduction Costs for the Beyond-the-Floor Mercury Rate in the Toxics Rule (Docket no. EPA-HQ-OAR-2009-0234-2925).
[83] *See* May 18, 2011 Revised MACT Floor Memo at 3 (Docket no. EPA-HQ-OAR-2009-0234-9858).

such units, not the 256 for which data were available and summarized) to be 2.19 x 10^{-4} lb/MMBtu.[84] Next, EPA accounted for variability in emissions at these 131 units by determining the 99th percentile Upper Prediction Limit (UPL) of the HCl emissions data. According to EPA, "a 99 percent level of confidence means that a facility whose emissions are in line with the best performers has one chance in 100 of exceeding the floor limit."[85] The 99th percentile UPL HCl emission rate was determined by EPA to be 1.250 x 10^{-3} lb/MMBtu.[86] Then, to derive a floor value, EPA rounded the 99th percentile UPL up to 0.0020 lb/MMBtu.[87]

This proposed emission limit of 0.0020 lb/MMBtu is higher than the minimum HCl emission rate measured at any of the 131 lowest HCl emitting EGUs and, in fact, is higher than all but three of the maximum HCl emission rates measured at the 131 "best-performing" HCl emitting EGUs. This proposed HCl emission rate can hardly be portrayed as representative of the average HCl emission rate of the top performing 12% of coal-fired EGUs. Further, of the full HCl dataset of 256 EGU HCl test data, 177 units have HCl emissions below EPA's proposed MACT floor limit – including several units with no SO2 or acid gas controls at all. The Clean Air Act instructs EPA to set a MACT floor reflecting the emissions averaged by the top 12% of EGUs; EPA's MACT standard of 0.0020 lb/MMBtu (purportedly based on 131 units of the 256 tested, or 51% of the total HCl dataset) can be met by a full 69% of the EGUs tested. EPA's standard-setting– ostensibly intended to determining the average emission rate achieved by the best performing 12% of coal-fired EGUs under the worst reasonably foreseeable conditions – has

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[84] *See* Spreadsheet entitled "floor analysis coal HCl 31611" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "Summary" worksheet.
[85] *See* May 18, 2011 Revised MACT Floor Memo at 4 (Docket no. EPA-HQ-OAR-2009-0234-9858).
[86] *See* Spreadsheet entitled "floor analysis coal HCl 31611" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "Summary" worksheet.
[87] *Id.*

resulted in a HCl MACT standard well out of sync with the statutory standard. Below we provide a more detailed explanation of the flaws in the agency's justification of its 0.0020 lb/MMBtu HCl emission limit.

i. EPA Did Not Include HCl Emissions Data for All of the Lowest Emitting Coal-Fired EGUs

EPA has HCl emissions data for 256 EGUs, which only reflect the emissions of 23% of the total number of coal-fired EGUs in the U.S. EPA assumed that this data captured all of the lowest emitting units, and on that bases selected data from the lowest emitting 131 units (51% of the units for which EPA collected emissions data) to represent the best performing 12% of all coal-fired EGUs in the United States.[88]

The statute requires EPA to establish existing source standards no higher than the "average emission limitation achieved by the best performing 12 percent of the existing sources (*for which the Administrator has emissions information*)." 42 U.S.C. § 7412(d)(3)(A) (emphasis added). The Agency has, instead, based its standard on the assumed emissions of sources for which it has no information.

And the record does not support EPA's reliance on that assumption. Prior to proposing EGU MACT standards, EPA collected emissions data on numerous coal-fired EGUs via an Information Collection Request.[89] EPA selected EGUs to be tested that it believed were the "best performing sources

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[88] In contrast, EPA collected mercury emissions data for 328 EGUs in the>8300 Btu/lb subcategory, but treated that data as representative of the fleet as a whole. Accordingly, it based its mercury standard on 12% of its dataset - or 40 EGUs. Similarly, For the <8300 Btu/lb subcategory, EPA assumed that 12% of that dataset of 11 EGUs - or 2 EGUs - reflected the top 12% of the EGUs in the nation in the <8300 Btu/lb subcategory.

[89] *See* Information Collection Effort for New and Existing Coal- and Oil-Fired Electric Utility Steam Generating Units, December 2009 (Docket no. EPA-HQ-OAR-2009-0234-0102).

for the HAP groups for which they will be required to test."[90] EPA targeted 15% of all EGUs and assumed that would ensure the agency had the emissions data for the top 12% of all EGUs.[91]

In particular, EPA assumed that EGUs with the most recently installed SO2 controls would achieve the lowest acid gas HAP emission rates. Consequently, EPA required acid gas HAP testing at the "175 units with the newest FGD controls installed."[92] EPA selected EGUs for testing with SO2 controls installed in 1991 or later. [93] EPA assumed that these units would have to comply with the most stringent SO2 emission limits and would achieve the lowest emission rates of acid gas HAPs (although EPA had not yet determined that SO2 could serve as a surrogate for acid gas HAPs).[94] EPA also randomly selected 50 other units for acid gas and other HAP testing that did not necessarily have SO2 controls.[95] Further, EPA collected other HCl testing that had been done in the past at EGUs.

EPA assumed that those units with the most recently installed SO2 scrubbers would have to comply with most stringent SO2 emission limits, and achieve the greatest SO2 removal efficiency.[96] EPA has not, however, presented data on the SO2 emission limits, or on SO2 removal efficiencies of the EGUs tested to verify that the SO2 controls at these units are operated to achieve the most stringent SO2 emission rates.

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[90] *See* Part B to the Supporting Statement for the Information Collection Request for the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coal- And Oil-fired Electric Utility Steam Generating Units at 2 (Docket no. EPA-HQ-OAR-2009-0234-0103).
[91] *Id.*
[92] *Id.* at 4.
[93] *See* Information Collection Request for National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coal- and Oil-Fired Electric Utility Steam Generating Units, Part B of Supporting Statement, December 2009, at 4; *see also* Attachment 8 (both located at (Docket no. EPA-HQ-OAR-2009-0234-0103).
[94] *Id.*
[95] *Id.*, Attachment 13.
[96] *Id.* at 4.

EPA's assumption that only the more recently installed scrubbers would have the highest removal efficiency was a flawed assumption. There are several examples of scrubbers installed in the 1980's that either were designed and always operated to achieve high levels of SO2 control, or that have been upgraded (e.g., bypass eliminated) to greatly improve SO2 removal. Despite the superior SO_2 (and acid gas) removal demonstrably achieved by such facilities, EPA excluded them from those selected for additional testing. For example, the following units burn lower chlorine coal and have scrubbers that achieve high levels of SO2 control, but they were not tested for HCl testing: Intermountain Power Units 1 and 2, Hunter Unit 3, Huntington Unit 2, and Craig Units 1 and 2.[97] There are also several EGUs that have recently had highly effective scrubbers installed, yet EPA did not require testing of those units either. For example, EW Brown Units 1-3 have recently installed scrubbers designed to achieve 98.5% SO2 removal, Jeffrey Energy Center had scrubbers installed in 2009 designed to achieve 98% SO2 removal, Paradise Unit 3 had a scrubber installed recently that was also designed to achieve 98% SO2 removal as did all six units at the WH Sammis plant.[98]

Most importantly, the data in the record does not support EPA's claimed relationship between SO_2 emissions and acid gas emissions. Aside from chlorine content of the coal and SO2 removal efficiency of the SO2 controls, HCl removal is affected by process conditions and by competing reactions between the slurry and the acid gases (including SO2). A

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[97] The following of these units have annual average SO2 emission rates of 0.06 lb/MMBtu or lower: Craig Units 1 and 2, Hunter Unit 3, and Huntington Unit 2. Intermountain Power Units 1 and 2 achieved 0.08 lb/MMBtu on an annual average basis. See Ex. 9-31, spreadsheet of 2008 and 2009 annual average emissions data for these units from EPA's Clean Air Markets Database.

[98] These and other examples of recently installed/upgraded high performance scrubbers can be found in the Burns & McDonnell paper entitled "Utility FGD Design Trends," which is attached as Ex. 9-32 to this letter.

comparison of the lowest 131 HCl-emitting EGUs to the lowest 131 HF-emitting EGUs seems to indicate such competing reactions. Based on all of the acid gas data presented in EPA's HCl MACT floor spreadsheet, we sorted the EGUs based on HF emission rates. The table below shows that the lowest 131 HCl-emitting EGUs have an average HF emission rate than is five times higher than the average HF emission rate of the lowest 131 HF-emitting EGUs.

Comparison of the Average HCl and HF Emission Rates of the Lowest HCl-Emitting Units and the Lowest HF-Emitting Units

	Avg HCl Emission Rate	**Avg HF Emission Rate**
Lowest 131 HCl-Emitting EGUS	2.19 E-04 lb/MMBtu	4.28 E-04 lb/MMBtu
Lowest 131 HF-Emitting EGUs	2.76 E-03 lb/MMBtu	8.58 E-05 lb/MMBtu

Similarly, the lowest 131 HF-emitting EGUs have an average HCl emission rate that is an order of magnitude higher than the average HCl emission rate of the lowest 131 HCl-emitting EGUs. EPA has indicated that HCl and HF would be absorbed more readily than SO2 in a scrubber[99], but such acid gas removal does not appear to occur at the same levels for each acid gas emitted by an EGU – as set forth above, and this suggests the need for separate HF limits.[100]

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[99] *See* Information Collection Request for National Emission Standards for Hazardous Air Pollutants (NESHAP) for Coal- and Oil-Fired Electric Utility Steam Generating Units, Part B of Supporting Statement, December 2009, at 3 (Docket no. EPA-HQ-OAR-2009-0234-0103).

[100] The record suggests that SO2 control efficiencies correlates with HCl control efficiencies. Nonetheless, EPA should not use SO2 limits as a surrogate for direct limits on HCl and other acid gas HAPs. Actual HCl emissions remain significantly dependent on the chlorine level in the fuel. Net SO2 emissions, similarly, depend on the sulfur content of the burned coal. The uncontrolled SO2 emissions based on sulfur in the coal can vary from 0.6 lb/MMBtu to in excess of 6 lb/MMBtu. *See* August 2010

In addition, the low chlorine dataset also included some EGUs with pulverized coal boilers that had absolutely no SO2 controls. Chlorine in the coal accounts for some of these low HCl values, but there is data to show some level of HCl removal is occurring at these units. For example, Joliet 9 Unit 5 is a cyclone boiler, burns subbituminous coal, and is equipped with activated carbon injection and an ESP; it is achieving approximately 55% HCl reduction.[101] As the data for this unit shows, there can be other factors that come into play that affect HCl removal. That EPA's 131 lowest HCl-emitting EGU dataset includes EGUs with no SO2 controls also suggests that EPA's dataset does not capture all of the lowest HCl-emitting EGUs in the U.S.

The SO2 removal efficiency of the SO2 controls is not the only factor impacting HCl emissions. Chlorine content of the coal has an impact. EPA's ICR did not seek out EGUs with the most effective SO2 controls that also were burning lower chlorine coal, and we have identified several such units that EPA should have included in its dataset but did not. In addition, there likely are other factors that affect the removal of HCl that go beyond the SO2 removal efficiency of the scrubber, such as competing reactions between the slurry, HCl and other acid gases. Further, there could be other factors in the design and/or operation of the scrubber that optimize a scrubber for HCl

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Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model, Table 9-5 (at 108-109) (Docket no. EPA-HQ-OAR-2009-0234-3049). Thus, a unit burning coal with an uncontrolled SO2 rate of 6 lb/MMBtu would be achieving 95% SO2 removal if its SO2 emission rate was 0.30 lb/MMBtu. However, if a unit was burning coal with an uncontrolled SO2 rate of 1 lb/MMBtu, an SO2 emission rate of 0.3 lb/MMBtu would only reflect 70% control. Accordingly, a unit with a low-performing scrubber (but low sulfur coal) could have low SO_2 emissions. The record suggests no correlation between sulfur content and chlorine content in coal; that same unit would, therefore, have high HCl emissions.

[101] *See* EPA spreadsheet with filename "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "AcidGas_Coal" worksheet, Row 130.

removal. For all of these reasons, it is unlikely that EPA's target data set includes the 131 lowest HCl-emitting EGUs out of all the 1,091 coal-fired EGUs in the U.S. We suggest that EPA truncate the dataset it uses to determine MACT floor to better ensure that it only reflects the HCl emissions of the top 12% performing units, to reflect the fact that some of the best-performers lie outside its data set.

ii) EPA's Determination of the Average HCl Emission Rate of the 131 Lowest Emitting Units Tested Fails to Take into Account Emission Rates that Were Below Detection Limits

In determining the average HCl emission rate of the 131 lowest emitting units, EPA is using some test data that was measured below the detection level of the monitoring method. EPA improperly accounted for data below detection limits in determining variability (as we have discussed elsewhere in these comments, Chapter VIII.B). We also question EPA's assumption the units with test results below detection limits to be emitting at the detection level in determining an average HCl emission rate of the best performing units.

In calculating the average emission rate for each unit, EPA assumed detection limit values were equal to the detection limit. When a unit's emissions are at or below the detection level, its emissions could be just below the detection level or lower. To account for such test results in developing emission factors, EPA has typically assumed emissions were at half the detection level when there are other test results for the unit that measured above detection limits.[102] Had EPA followed the same approach here, the average of the test results of EPA's 131 lowest HCl emitting units would have been lower. The flaws associated with substituting the detection limit (or

[102] *See* US EPA, Procedures for Preparing Emissions Factor Documents, EPA 454/R-95-015, November 1997, at 4-21, available at http://www.epa.gov/ttn/chief/efdocs/procedur.pdf.

even half the detection limit) in censored data are well known.[103] EPA should use better methods such as maximum likelihood estimation (MLE) methods, imputation methods, or the Kaplan-Meier method to conduct data substitution before initiating its floor analysis.[104] As it stands, instead, EPA has assumed that HCl emissions are equal to the detection limit of the test at that unit. By doing so, EPA has overestimated the average HCl emission rate of the lowest 131 HCl-emitting EGUs for which EPA had test data.

EPA should account for the likelihood that HCl emissions are lower than the detection limit in determining the average HCl emission rate. At the minimum, EPA should take into account the likelihood that its average HCl emission rate is likely an overestimate when determining an appropriate HCl emission limit to propose as reflective of the MACT floor for HCl.

The data used in the floor analysis for HCl for Logan Unit 1 provides an example of the manner in which EPA has distorted its standards. On the basis of the minimum data for HCl, this unit was picked as the best performing unit and is the basis for the new source floor. However, for the analysis of variability of the existing source, six sets of data were used for this unit – one collected as part of the ICR and 5 older tests for the years 2005, 2006, 2007, 2008, and 2009. From EPA's Part I and Part II Access database, the following information was obtained regarding the older (non-ERT) tests.

Test Date/Run	Result	Result (Alt Units)
5/19/05/Run 1	<0.1 lb/hr	<0.04 ppm
5/19/05/Run 2	<0.3 lb/hr	<0.08 ppm
5/19/05/Run 3	0.0002 lb/MMBtu	
6/15/06/Run 1	<1.47 lb/hr	<0.06 ppm

[103] *See* Helsel, D.R., "Fabricating Data: How Substituting Values for Non-Detects Can Ruin Results and What Can Be Done About It," Chemosphere Vol. 65, 2006. Ex. 9-33.

[104] See Helsel, D.R., "More Than Obvious: Better Methods for Interpreting Non-Detect Data," Environmental Science and Technology, October 15, 2005, p. 419. Ex. 9-34.

6/15/06/Run 2	<1.67 lb/hr	<0.06 ppm
6/16/06/Run 3	<1.35 lb/hr	<0.05 ppm
7/12/07/Run 1	<0.46 lb/hr	<0.15 ppm
7/12/07/Run 2	<0.43 lb/hr	<0.15 ppm
7/12/07/Run 3	<0.41 lb/hr	<0.14 ppm
6/27/08/Run 1	<1.01 lb/hr	<0.32 ppm
6/27/08/Run 2	<0.99 lb/hr	<0.32 ppm
6/27/08/Run 3	<1.02 lb/hr	<0.33 ppm
6/24/09/Run 1	<0.17 lb/hr	<0.06 ppm
6/24/09/Run 2	<0.17 lb/hr	<0.06 ppm
6/24/09/Run 3	<0.17 lb/hr	<0.06 ppm

As seen in the table above, except for one data point (i.e., 5/19/05 Run 3), all of the runs were non-detect. Yet, the detection limits (all MDLs, per the database) show wide and inexplicable variability. Since actual test reports are not available for these older tests (or could not be located), it was not possible to determine exactly why the detection limits (in units of ppm and lb/hr) varied so significantly. It is not certain if all of the data were analyzed by the same or different labs. For example, in ppm units, the MDL ranged from 0.05 ppm to 0.33 ppm. This is more than a six-fold variability in detection limits, which, based on EPA's methodology (i.e., assuming that actual emissions are equal to the detection limit in the case of non-detect data), significantly (and likely spuriously) affects the variability analysis, since, in all of these runs, the actual emissions of the unit were non-detect. In other words, the variability analysis factors in the effects of analytical test variability more than the actual variability in the emissions of the source itself. Further, considering the data shown above, it is not readily apparent why the 2006 runs had relatively low detection limits in ppm terms but high detection limits in lb/hr units. Compare the lb/hr numbers for 2006 and 2009. In both years, the runs had MDLs in the range of 0.05-0.06 ppm. Yet the calculated lb//hr values are almost an order of magnitude greater in 2006 than 2009. Without the underlying test data and reports, the cause of this could not be ascertained. But, it is important to note that EPA included all of this data in its variability analysis, assuming that these reflect proper "intra-

unit" variability over the years. The range in this data do not properly reflect likely intra-unit variability for an emissions unit whose emissions were always likely low.

EPA should also examine the range of data for various other units included in its floor variability analysis. These include TS Power and Montrose Units 2 and 3. In each of these cases, the ratio of the maximum to the minimum averages of various tests exceeds 10. EPA should not simply assumes that these large variations reflect unit emissions variability; test variability, or other factors unrelated to actual emissions, may be responsible. If so, those results should be excluded from EPA's calculations.

iii. EPA Has No Justification to Round Up the HCl MACT Floor from the 99th Percentile UPL

After taking the average of the HCl emissions of the 131 lowest emitting EGUs (including the flawed assumption that those units tested below detection limits were emitting HCl at the detection limit) and after determining the 99th percentile UPL value, EPA 'rounded' that number up to the nearest third decimal place in coming up with a proposed HCl MACT floor limit. Specifically, the 99th percentile UPL HCl value was 0.001250 lb/MMBtu and EPA "rounded" that up to a proposed MACT floor limit of 0.0020 lb/MMBtu.[105] The proposed MACT floor is 1.6 times higher than the 99th percentile UPL HCl value. A review of the HCl data collected by EPA shows twelve of the 256 units with minimum HCl values falling between 0.001250 and 0.0020 lb/MMBtu.[106] So just in EPA's dataset of 256 units tested, 4.6% of the tests results fall in this range at EGUs that would have

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[105] *See* EPA spreadsheet with filename "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "Summary" worksheet. *See also* 76 Fed.Reg. 25045 (Table 10); proposed Table 2 to Subpart UUUUU of 40 C.F.R. Part 63 (76 Fed.Reg. 25126).
[106] *Id.* at AcidGas_coal worksheet.

had to reduce HCl emissions had EPA not rounded up the 99th percentile UPL from 0.001250 and 0.0020 lb/MMBtu.

EPA offers no justification for that inflation. EPA has not suggested that its calculation of HCl emissions at .001250 lb/MMbtu is so imprecise as to require the chosen inflation. EPA consequently has no basis to conclude that the average *actual* emissions of the floor plants are any higher (or lower) than .001250 lb/MMbtu, or that measurement inaccuracies make a limit at that level infeasible. By inflating the standard from 0.001250 to 0.0020 lb/MMBtu, EPA has provided a limit which exceeds (even the 99th percentile UPL-adjusted) emissions of the best performing sources. EPA has provided no justification that departure from statutory standard.

iv. Conclusion

EPA's proposed HCl limits for existing units are in excess of the statutory floor. EPA has made an unsupported assumption that it captured the 131 lowest HCl emitting units in its ICR for HCl emissions. EPA has also improperly assumed those units with HCl test results below test method detection limits were actually emitting at the detection limit. And EPA has impermissible rounded up its UPL-adjusted rate such that it is now 1.6 times the 99th percentile UPL of the plants' actual emissions. Finally, compounding all of this, EPA has set the floor based on 3 times the MDL – without proper justification. EPA should, for these reasons, revise the HCl MACT floor to realistically reflect the actual emissions of the best performers.

2. Determination of a Surrogate SO2 MACT Floor Limit for Existing Sources.

EPA has proposed the use of SO2 as a de facto surrogate for HCl and other acid gases at EGUs with some sort of flue gas desulfurization system. As discussed elsewhere in these comments, EPA has not provided adequate legal or technical justification for its decision to use SO2 as a surrogate for HCl, HF, HCN, or SeO_2. SO2 emissions do not correlate with that of HCl, HF

or HCN emissions. Those issues aside, below we provide our comments on EPA's assessment of the MACT floor for SO_2.

In determining the SO2 MACT floor, EPA re-ranked the data collected for the 256 EGUs not by HCl emissions but by SO2 emissions. *See* EPA spreadsheet titled "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036). The top ranked units in the HCl ranking is the Logan Generating Plant Unit 1, whereas the top ranked unit in the SO2 ranking is Stanton Unit 10 – a unit which does not even show up in EPA's lowest 131 HCl emitters. The 2nd ranked unit for SO2 is Stockton Unit 1, which is also not included in EPA's lowest 131 HCl emitters. In fact, eleven of the top 20 units ranked by lowest SO2 emissions are not in EPA's lowest 131 HCl emitters (this, of itself, should cast doubt on the notion of using SO_2 as a surrogate for HCl or any other acid gas). The average SO2 rate of the 131 lowest HCl emitting units with a flue gas desulfurization system (i.e., wet or dry scrubber) is 0.14 lb/MMBtu[107], as compared to the average SO2 rate of the 131 lowest SO2 emitting units which EPA has calculated to be 0.0740 lb/MMBtu.[108]

a) EPA Should Not Apply a 99th Percentile UPL in Setting an SO2 Limit

For its proposed SO2 MACT floor limit, EPA took the average of its new ranking of the lowest SO2 emitting 131 units and determined the 99th percentile UPL of that SO2 data. Specifically, EPA calculated the average SO2 emission rate of the lowest SO2 emitting units to be 0.0740 lb/MMBtu and then determined that the 99th percentile UPL of that data was more than

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[107] Note that EPA's spreadsheet does not have SO2 emission rates for all units. This info is readily available in EPA's Clean Air Markets Database based on continuous emission monitoring data. For the units with missing SO2 emissions data in EPA's spreadsheet, we used quarterly average SO2 emission rates from 2010.

[108] *See* EPA spreadsheet with filename "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "Summary" worksheet.

double the average emission rate at 0.1699 lb/MMBtu.[109] EPA provided no justification for application of the 99th percentile UPL; there is none.

First, EPA's proposed rule would evaluate compliance with the surrogate SO2 limit based on a 30-day rolling average.[110] Such a long term average adequately accounts for variability in SO2 emissions. The SO2 data used by EPA in ranking the SO2 emission rates of the coal-fired EGUs was based on short term average data. Long term averages are typically at the same level or lower than that measured on a short term basis. And they are less variable; had EPA run its UPL formula with 30-day average emissions, it would have inflated the limit by far less. If EPA is setting the SO2 MACT limit based on short term average testing, the 30-day average compliance time provides all of the flexibility needed to reflect the best performing sources under the worst reasonably foreseeable conditions. Given that all coal-fired EGUs are required to measure SO2 with continuous emission monitoring systems (CEMS) under requirements of the New Source Performance Standards as well as Acid Rain Program requirements, a 30-day average SO2 limit will be readily achievable by these sources.

Operators of EGUs routinely use SO2 CEMS data to guide adjustments to the SO2 control equipment. This is especially so when the unit has a strict SO2 limit to meet. For example, if a unit operator sees SO2 emissions spiking, the concentration of lime or limestone in the scrubber slurry can be increased which in turn increases the removal efficacy of the scrubber. Plant operators use such methods on a daily basis.

EPA's analysis suggests that the SO2 removal efficiency of the SO2 controls has an impact on HCl emission rates. Yet, EPA, in applying the 99th percentile UPL to the average SO2 emissions rate, has come up with an SO2 emission rate that will not encourage the best operation of the scrubber, and thus will not ensure removal of HCl (or other acid gases).

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[109] *Id.*.
[110] *See* 76 Fed.Reg 25029 (May 3, 2011).

A long term averaging time provides sufficient flexibility to EGU owners/operators to deal with spikes in SO2 emissions, and thus no adjustments to the SO2 emission rate considered to be reflective of the lowest HCl emitting units is warranted. Further, an SO2 MACT limit that is based on an appropriate subset of the lowest HCl emitting units will ensure that the SO2 controls at each EGU are operated to maximize SO2 removal and also maximize removal of HCl.

b) EPA Has No Justification for Rounding Up the 99th Percentile UPL SO2 Emission Rate in Setting an SO2 Limit

Not only did EPA fail to justify its determination of the 99th percentile UPL SO2 emission rate, EPA then rounded up the UPL emission rate from 0.1699 lb/MMBtu to 0.20 lb/MMBtu in setting an SO2 MACT emission limit.[111] This limit is almost 20% higher than the SO2 emissions rate that EPA determined to reflect the 99th percentile UPL and is 270% higher than the 0.0740 lb/MMBtu SO2 emission rate that EPA determined to reflect the uninflated MACT floor. EPA has provided no justification for rounding up to 0.2 lb/MMBtu; the lower rate was precisely measured when EPA collected its data, and can be precisely measured by subject facilities.

c) If EPA Could Justify Using SO2 as a Surrogate for HF, HCN, or SeO2, It Must Do a Separate Analysis for Each HAP

Sulfur dioxide's relationship to HCl differs (if if exists at all) from its relationship to other acid gases. In order to justify using SO_2 as a surrogate for all acid gases, therefore, EPA would first have to determine the MACT floor dataset for the particular HAP and then determine the appropriate SO2 limit to impose. As we have stated elsewhere in these comments, EPA has provided absolutely no justification to use SO2 as a surrogate for HCN or SeO_2. An initial review of the data collected by EPA indicates some relationship between SO_2 removal and HF removal; however, in order to

[111] *See* EPA spreadsheet with filename "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "Summary" worksheet.

properly establish an SO_2-based HF limit, EPA would need to truncate its dataset to reflect the lowest HF emitting units (a dataset much smaller than 131 units).

3. Determination of HCl MACT Floor for New Sources

The MACT floor for new sources must be based on the emissions achieved in practice by the best controlled similar source. Accordingly, EPA based its HCl MACT floor determination for new sources on the EGU with the lowest HCl emissions – the Logan Generating Plant Unit 1. The average HCl emission rate at this unit was 1.3×10^{-5} lb/MMBtu.[112] EPA then determined the 99th percentile UPL emission rate to be 3.0×10^{-5} lb/MMBtu.[113] EPA converted the HCl test data at Logan to lb/MW-hr, and came up with an average emission rate to be 0.000113 lb/MW-hr. EPA determined the 99th percentile UPL of the three test runs to be 0.000262 lb/MW-hr. Then EPA converted this value to lb/GW-hr and 'rounded' up the value to the nearest tenth to come up with a proposed MACT floor limit of 0.30 lb/GW-hr.[114]

At least some of the three test results at the Logan Generating Plant were measured below the detection limit of the testing method.[115] Yet, EPA assumed that the test results were measured at the detection limit. While the precise emissions are not known when a test does not detect a pollutant, it is known that the emissions are less than the detection limit. See previous discussion on better approaches for data substitution when non-detect data are present. So EPA overestimated the average HCl emission rate being achieved at the best performing source. EPA compounded this issue by

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[112] *Id.*
[113] *Id.*
[114] *See* 76 Fed.Reg. 25125 (May 3, 2011).
[115] *See* EPA spreadsheet with filename "floor_analysis_coal_HCl_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3036) at "HCl_New_MMBtu" worksheet.

applying a 99th percentile UPL factor and then rounding up to the nearest tenth of a lb/GW-hr.

Further, by rounding up to 0.3 lb/GW-hr, EPA's proposed new source MACT standard assumes a very poor heat rate and thermal efficiency for new units. Specifically, the proposed 0.3 lb/GW-hr limit includes an assumption that the heat rate is 10,000 Btu/kW-hr and that the unit thermal efficiency is 34% when converted from EPA's 99th percentile MACT floor value of 0.000030 lb/MMBtu. A heat rate of 10,000 Btu/kW-hr is higher than the annual average heat rate of 9,854 Btu/kW-hr of the existing coal-fired EGU fleet.[116] New coal-fired EGUs are typically supercritical or ultra-supercritical boilers that are designed to be more efficient with lower heat rates than typical existing coal-fired EGUs. EPA should not assume a heat rate of new coal-fired EGUs higher than 9,000 Btu/kW-hr (or approximately 38% thermal efficiency) in setting its new source MACT floor limit. Based on EPA's floor emission rate of 0.000030 lb/MMBtu, that means EPA's proposed new source MACT floor limit should not be any higher than 0.27 lb/GW-hr.

For all of these reasons, EPA's proposed HCl MACT floor limit for new units is too high and does not reflect the emissions achieved at the best controlled similar source under the worst reasonably foreseeable circumstances.

a) EPA Failed to Fully Evaluate Beyond the Floor Methodologies to Achieve Lower HCl Emission Rates at Existing Coal-Fired EGUs

EPA did not evaluate in any meaningful way control technologies or methodologies that would enable units to achieve HCl emission reductions beyond EPA's proposed HCl floor emissions rates. EPA's justification apparently was that they could not identify any control technologies that could achieve greater emission reductions of HAP than the control

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[116] *See* Sargent & Lundy Report, Coal-Fired Power Plant Heat Rate Reductions, SL-009597, January 22, 2009, at 1-1 (Ex. 9-1).

technologies they expected to be used to meet MACT.[117] However, EPA has not adequately demonstrated that there are no beyond the floor control techniques or methodologies that could be implemented to further reduce HCl to the maximum achievable level. This is especially true for EPA's proposed existing source MACT floor.

The Clean Air Act defines how the floor of the MACT emission standard is to be set, but (as set forth above) the statute requires EPA to establish lower emission standards, where further reductions are achievable, "taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements" under the statutory standard. 42 U.S.C. § 7412(d)(2).

In EPA's determination of the existing source MACT floor, EPA took the average emission rate of the 131 lowest HCl emitting EGUs for which it had HCl emission data. As we have discussed above, EPA has not likely captured the HCl emissions of the lowest emitting 131 (12%) coal-fired EGUs in the U.S. This is evident in the fact that not all of the units in EPA's MACT floor dataset of 131 EGUs have SO2 controls. While many units have wet or dry scrubbers, several have only DSI and others have only particulate matter controls. In part due to this dataset, EPA's calculation of the HCl MACT floor emission rate is high. In fact, the 0.0020 lb/MMBtu MACT floor emissions rate which EPA has proposed to meet existing source MACT is higher than the HCl rates actually emitted by any of the 131 EGUs in EPA's dataset.

That data suggests that the control technologies in use by those sources can achieve greater emission reductions than the MACT floor. EPA has suggested that that would be required to meet the MACT floor for HCl.[118] EPA's HCl emission dataset strongly implies that EGUs may not have to install scrubbers to meet EPA's HCl MACT floor for existing sources, and some EGUs may not have to install any SO2 controls. There are beyond the

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[117] *See* 76 Fed.Reg. 25046 (May 3, 2011).
[118] *Id.*

floor techniques and methodologies that must be at least considered by EPA in setting the existing source MACT standard for HCl.

i) EPA Has Acknowledged that Lower HCl Emission Rates than Its Proposed MACT Floor Are Achievable at Coal-Fired EGUs

EPA assumed a much lower HCl emission rate than its proposed HCl MACT floor in its Integrated Planning Model (IPM). Specifically, EPA assumed a floor HCl emission rate of 0.0001 lb/MMBtu, an emissions rate that is 20 times lower than EPA's proposed MACT floor limit of 0.0020 lb HCl/MMBtu.[119] In the modeling for the IPM, EPA assumed that this floor HCl emission rate would be achieved through limestone forced oxidation scrubbers (wet scrubbers), dry flue gas desulfurization (dry scrubbers), dry sorbent injection (DSI), or upgrades to existing scrubbers.[120] With respect to upgrades, EPA assumed that scrubbers would have to be upgraded to achieve 92-96% SO2 removal which should in turn achieve 99% HCl removal.[121]

An HCl emission rate of 0.0001 lb/MMBtu is achievable with these control technologies. Fifty four of the EGUs tested in the ICR already have actual HCl emission rates that would be in compliance with a MACT standard of 0.0001 lb/MMBtu. More than half of the 131 EGUs considered by EPA as the lowest HCl emitting units are achieving greater than 99% HCl emission control.

Both of these findings fit with our analyses of subsets of the dataset used by EPA to determine HCl MACT floor. Specifically, by first dividing up the 131 EGU dataset that EPA relied on for MACT floor by low chlorine coal and higher chlorine coal and then analyzing the lowest emitting half of each of those datasets, we found a significant decrease in HCl emission rate with SO2 emission rates of 0.15 to 0.08 lb/MMBtu or lower, indicative of at least

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[119] *See* March 2011 Document Supplement for EPA Base Case v.4.10_PTox – Updates for Proposed Toxics Rule at 89-90 (Docket no. EPA-HQ-OAR-2009-0234-3048).
[120] *Id.* at 90.
[121] *Id.*

90% SO2 control or greater.[122] As previously discussed in these comments, EPA has failed to capture HCl emissions data on numerous other coal-fired EGUs with SO2 scrubber upgrades and/or high efficiency scrubbers. Had EPA done so, it is very likely that the HCl MACT floor would be much lower, in line with the HCl emissions achieved with state-of-the-art SO2 controls (including retrofits and upgrades) today.

In any event, EPA's analyses for the IPM provides EPA's view that technologies and methodologies are available that would result in lower HCl emission rates than the 0.0020 lb/MMBtu MACT floor proposed by EPA. There are thus, according to EPA itself, beyond-the-floor technologies and methodologies that can achieve greater HCl reductions than the prescribed MACT standard.

ii) EPA Has Determined that the Technologies and Methodologies Available to Achieve Lower Emission Rates of HCl Are Cost Effective, Considering Non-Air Quality Health and Environmental Benefits and Energy Impacts

In its base case and policy case runs for the Integrated Planning Model (IPM), EPA estimated the costs of new scrubbers, scrubber upgrades, and DSI to meet an HCl emission rate of 0.0001 lb/MMBtu.[123] The control technologies for HCl include wet and dry SO2 scrubbers and dry sorbent injection. To achieve the highest levels of HCl control, baghouses will likely be needed at fluidized bed combustors or pulverized coal-fired units with dry

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[122] *See* Ex. 9-30, which is a table that compared the lowest emitting subsets of HCl and SO2 emission rates at low and higher chlorine coal-fired EGUs.
[123] *See* March 2011 Document Supplement for EPA Base Case v.4.10_PTox – Updates for Proposed Toxics Rule at 89-90, 91-98 (Costs of DSI and Baghouse) (Docket no. EPA-HQ-OAR-2009-0234-3048). *See also* August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model, Chapter 5 at 5-2 to 5-6 (Docket no. EPA-HQ-OAR-2009-0234-3049).

scrubbers.[124] For units using dry sorbent injection (DSI), baghouses will also most likely be required to achieve the highest levels of HCl control.[125] For EGUs with existing SO2 scrubbers, upgrades to existing scrubbers to improve collection efficiency may be required, such as elimination of scrubber bypass.

EPA found that the costs of complying with a 0.0001 lb/MMBtu HCl MACT limit, which would be achieved through installation of scrubbers or scrubber upgrades, installation of baghouses at fluidized bed boilers, and/or DSI with baghouses to achieve SO2 removal efficiencies of 92% to 96%, would be cost effective. According to EPA's documentation on the base case IPM modeling, EPA did not account for the fact that numerous units will likely have to achieve this level of control through SO2 controls that will soon be required under BART, CAIR, or state regulations to meet ambient air quality standards.[126]

EPA estimated the costs of compliance with the proposed MACT rule using the IPM.[127] Although EPA's Regulatory Impact Analysis implies that its cost-benefit modeling was based on its proposed HCl MACT limit of 0.002 lb/MMBtu, the analysis was based on the IPM and the March 2011 update to the IPM included the modeling of an HCl emission rate of 0.0001 lb/MMBtu.[128] The analysis was also based on an assumed SO2 rate of 0.06 to 0.065 lb/MMBtu for those EGUs with wet or dry scrubbers and an SO2

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[124] *See* March 2011 Document Supplement for EPA Base Case v.4.10_PTox – Updates for Proposed Toxics Rule at 88 (Docket no. EPA-HQ-OAR-2009-0234-3048).
[125] *Id.* at 91.
[126] *See* August 2010 Documentation for EPA Base Case v.4.10 Using the Integrated Planning Model at 1-1 to 1-2 (Docket no. EPA-HQ-OAR-2009-0234-3049).
[127] *See* March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report, at 1-11, 2-11 (Docket no. EPA-HQ-OAR-2009-0234-3051).
[128] *See* March 2011 Document Supplement for EPA Base Case v.4.10_PTox – Updates for Proposed Toxics Rule at 89-90 (Docket no. EPA-HQ-OAR-2009-0234-3048).

removal efficiency of 70% for those EGUs assumed by EPA to use DSI with a baghouse.[129]

In the base case 2005 emissions analysis, EPA determined the EGU sector emitted 10.4 million tons per year of SO2 and 352,000 tons per year of HCl.[130] In 2016, as a result of the EGU MACT rule, EPA determined the SO2 emissions from coal-fired EGUs would decrease to 3.6 million tons per year.[131] In Table 3-12 of the Regulatory Impact Analysis, EPA provides a summary of the emission changes due to the toxics rule in the lower 48 states, projecting a 66% decrease in SO2 emissions by 2016.[132]

EPA determined that the social costs to implement the proposed MACT rule was $10.9 billion in 2007 dollars, and also determined that the benefits of the rule far outweigh the costs[133]. The numerous non-air quality and environmental benefits of the HCl MACT requirement of the rule include decreased mercury emissions due to wet scrubbers and/or baghouses added with dry scrubbers or DSI, decreased SO2 emissions, and decreased fine particulates. This rule will mean less mercury deposited in our nation's water bodies, less sulfate deposition (which may decrease mercury methylization in the environment), a decrease in fish consumption advisories, and lower numbers of people with diminished IQs due to mercury consumption. The HCl requirements of the rule will also help to improve regional haze and sulfate deposition, lessen acidification of lakes and streams, and decrease concentrations of lung damaging HCl and also fine particulate in the air. Thus, a strong MACT rule and HCl reduction requirements will provide important benefits to public health and the environment. EPA estimates the

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[129] *Id.* at 90.
[130] *See* March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report, at 3-9 (Table 3-2 under Sector abbreviation "ptipm") (Docket no. EPA-HQ-OAR-2009-0234-3051).
[131] *Id.* at 3-20.
[132] *Id.* at 3-25.
[133] *Id.* at 11-1.

net benefit of the MACT rule at $48 to $130 billion based on 2007 dollars.[134] EPA has shown that it is quite cost effective to meet a beyond the floor MACT level of HCl control of 0.0001 lb/MMBtu along with all of the other proposed MACT requirements. These aggregate numbers strongly suggest that superior HCl reductions are achievable as MACT, under the statutory standard.

iii) HCl Emission Limits Well Below EPA's Proposed MACT Floor of 0.0020 lb/MMBtu Are Achievable at Existing EGUs

EPA has determined that an HCl emission rate of 0.0001 lb/MMBtu is cost effective, and we know that numerous EGUs that were tested for the ICR have achieved HCl emissions at or below 0.0001 lb/MMBtu. Though they are likely to claim otherwise now, EGU owners/operators around the country have repeatedly asserted that, HCl emission rates less than EPA's proposed MACT standard of 0.0020 lb/MMBtu (down to as low as 0.0001 lb/MMBtu) can be met on a continuous basis.

Several owners of coal-fired EGUs have in fact claimed that such low HCl emission rates can be met on a continuous basis. For example, Longleaf Energy Associates has obtained a permit with emissions limitations that the Georgia Environmental Protection Division has found are sufficient to keep the proposed 2 unit 1200 MW power plant to less than major source emission thresholds. This plant will burn primarily subbituminous coal, although their permit also allows up to 100% Central Appalachian coal, and each unit will be equipped with dry scrubbers and baghouses. Based on its review of the average HCl emission rate being achieved at subbituminous coal fired units with dry scrubbers, the company proposed that it would emit HCl at a rate of 9.56×10^{-5} lb/MMBtu.[135] This HCl emission rate is just under the 0.0001 lb/MMBtu HCl rate that EPA assumed would apply in its IPM.

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[134] *Id.*

[135] *See* Ex. 9-35, December 22, 2009 submittal from Longleaf Energy Associates to Georgia Division of Environmental Protection, Attachment at 3.

While Georgia did not impose 9.56 x 10^{-5} lb/MMBtu as a limit in the Longleaf permit, Georgia did impose a limit on emissions of any single HAP of 10 tons per year.[136] Since HCl and HF are the HAPs that coal-fired EGUs emit in the greatest quantities, the 10 ton per year (tpy) limit applies to Longleaf's emissions of each of these HAPs.[137] In order to comply with the 10 tpy limit on emissions of HCl, the Longleaf boilers cannot emit HCl at a rate any higher than 0.00019 to 0.00022 lb/MMBtu. This range of limits reflects operation at 100% capacity factor, which is not likely to occur, down to 85% capacity factor. These are effectively the Longleaf plant's HCl limits in order to stay a minor source of HAPs. Further, Longleaf Energy Associates claimed they could continue to comply with the 10 tpy limit even when burning Central Appalachian coal which is much higher in chlorine content than subbituminous coal.[138]

The Longleaf plant is not alone. There have been numerous "synthetic minor" permits issued to coal-fired EGUs which claim they will keep HCl emissions below 10 tpy with planned SO2 scrubbers. While Sierra Club does not agree that any of these synthetic minor permits properly limit potential to emit of all HAPs to less than major source emission thresholds[139], we are

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[136] *See* Ex. 9-36, November 8, 2010 Permit Amendment for Longleaf Energy Associates, Condition 2.25. While the permit also has specific lb/MMBtu emission limits for HCl in Condition 2.15o. of 0.0006 lb/MMBtu when burning subbituminous coal and 0.0024 lb/MMBtu when burning bituminous coal, those emission limits are superseded by the 10 tpy limit on the emissions of any one HAP.

[137] There is also a 25 tpy limit on all HAPs including HCl and HF with which Longleaf must comply to be considered a minor source of HAPs which will likely require HCl emissions to be even less than 10 tpy, but for the purposes of this comment letter, we are focusing only on the impacts of the 10 tpy limit.

[138] The Longleaf permit requires compliance with the 10 tpy single HAP limit and also allows up to 100% Central Appalachian coal to be burned.

[139] In several instances, Sierra Club and /or other environmental organizations have challenged these permits on grounds that the 10 tpy single HAP and 25 tpy total HAPs emission limits are not practically

raising these permits to EPA's attention because they essentially reflect company's and state permitting agencies' determinations of HCl emission rates that they claim can be met on a continuous basis.

For example, the synthetic minor HAP permit for the Big Stone II power plant, a proposed 600 MW unit that would have burned subbituminous coal and be equipped with a wet scrubber, required the unit to not emit any more than 9.5 tpy HCl.[140] To comply with the 9.5 tpy limit, the unit could not emit HCl at emission rates any higher than 0.00036 lb/MMBtu (at 100% capacity factor) to as high as 0.00043 lb/MMBtu (at 85% capacity factor). While the company has decided not to build this unit, nonetheless the company proposed these emission limits, the state of South Dakota issued the permit with these limits, and the Board of Minerals and Environment upheld these permit limits.

Eastern Kentucky Power Cooperative's Spurlock Unit 4 also has a permit with synthetic minor HAP limits. This 268 MW (net) unit began operation in 2009.[141] It is a circulating fluidized bed boiler with a dry scrubber that burns eastern bituminous coal, and the unit is subject to a 9 tpy limit on emissions of a single HAP such as HCl.[142] To comply with the 9 tpy emission limit, the unit cannot emit HCl at rates higher than 0.00073 lb/MMBtu (at 100% capacity factor) to 0.00086 lb/MMBtu (at 85% capacity factor).

The lb/MMBtu HCl emission rates reflective of compliance with the HCl limits of these permits are all less than EPA's proposed HCl MACT limit of 0.0020 lb/MMBtu. Thus, this indicates that emission limitations that go

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enforceable, both for HCl and HF as well as all of the other numerous HAPs emitted by coal-fired EGUs.

[140] Ex. 9-37, Big Stone Permit at 30 (Condition 11.5).

[141] *See* East Kentucky Power Cooperative Spurlock Power Station Fact Sheet. Ex. 9-38.

[142] *See* Ex. 9-39, Hugh L. Spurlock Generating Station, Permit Number V06-007 Revision 3 at 25 and at 27 (Condition 2.o).

beyond the floor (i.e., are lower) proposed by EPA are considered feasible and achievable by the utility companies and state agencies.

The fact that these permits were issued for new EGUs should not be a factor in determining whether these emission rates reflect achievable beyond the floor HCl emission limits for existing EGUs. The technologies used (i.e., SO2 control technologies with the cobenefit of HCl control) are the same whether the EGUs are existing or new. Wet and dry scrubbers have been retrofitted at existing EGUs to achieve very high levels of SO2 removal, and thus these SO2 controls would also then provide for very high levels of HCl removal. A prime example is the Chiyoda CT-121 FGD. Vendor information for this technology indicates that this scrubber has achieved 98-99% SO_2 removal even with low sulfur coal.[143] For example, the Chiyoda's bubbling jet reactor has consistently achieved >99% SO_2 removal during long-term operation at the Shinko-Kobe power plant in Japan. This facility consists of two 700-MW coal-fired utility boilers. The wet FGD was designed to achieve 0.014 lb SO2/MMBtu (9 ppmv at 3% oxygen) on an instantaneous basis and has consistently exceeded this level of control while treating gases with inlet SO_2 concentrations of 1.78 lb/MMBtu.[144] This technology has been guaranteed by Chiyoda to achieve 99% SO_2 removal on three coal-fired boilers in Japan.[145] It also has been demonstrated in the U.S. at the University of Illinois's Abbott power plant, Georgia Power's Plant Yates[146],

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[143] *See* Black & Veatch vendor brochure on CT-121, ex. 9-40.

[144] Yasuhiko Shimogama, Hirokazu Yasuda, Naohiro Kaji, Fumiaki Tanaka, and David K. Harris, Commercial Experience of the CT-121 FGD Plant for 700 MW Shinko-Kobe Electric Power Plant, Paper No. 27, presented at MEGA Symposium, Air & Waste Management Association, May 19-22, 2003, ex. 9-41.

[145] CT-121 FGD Process – Jet Bubbling Reactor, http://www.netl.doe.gov/technologies/coalpower/cctc/resources/pdfs/ct121/PPACT121_1.pdf, Ex. 9-42.

[146] Emission-control Technologies Continue to Clear the Air, Power, May/June 2002. Ex. 9-43.

Dayton Power & Light's Killen Unit 2,[147] and Plant Bowen Unit 3.[148] It has also been licensed for installation on several additional units in the US, including the other three units at Plant Bowen in Georgia, the other units at Dayton Power & Light's Killen plant, Dayton Power & Light's Stuart plant, and AEP's Big Sandy Unit 2, Conesville Unit 4, Cardinal Units 1 and 2, and Kyger Creek, among others.[149] Many of these EGUs were tested for HCl emissions in EPA's ICR and are in fact among the lowest HCl emitters for which EPA has data.

For those EGUs with existing wet scrubbers, options abound for upgrades to the scrubbers to improve HCl removal. For example, a new improved magnesium-enhanced lime scrubber process can achieve up to 99% SO2 removal.[150] In the year 2000, 4,300 MW of older magnesium-enhanced lime wet scrubbers were converted to this improved version.[151] According to vendor literature on this technology, the pre-existing magnesium-enhanced lime scrubbers were also capable of very high SO2 removal efficiencies in excess of 95%.[152] Elimination of scrubber bypass is a common scrubber upgrade that can greatly improve HCl emission rates. Other changes that could be made to existing scrubbers include improving gas flow distribution

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[147] *See* Black & Veatch, First Black & Veatch/Chiyoda Wet Flue Gas Desulfurization System in North America Successfully Goes Operational, 2008. Ex. 9-44.

[148] Blankinship, Steve, Go Take a Bath, Power Engineering, October 2008. Ex. 9-45.

[149] Chiyoda Licenses Its Flue Gas Desulfurization Technology in USA Newly for 5 Coal-Fired Generation Units, Press Release, May 2, 2005; Chiyoda Licenses its Flue Gas Desulfurization Process in USA for Georgia Power Owned 4 FGD Units, January 26, 2005. Ex. 9-46.

[150] *See* Roden, Bob et al., New Magnesium-Enhanced Lime FGD Process, Carmeuse-North America Technology Center, Pittsburgh, PA, at 1. Ex. 9-47.

[151] *Id.*

[152] *Id. See also* Nolan, Paul S., Babcock & Wilcox Co., Flue Gas Desulfurization Technologies for Coal-Fired Power Plants, presented at Coal-Tech 2000 International Conference, November 13-14, 2000, Jakarta, Indonesia, at 3. Ex. 9-48.

through ductwork changes, improving spray level coverage, adding frothing trays, increasing liquid to gas ratio (increasing recycle flow), and injecting dibasic acid.[153] Modifications such as these have been done or are planned at numerous EGUs to meet BART or CAIR, and have proven cost-effective under those rules. For example, scrubber upgrades were considered cost effective to meet BART at the Jim Bridger Power Plant Units 1-4, Coal Creek Units 1 and 2, King Unit 1, Laramie River Units 1 and 2, Milton R. Young Units 1 and 2, Naughton Unit 3, and Sherburne County Units 1 and 2.[154]

Dry scrubbers can also be upgraded to improve SO2 and thus HCl removal. For example, use of performance additives or more reactive sorbent could improve HCl removal, as could an increase in the pulverization of the sorbent and/or a redesign of the slurry injection system or atomizer. The Colorado Department of Public Health and Environment required evaluation of these dry scrubber upgrades as part of its BART analysis for the Hayden Station units.[155] At the Laramie River Station Unit 3, scrubber upgrades have included operation of all scrubber modules (no spare), increasing the gas residence time, changes to the turbo diffusers, use of additives, etc.[156]

There are also examples of coal-fired EGUs finding it cost effective to install new wet or dry scrubbers to meet BART – a standard which imposes a similar (and often less generous) statutory standard.[157]

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[153] *See* Carstens, Andrew J. et al., Performance Upgrades for Low-Sulfur Wet Scrubbers, Sargent & Lundy and CPS Energy, Paper # 134, at 6-12 (Ex. 9-49).

[154] *See* National Park Service Spreadsheet "EGUs with proposed BART SO2 controls Mar 2011." Ex. 9-50.

[155] *See* Colorado Department of Public Health and Environment - Air Pollution Control Division, Best Available Retrofit Technology (BART) Analysis of Control Options for Public Service Company – Hayden Station. Ex. 9-51.

[156] *See* Doyle, John B. and Dan Hagel, Dry Scrubber 20 Years Later, Babcock & Wilcox publication BR-1692, 1999. Ex. 9-52.

[157] *See* National Park Service Spreadsheet "EGUs with proposed BART SO2 controls Mar 2011." Ex. 9-50.

For all of these reasons, HCl emission limits below EPA's proposed HCl emission limit of 0.0020 lb/MMBtu are achievable at existing EGUs through available technology and/or technology upgrades.

iv) Summary: EPA Is Obligated to Impose Lower HCl Emission Limits than EPA's Proposed MACT Floor to Ensure the Maximum Degree of HCl Emission Reduction is Required as MACT Because Such Lower Limits Are Achievable and Cost Effective

For all of the reasons discussed above, EPA is obligated to impose lower HCl emission limits to meet MACT for HCl. First, EPA has already determined that an HCl emission limit of 0.0001 lb/MMBtu would be cost effective, because the public health and environmental benefits of the scrubbers required to meet an HCl limit of 0.0001 lb/MMBtu would reduce mercury, SO2, and fine particulate which will in turn benefit public health and the environment. EPA projected benefits to improved public health and environment of $48 to $130 billion at a cost of $10.9 billion.[158] The benefits outweigh the costs at a ratio of 5 – 13 to 1. While the monetary value of the benefits takes into account the mercury MACT and metal HAP MACT proposals as well as the HCl MACT requirements, it is difficult to separate these costs and benefits since the SO2 scrubbers and potentially baghouses required for HCl and metal HAP compliance will result in reduced mercury as well as reduced HCl and other acid gas HAPs. Given that EPA did not quantify the improved reductions of other acid gases such as HF that should be achieved with HCl controls to meet MACT, EPA's cost-benefit analysis likely underestimates true benefits of a 0.0001 lb/MMBtu HCl MACT limit. Further, EPA also did not take into account that many of these units will be required to install or upgrade SO2 controls to meet BART or CAIR. Thus, EPA's cost benefit analysis likely overstated the cost of controls as due solely

[158] EPA's March 2011 Regulatory Impact Analysis of the Proposed Toxics Rule: Final Report at 1-1 (Docket no. EPA-HQ-OAR-2009-0234-3051).

to MACT requirements and also likely understated the environmental benefits.

Second, HCl emission limits lower than EPA's proposed MACT floor limit of 0.0020 lb/MMBtu are achievable. EPA stated it did not consider any beyond the floor requirements because there were not additional control technologies that could be applied beyond those needed to meet the MACT floor. But EPA has no justification for not evaluating beyond the floor emission limits achievable through available technologies and methods – including further reductions that may be achieved through the use of the technologies used by (some) sources in the dataset used to establish the MACT floor. 42 U.S.C. § 7412(d)(2) (requiring consideration of all "measures, processes, and methods" of pollution reduction). And, in fact, EPA's proposed HCl MACT floor emission limit of 0.0020 lb/MMBtu, is being met by all of the units that EPA considered to be the lowest emitting 12% of coal-fired EGUs, which are equipped with a wide range of control technologies including scrubbers being operated at varying levels of SO2 removal as well as units without any SO2 controls. Thus, EPA's proposed MACT floor emission limit of 0.0020 lb/MMBtu is not based on any particular control technology.

EPA itself determined that an HCl emissions rate of 0.0001 lb/MMBtu was achievable. Indeed, that was the HCl emission limit, along with assumptions that units would operate wet or dry scrubbers achieving 92-96% SO2 removal or use DSI with a baghouse, evaluated by EPA in its Integrated Planning Model.[159] EPA's HCl emissions data also shows that an emission limit of 0.0001 lb/MMBtu is achievable, as 54 of the top performing units for which EPA has emissions data for emit HCl at or lower than 0.0001

[159] *See* March 2011 Document Supplement for EPA Base Case v.4.10_PTox – Updates for Proposed Toxics Rule at 90 (Docket no. EPA-HQ-OAR-2009-0234-3048).

lb/MMBtu.[160] As previously discussed, we think there are likely many other units that are already configured to achieve similar low emission rates of HCl but EPA does not currently have HCl emissions data on all of these units.

Further, EPA's proposed MACT limit does not ensure the maximum degree of HCl emission reduction is achieved on a continuous basis. The best way for EPA to ensure that its HCl MACT limit requires continuous emission reductions it to require compliance to be measured by HCl CEMs. Not only would the required use of HCl CEMs better ensure continuous HCl reductions, but EPA could account for variability via an HCl limit with a long term averaging time. The use of CEMs will allow an EGU operator to more readily adjust the operations of the SO2 controls to optimize HCl removal. With a long term average HCl limit truly reflective of the maximum degree of HCl emissions that can be achieved that is also measured by CEMs, EPA can account for expected variability in emissions while still motivating EGU operators to achieve the lowest HCl levels on a continuous basis.

In summary, EPA's proposed HCl MACT limit does not require the maximum degree of reduction in HCl that EPA has already determined is achievable and cost effective. Even an HCl emission limit of 0.00086 lb/MMBtu, which is among the highest HCl rates that coal-fired EGUs would be required to meet under a synthetic minor HAP permit, is less than half of EPA's proposed MACT floor emission limit. EPA should also require the use of HCl CEMs to ensure continuous compliance with the HCl MACT limit.

C. EPA's Proposed MACT Standards for Petroleum Coke Fired EGUs

EPA has proposed petroleum coke ("pet coke") burning EGUs to be covered under the solid oil-derived fuel-fired EGU category. This section of

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[160] *See* Spreadsheet entitled "floor analysis coal HCl 31611" (Docket no. EPA-HQ-OAR-2009-0234-3036 at "AcidGas_coal" worksheet.

our letter provides comments on EPA's proposed standards, as they apply to units burning pet coke.

1. Whether Petroleum Coke-Fired EGUs Should Be in a Separate Subcategory from Coal-Fired EGUs

EPA is taking comment on whether petroleum coke-fired EGUs should be in a separate subcategory for MACT. *See* 76 Fed.Reg. 25070 (May 3, 2011). It appears that EPA has proposed to include EGUs that burn other fuels with coal to be considered coal-fired EGUs. *See* 76 Fed.Reg. at 25122 (definition of "coal-fired electric utility steam generating unit" in proposed §63.10042).[161]This is consistent with the definition of "coal-fired electric utility steam generating units" in the New Source Performance Standards, Subpart Da (40 C.F.R. §60.41Da). We support such a determination by EPA. Coal-fired units that blend with pet coke do so in varying amounts throughout a year of operations. It would be administratively impracticable to set separate MACT limits for units that intermittently burn pet coke with coal.

Moreover, even for units that burn 100% pet coke, there is no justification for putting such units in a separate subcategory from those that burn coal or coal and pet coke. All of these units are "similar sources" to coal-fired EGUs. *See* 40 C.F.R. §63.41. Specifically, such coal-fired and coal/pet coke-fired EGUs have comparable HAP emissions, are structurally similar in design and capacity, and the HAP emissions can be controlled with the same control technology. For example, the RD Green Unit 2 burns bituminous coal and pet coke, is a conventional boiler with an ESP and wet scrubber, and it is in the coal-fired EGU MACT floor analysis for PM and HCl.[162] AES

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[161] EPA's proposed definition of "coal-fired electric utility steam generating unit" includes units that burn coal or coal refuse "in any combination with other fuels in any amount."

[162] *See* EPA's MACT Floor Spreadsheets for Coal HAP Metals and Coal Acid Gas, available at http://www.epa.gov/ttn/atw/utility/utilitypg.html.

Greenridge Unit 4 is a conventional boiler that burns bituminous coal and pet coke, is equipped with activated carbon injection along with SCR, a spray dry absorber and a fabric filter baghouse, and this unit was ranked the 6th lowest emitter for mercury emissions among coal-fired units.

EPA has not put forth any rationale for identifying a separate subcategory for pet coke-fired EGUs (i.e., EPA's "solid oil-derived fuel-fired EGU" category). Because the HAP emissions from pet coke-fired EGUs can be controlled with the same control technology and methods as can be applied at those EGUs that burn coal, there is no justification for a separate category for pet coke burning EGUs.

EPA should not, therefore, create separate standards for pet coke units. Though we believe that the subcategory lacks justification, we offer the following comments on EPA's MACT analysis for its "solid oil-derived fuel-fired EGU" category."

2. EPA's Proposed HCl MACT Standard for New Pet Coke-Fired EGUs

EPA has proposed an HCl standard for new pet coke-fired EGUs of 0.00030 lb/MW-hr.[163] EPA also determined the MACT floor emission rate in terms of lb/MMBtu to be 2.3618 x 10^{-5} lb/MMBtu based on the 99th percentile UPL.[164]

EPA's determination of the 99th percentile UPL HCl emission rate for the best performing source, AES Deepwater, is higher than the three HCl emissions results provided in EPA's MACT floor spreadsheet. Specifically, the highest HCl emission rate measured at AES Deepwater was 1.9592 x 10^{-5} lb/MMBtu, yet EPA's proposed 99th UPL value of 2.3618 x 10^{-5} lb/MMBtu is 20% higher than the highest HCl emission rate measured at this unit. Thus, EPA's proposed MACT floor value in units of lb/MMBtu fails to reflect the

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[163] *See* 76 Fed.Reg. 25027, 25126 (May 3, 2011).
[164] *See* EPA's spreadsheet with filename "floor_analysis_petcoke_031611.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "Summary_Pet coke" tab.

HCl emissions of the best performing unit under the worst reasonably foreseeable circumstances.

In addition, EPA determined the HCl MACT floor in terms of lb/MW-hr to be 0.00027169 lb/MW-hr, based on EPA's determination of the 99th percentile UPL.[165] Yet, the limit EPA proposed as MACT is 0.00030 lb/MW-hr, which is 10% higher than EPA's 99th percentile UPL emission rate. EPA has not provided any justification for going beyond the 99th percentile value in its MACT floor determination for HCl.

EPA's proposed new source MACT standard for HCl reflects a very poor heat rate and thermal efficiency for new units. Specifically, the proposed 0.00030 lb/MW-hr limit reflects an assumed heat rate of 12,702 Btu/kW-hr and a thermal efficiency of 26.8% when compared to EPA's 99th percentile MACT floor value of 2.3618×10^{-5} lb/MMBtu. A heat rate of 12,702 Btu/kW-hr is higher than the annual average of the existing coal-fired EGU fleet.[166] New pet coke-fired EGUs should be able to operate at much lower heat rates, in line with coal-fired EGUs, i.e., closer to 9,000 Btu/kW-hr (approximately 38% thermal efficiency). Based on EPA's floor emission rate of 2.3618×10^{-5} lb/MMBtu, that means EPA's proposed new source MACT floor limit should not be any higher than 0.00021 lb/MW-hr assuming a heat rate of new pet coke-fired units of 9,000 Btu/kW-hr.

Based on the above comments, EPA's proposed HCl limit for new pet coke-fired units fails to be at least as stringent as the best controlled similar source.

3. EPA's Proposed HCl MACT Standard for Existing Pet Coke-Fired EGUs

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[165] *Id.*

[166] *See* Sargent & Lundy Report, Coal-Fired Power Plant Heat Rate Reductions, SL-009597, January 22, 2009, at 1-1 (Ex. 9-1).

EPA has proposed an HCl MACT limit for existing pet coke burning EGUs of 0.0050 lb/MMBtu or 0.080 lb/MW-hr.[167] Though EPA's proposed rule states the 0.080 limit in terms of lb/GW-hr, we assume the reference to "GW-hr" to be a mistake. EPA's pet coke MACT floor spreadsheet indicates a 99th percentile UPL emissions level in terms of lb/MW-hr. , We take EPA's proposed existing source HCl limit for pet coke is 0.080 lb/MW-hr. These emission limits fail to reflect the existing source MACT floor for pet coke-fired EGUs.

EPA has included EGUs that burn blends of coal and pet coke in the HCl MACT floor determination for existing pet coke burning EGUs. Specifically, the Northside Generating Station units[168] and the Manitowoc units burn coal in addition to pet coke.[169] Such units should be considered coal-fired EGUs under EPA's proposed definition of coal-fired electric utility steam generating unit in §63.10042. 76 Fed.Reg. at 25122. It is not clear why these units were included in the pet coke MACT floor analysis. Further, it is not known whether the units were burning any coal at the time of the tests but, regardless, it does not make sense to include these units that should be covered under the coal-fired EGU MACT requirements rather than under the pet coke (solid oil-derived fuel) EGU MACT requirements.

In addition to these significant issues, EPA rounded up its HCl MACT floor determination from the 99th percentile UPL emission rate. Specifically, EPA determined the 99th percentile UPL from the top 5 pet coke-fired EGUs with the lowest HCl emissions to be 4.0628×10^{-3} lb/MMBtu.[170] Yet, EPA has proposed an HCl limit for existing sources of 5.0×10^{-3} lb/MMBtu, a limit that

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[167] *See* 76 Fed.Reg. 25027, 25128 (May 3, 2011).
[168] A 2003 Babcock & Wilcox paper indicates the units were not yet capable of firing 100% pet coke at that time. *See* Goodrich, William et al., Summary of Air Emissions from the First Year of Operation of JEA's Northside Generating Station, presented at ICAC Forum 2003, ex. 9-53.
[169] EPA's spreadsheet with filename "floor_analysis_petcoke_031611.xlsx" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "AcidGas_Petcoke_data" tab.
[170] *Id.* at "Summary" tab.

is 23% higher than EPA's 99th percentile UPL value. EPA has not provided any justification for going beyond the 99th percentile UPL in setting the HCl MACT floor for existing pet coke-fired EGUs.

Further, EPA determined the HCl MACT floor in terms of lb/MW-hr to be 0.078803 lb/MW-hr, based on EPA's determination of the 99th percentile UPL.[171] The limit EPA proposed as MACT is 0.080 lb/MW-hr, which is higher than EPA's 99th percentile UPL emission rate. EPA has not provided any justification for going beyond the 99th percentile value in its MACT floor determination for HCl.

4. Determination of a Surrogate SO2 MACT Floor Limit for Existing Pet Coke-Fired EGUs

EPA has proposed the use of SO2 as a de facto surrogate for HCl and other acid gases at pet coke burning EGUs with some sort of flue gas desulfurization system. As discussed elsewhere in these comments, EPA has not provided adequate legal or technical justification for its decision to use SO2 as a surrogate for HCl, HF, HCN, or SeO_2. Those issues aside, below we provide our comments on EPA's assessment of the MACT floor for SO_2.

In determining the SO2 MACT floor, EPA re-ranked the data collected for the ten pet coke-fired EGUs not by HCl emissions but by SO2 emissions. *See* EPA spreadsheet titled "floor_analysis_pet coke_031611.xls." The top ranked pet coke-fired unit in the HCl ranking is AES Deepwater, whereas the top ranked unit in the SO2 ranking is Hanford Unit 1A. AES Deepwater is not even in the top 5 SO2 emitters for the pet coke units that EPA used for its SO2 MACT floor determination. Further, Hanford Unit 1A is only ranked fourth for HCl emissions among pet coke burning units. This re-ranking of the top performing units and the fact that the top units change when ranked for SO2 emissions compared to the ranking for HCl emissions adds to the

[171] *Id.*

argument that SO2 is not likely a good surrogate pollutant for HCl or other acid gas HAPs at pet coke-fired EGUs.

a) EPA's SO2 MACT Floor Determination Does Not Reflect the Actual Emissions of the Top 12% of Pet Coke-Fired EGUs

i) EPA Should Not Apply a 99th Percentile UPL in Setting an SO2 Limit

For its proposed SO2 MACT floor limit pet coke-fired units, EPA took the average of its new ranking of the lowest SO2 emitting units and determined the 99th percentile UPL of that SO2 data. Specifically, EPA calculated the average SO2 emission rate of the lowest SO2 emitting units to be 0.2113 lb/MMBtu and then determined that the 99th percentile UPL of that data was close to double the average emission rate at 0.39862 lb/MMBtu.[172] EPA provided no justification for application of the 99th percentile UPL; there is none.

First, EPA's proposed rule would evaluate compliance with the surrogate SO2 limit based on a 30-day rolling average.[173] Such a long term average adequately accounts for variability in SO2 emissions. The SO2 data used by EPA in ranking the SO2 emission rates of the pet coke-fired EGUs was based on short term average data. Long term averages are typically at the same level or lower than that measured on a short term basis. And they are less variable; had EPA run its UPL formula with 30-day average emissions, it would have inflated the limit by far less (indeed, if EPA wishes to set a limit based on 30-day averages, it must calculate its UPL based on a similar duration of emissions). If EPA is setting the SO2 MACT limit based on short term average testing, the 30-day average compliance time provides all of the flexibility needed to reflect the best performing sources under the

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[172] *See* EPA spreadsheet with filename "floor_analysis_petcoke_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "Summary" worksheet.
[173] *See* 76 Fed.Reg 25029 (May 3, 2011).

worst reasonably foreseeable conditions. Given that all pet coke-fired EGUs are required to measure SO2 with continuous emission monitoring systems (CEMS) under requirements of the Acid Rain Program, a 30-day average SO2 limit will be readily achievable by these sources.

Operators of EGUs routinely use SO2 CEMS data to guide adjustments to the SO2 control equipment. This is especially so when the unit has a strict SO2 limit to meet. For example, if a unit operator sees SO2 emissions spiking, the concentration of lime or limestone in the scrubber slurry can be increased which in turn increases the removal efficacy of the scrubber. Plant operators use such methods on a daily basis.

A long term averaging time provides sufficient flexibility to EGU owners/operators to deal with spikes in SO2 emissions, and thus no adjustments to the SO2 emission rate considered to be reflective of the lowest HCl emitting units is warranted. Further, an SO2 MACT limit that is based on an appropriate subset of the lowest HCl emitting units will ensure that the SO2 controls at each EGU are operated to maximize SO2 removal and also maximize removal of HCl.

ii) EPA's SO2 Emission Rates in Terms of Pounds per Megawatt-Hour Fail to Reflect Energy Efficient EGUs

EPA's proposed existing source MACT standard for SO2 reflects a very poor heat rate and thermal efficiency for new units. Specifically, the proposed 5.0 lb/MW-hr limit reflects an assumed heat rate of 12,543 Btu/kW-hr and a thermal efficiency of 27.2% when compared to EPA's 99th percentile MACT floor value of 0.39862 lb/MMBtu. This is significantly higher than the annual average of the existing coal-fired EGU fleet average heat rate of the coal-fired EGU fleet of 10,400 Btu/kW-hr.[174] Existing pet coke-fired EGUs should be able to operate at much lower heat rates, in line with coal-fired EGUs, i.e.,

[174] *See* Sargent & Lundy Report, Coal-Fired Power Plant Heat Rate Reductions, SL-009597, January 22, 2009, at 1-1 (Ex. 9-1).

closer to 10,500 Btu/kW-hr (approximately 33% thermal efficiency). Based on EPA's floor emission rate of 0.39862 lb/MMBtu, that means EPA's proposed existing source MACT floor limit should not be any higher than 4.185 lb/MW-hr assuming a heat rate of existing pet coke-fired units of 10,500 Btu/kW-hr.

For all of the above reasons, EPA's proposed existing source SO2 surrogate MACT limits of 5.0 lb/MW-hr and 0.40 lb/MMBtu fail to reflect the MACT floor for pet coke-fired EGUs.

b) EPA's Proposed New Source SO2 MACT Surrogate Limit Also Fails to Reflect the MACT Floor

EPA has proposed a new source SO2 MACT limit of 0.40 lb/MW-hr as a surrogate limit for acid gas HAPs if the EGU has some sort of flue gas desulfurization system installed. Similar to the SO2 surrogate limit for existing pet coke-fired EGUs, the EPA's proposed new source SO2 limit fails to reflect the lowest HCl-emitting unit and it also fails to reflect the SO2 emissions of the lowest SO2-emitting pet coke-fired EGU.

The best controlled source for HCl was determined by EPA to be the AES Deepwater EGU, but the best controlled source for SO2 was determined by EPA to be the Hanford Unit 1A EGU.[175] These differing determinations of the best controlled similar source for HCl and SO2 emissions adds to the argument that SO2 is not likely a good surrogate pollutant for HCl or other acid gas HAPs at pet coke-fired EGUs.

The EPA's proposed SO2 MACT limit for new sources of 0.40 lb/MW-hr also has the same flaws described above regarding the existing source SO2 surrogate MACT limit. First, EPA's 99th percentile UPL SO2 rate of 0.36175 lb/MW-hr is higher than the highest SO2 rate measured at the Hanford Unit

[175] *See* EPA spreadsheet with filename "floor_analysis_petcoke_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "Acid_Gas_SO2_New_PC_MW" worksheet and at "Acid_Gas_New_PC_MW" worksheet.

1A EGU of 0.2678 lb/MW-hr.[176] Second, EPA's proposed MACT limit of 0.40 lb/MW-hr is 10% higher than EPA's 99th percentile UPL emission rate, and EPA has not provided any justification for going beyond the 99th percentile UPL emission rate in setting the MACT floor limit. Third, in comparing EPA's proposed SO2 limit of 0.40 lb/MW-hr to its 99th percentile UPL MACT floor emission rate in terms of lb/MMBtu of 0.03755 lb/MMBtu[177] shows that EPA's 0.40 lb/MW-hr limit reflects a poor heat rate for new sources of only 10,652 Btu/kW-hr. New sources should be able to achieve heat rates of 9,000 Btu/kW-hr, meaning a more appropriate new source SO2 emission limit that reflects the EPA's determination of SO2 MACT floor would be 0.0338 lb/MW-hr.

c) If EPA Could Justify Using SO2 as a Surrogate for HF, HCN, or SeO2, It Must Do a Separate Analysis for Each HAP

Sulfur dioxide's relationship to HCl differs (if if exists at all) from its relationship to other acid gases. In order to justify using SO_2 as a surrogate for all acid gases, therefore, EPA would first have to determine the MACT floor dataset for the particular HAP and then determine the appropriate SO2 limit to impose. As we have stated elsewhere in these comments, EPA has provided absolutely no justification to use SO2 as a surrogate for HCN or SeO_2. An initial review of the data collected by EPA indicates some relationship between SO_2 removal and HF removal; however, in order to properly establish an SO_2-based HF limit, EPA would need to truncate its dataset to reflect the lowest HF emitting units (a dataset much smaller than 131 units).

5. EPA Failed to Consider Any Beyond the Floor Technologies in Setting the HCl and SO2 MACT Limits

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[176] *See* EPA spreadsheet with filename "floor_analysis_petcoke_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "Acid_Gas_SO2_New_PC_MW" worksheet.
[177] *Id.* at "Summary" worksheet.

EPA did not evaluate in any meaningful way control technologies or methodologies that would enable units to achieve HCl emission reductions beyond EPA's proposed HCl and SO2 floor emissions rates for pet coke-fired EGUs. EPA's justification apparently was that they could not identify any control technologies that could achieve greater emission reductions of HAP than the control technologies they expected to be used to meet MACT.[178] However, EPA has not adequately demonstrated that there are no beyond the floor control techniques or methodologies that could be implemented to further reduce acid gases to the maximum achievable level.

The Clean Air Act defines how the floor of the MACT emission standard is to be set, but the statute requires EPA to establish lower emission standards, where further reductions are achievable, "taking into consideration the cost of achieving such emission reduction, and any non-air quality health and environmental impacts and energy requirements" under the statutory standard. 42 U.S.C. § 7412(d)(2).

The EPA's new source HCl MACT floor determination for pet coke-fired EGUs is based on the AES Deepwater unit's HCl emissions, and this unit is a conventional boiler with a wet scrubber. This unit also has among the lowest fuel chlorine content of any of the 7 pet coke-fired EGUs tested in EPA's ICR, in some cases two orders of magnitude lower than other pet coke-fired units.[179] While the unit has a wet scrubber that is typically among the most effective in removing HCl emissions, the pet coke chlorine content used at this unit also contributed to its HCl emission rate. This is especially clear given that the wet scrubber appears to only be removing 91% of the HCl emissions at best, based on the data provided regarding chlorine in the coal

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[178] *See* 76 Fed.Reg. 25046 (May 3, 2011).
[179] *See* EPA spreadsheet with filename "floor_analysis_petcoke_31611.xls" (Docket no. EPA-HQ-OAR-2009-0234-3041) at "Acid_Gas_Petcoke_Data" worksheet.

and the minimum HCl emission rate.[180] Yet, there are numerous coal-fired EGUs achieving over 99% HCl removal. Thus, the best performing pet coke-fired EGU determined by EPA does not reflect the maximum degree of HCl emission reduction that can be achieved at these units.

The existing source HCl MACT floor determination also includes units that don't have the top acid gas controls. For example, the Manitowoc and Hanford EGUs in the existing source MACT floor determination are fluidized bed boilers without any add-on SO2/acid gas controls, in comparison to the Northside units which are fluidized bed units and have dry scrubbers. Thus, the existing source MACT floor determination does not reflect the available acid gas controls for pet coke-fired units.

In Section IX.B.3. of these comments, we discuss beyond the floor technologies for acid gas HAPs at coal-fired EGUs. The same technologies and techniques can be applied to pet coke-fired EGUs. We also discuss how EPA already determined than an HCl emission limit of 0.0001 lb/MMBtu is cost effective. We incorporate all of those comments here.

EPA must evaluate beyond the floor technologies for acid gases at pet coke-fired EGUs and ensure that its proposed MACT standards truly reflect the maximum degree of acid gas HAPs emission reduction that is achievable at these units.

D. The Agency's Particulate Matter Standards Exceed the Statutory Standard

1. EPA's Floor Analysis Does Not Reflect the Performance of the Best Performing Sources

EPA has proposed limits on total particulate matter (filterable) in lieu of limits on non-mercury metallic HAP emissions: 0.03 lb/MMBtu for existing coal-fired units, and 0.050 lb/MWh for new coal-fired units. As discussed elsewhere, EPA has not justified use of particulate matter as a surrogate for

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[180] *Id.*

non-mercury metals. Further, the specified PM limits do not reflect the maximum achievable reductions in such pollution.

First, in setting the new floor limit, EPA did not use the unit with the lowest emissions (i.e., the best performing unit), which was the Bonanza Power Plant, Unit 1-1. Instead, citing unspecified data issues, EPA set the floor using the second lowest emitting unit, the Dunkirk Generating Plant, Unit 1. The total particulate emissions from Bonanza were 8.6E-06 lb/MMBtu while the emissions from Dunkirk were 2.82E-03 lb/MMBtu. Absent an explained technical basis for disregarding them, EPA should have been based the new source floor on the Bonanza plant. Further, the data questions which prevented EPA from selecting the Bonanza plant as its best performer did not prevent EPA from retaining the Bonanza emissions in the variability analysis used to set the existing source floor.

Second, in setting the existing source floor, EPA used the top 12% or 131 units based on the total number of plants and not the units for which EPA has data (approximately 245 units). EPA thereby assumed that it had captured, in its data, the entirety of the "best performing" units. Since the best performing set includes units that have both ESPs and fabric filters of various designs, with and without various scrubbers, it is difficult to see how EPA can justify this assumption.

Third, we note that even with the best performing set, the emissions of the 131st unit (Dale Station, Unit 3) is 2.58 E-02 lb/MMBtu, which is approximately 9.1 times the emissions of the second best source (i.e., Dunkirk Unit 1) or close to 3000 times the emissions of the best performing unit (i.e., Bonanza). EPA assumes – without support – that all of this variability is emissions variability. For example, a portion of this variability could be due to different test methods, and other factors unrelated to variability in the plants' actual emissions. Or (as discussed above) the Dale unit is not amongst the best performing sources.

2. EPA Has Not Justified Its Refusal to Set Limits Beyond the Floor

EPA has not justified its failure to require additional "beyond-the-floor" reductions in emissions. Available means of achieving lower particulate matter emissions exist. Baghouses vary in design – notably, as to the choice of fabric used for a filter. As a result, some filters (e.g., Daikin's AMIREX™, PTFE membrane filters,[181] and W.L. Gore's L3650[182]) achieve better control of smaller particles (and thus HAP) than others (e.g., filters using Ryton). *See* summary of U.S. EPA's ETV test results in Ex. 9-56.[183] A bag leak detection system can lower emissions for any filter.

Other technologies that control $PM_{2.5}$ emission are available. For example, a WESP placed after a fabric filter would eliminate significant amounts of $PM_{2.5}$ emissions. Ex. 9-57.[184] *See* Exs. 9-58[185] 9-59,[186] 9-60[187]

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[181] *McIlvaine Hot Topic Hour, Filter Media Selection for Coal-Fired Boilers*, September 13, 2007, Presentation by Todd Brown, Daikin America, Inc. Ex. 9-68. Voice recording available online to subscribers of McIlvaine Power Plant Knowledge System and available for purchase.

[182] USEPA, *ETV Joint Verification Statement, Baghouse Filtration Products*, W.L. Gore & Associates, L3650, Ex. 9-55.

[183] Fabric Filtration Media are certified by the U.S. EPA Environmental Technology Verification Program using the "Generic Verification Protocol for Baghouse Filtration Products" to Achieve 99.99% Removal of PM2.5.

[184] Report of Expert Witness Hal Taylor, *Feasibility of Conducting PM2.5 BACT Analysis for the Highwood Generating Station*, September 2007. *See also* Ex. 9-57 at 9 ("A wet ESP placed after the fabric filter would eliminate up to 99% of the 130 tons of filterable PM2.5 emissions projected in the Highwood facility air permit. In addition, it would eliminate a similar percentage of the 161 tons of condensable PM that this unit will emit"). Notably, the Wet ESP system "has been in successful commercial operation since 1986."

[185] Moretti et al., *Application of Wet Electrostatic Precipitators to Address Fine Particulate Emission Requirements from Fossil-Fueled Combustors*, ICAC 2005. Ex. 9-58.

[186] "*Evaluation of Potential PM2.5 Reductions by Improving Performance of Control Devices: Conclusions and Recommendations*," Prepared for: U.S. Environmental Protection Agency by E.H. Pechan & Associates, Inc., EPA Contract No. 68-D-00-265 at 23 (September 30, 2005) (describing Wet ESP as

EPA's Environmental Test Verification (ETV) program recently verified the performance of the "Advanced Hybrid Particulate Collector" (AHPC) system[188] "as providing the lowest filter outlet concentrations for both $PM_{2.5}$ and total mass concentration."[189] A 2005 report prepared for the EPA listed additional innovative control techniques that yield high $PM_{2.5}$ emissions reductions. Included in the list of controls are: (1) Compact Hybrid Particulate Collector, Ex. 9-59,[190] (2) Indigo Particle Agglomerator, Ex. 9-59,[191] 9-64,[192] 9-65,[193] (3) Wet ESP, Ex. 9-66,[194] and (4) Wet Membrane ESP, Ex. 9-59.[195]

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an "innovative control system" that "yield[s] higher PM2.5 emissions reductions than the methods identified to improve existing control device performance"). Ex. 9-59.

[187] *See also Candidate Stationary and Area Control Measures*, Chicago PM2.5 Workshop, June 21, 2007, Tim Smith, USEPA at slide 15 (recognizing Wet ESP's as "innovative PM2.5 controls"). Ex. 9-60. *See also* CIBO Industrial Emissions Control Technology II Conference, August 2 - 4, 2004 Portland, Maine at 6 (explaining that Wet ESP's are an effective control technology for PM2.5: "There are no moving parts in a wet ESP. The [fine] particles never really reach the electrode and are constantly washed away by the water flow"). Ex. 9-61.

[188] Since its original development, the name of this technology has been changed to "Advanced Hybrid™". The name was trademarked by W.L. Gore and Associates, Inc. "Demonstration of a Full-Scale Retrofit of the Advanced Hybrid Particulate Collector Technology," U.S. Department of Energy (February 2007). Ex. 9-62.

[189] EPA Test Program Verifies Performance of GORE® Filter Laminate (October 2006). Ex. 9-63.

[190] The Compact Hybrid Particulate Collector (COHPAC) is "a pulse jet filter module operated at a very high filtration velocity (air-to-cloth ratio), installed downstream of an ESP. The function of a COHPAC is as a "polishing filter," collecting the particulate (especially fine particulate) that escapes an ESP. A full-scale COHPAC system has been installed at the Gaston power plant near Birmingham, AL (Southern Company, 2004)." Ex. 9-59 at 23.

[191]The Indigo Agglomerator was "developed in Australia to reduce visible emissions from coal fired boilers. The Indigo Agglomerator contains two sections, a bipolar charger followed by a mixing section. The bipolar charger has alternate passages with positive or negative charging. That is, the even passages may be positive and the odd passages negative, or vice versa. This can be contrasted with a conventional coal fired boiler precipitator, which has

Recently constructed units are, through these and other means, achieving substantially lower particulate emissions than those required by standards. The table below lists some of those units, all of which demonstrate that lower emissions are achievable. By failing to explain, in a manner consistent with the statutory standards, why EPA's proposed standards exceed those achievable, lower rates, the Agency has failed to adhere to the statutory standard.

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only negative charging electrodes. Following the charging sections, a mixing process takes place, where the negatively charged particles from a negative passage are mixed with the positively charged particles from a positive passage. The close proximity of particles with opposite charges causes them to electrostatically attaché to each other. These agglomerates enter the precipitator, where they are easily collected due to their larger size." Ex. 9-59 at 23.

[192] Rodney Truce and others, *Reducing PM2.5 Emissions Using the Indigo Agglomerator*, Mega 2006.

[193] *Indigo Agglomerator: Reducing Particulate Emissions & Reducing Opacity, McIlvaine Hot Topic Hour*, November 3, 2006.

[194] *Wheelabrator Air Pollution Control, Inc., PM2.5 Control with Wet Electrostatic Precipitators*, November 2, 2006.

[195] The wet membrane ESP "attempts to avoid problems of water channeling and resulting dry spots than can occur with wet ESPs, and avoiding the higher-cost metals that must be employed to avoid corrosion in a traditional wet ESP. The membranes are made from materials that transport flushing liquid by capillary action effectively removing collected material without spraying (Southern Environmental Corporation, 2004)." Ex. 9-59 at 25.

Permitted Filterable PM/PM10 Emission Limits

Facility	Permit Lb/MMBtu	Reference
Virginia City HEC	0.0090	RBLC VA-0311
Desert Rock[196]	0.010	Permit (7.31.08) Condition H.1.b
Karn Weadock	0.0110	RBLC MI-0389
American Municipal Power	0.0120	RBLC OH-0310
Basin Dry Fork	0.0120	RBLC WY-0064
Deseret Power	0.0120	RBLC UT-0070
Wygen 3	0.0120	RBLC WY-0063
Dallman Power Plant	0.0120	RBLC IL-0107
John W. Turk	0.012	RBLC AR-0094
Norbornne Power Plant	0.012	RBLC MO-0077
Spiritwood Station	0.0150	RBLC ND-0024
Hugo Generating Station	0.0150	RBLC OK-0118

All RBLC data are at www.epa.gov/ttn

E. The Agency Has Not Justified Its Refusal to Set MACT Limits for Organic Air Toxics and Dioxin/Furan

EPA has refused to set MACT limits for any organic hazardous air pollutants, or dioxin or furan, substituting a "work-practice standard" of an annual performance test intended to promote "good combustion."[197] 76 Fed. Reg. 25046. It bases that refusal on the assertion that "the significant majority of the measured emissions from EGUs of dioxin/furan and non-dioxin/furan organic HAP are at or below the MDL [(minimum detection level] of the EPA test methods even though we required 8 hour test runs." *Id.* EPA concludes that the "application of measurement technology to [EGUs] is not practicable due to technological and economic limitations." *Id.*

The Clean Air Act allows EPA to issue work practice standards in lieu of emission standards only where it is not feasible to prescribe or enforce and

[196] Ex. 9-67.

[197] Polycyclic aromatic compounds present particularly acute dangers to public health. *See* Exs. 9-69 through 9-75.

emission standard. 42 U.S.C. § 7412(h)(1). Further, it provides expressly that the term "not feasible to prescribe or enforce an emission standard" refers only to situations where: "(A) a hazardous air pollutant cannot be emitted through a conveyance designed and constructed to emit or capture such a pollutant, or that any requirement for, or use of, such a conveyance would be inconsistent with any Federal, State, or local law, or (B) the application of measurement methodology to a particular class of sources is not practicable due to technological and economic limitations." 42 U.S.C. § 7412(h)(2).

EPA's argument that some test results were below some MDLs does not even speak to the relevant statutory standard. EPA does not claim that it is not practicable to apply measurement technology to EGUs' emissions of dioxins or other organic HAPs, nor could the agency possibly make such a claim. As EPA admits, measurement technology has been applied to EGUs' emissions of dioxins and other organic HAPs, and it has generated significant quantities of emissions test data. For this reason alone, setting work practice standards in lieu of emission standards for dioxins and organic HAPs would be unlawful and arbitrary.

EPA claims that because some of the emission test results fell below the MDLs that happened to be used at some units, "EPA considers it impracticable to reliably measure emissions from these units." 76 Fed. Reg. at 25046. The test under § 112(h), however, is whether "the application of measurement methodology to a particular class of sources is not practicable." EPA does not identify any class of sources to which measurement methodology for dioxins and organic HAPs is not practicable. Nor does the mere fact that some units recorded test results below the particular MDL that a unit chose show that application of measurement methodologies is impracticable even for those same units. Rather, it merely reflects EPA's discretionary decisions not to specify a maximum MDL and to collect data in a way that allowed some sources to return test results with extremely high

MDLs. The measurement methodologies that allowed many other EGUs to use much lower MDLs are applicable to all EGUs.

Further, the record does not indicate that EGUs consistently emit all organic HAP at levels below any MDLs. EPA indicates only that in "several cases . . . all of the data for a given run were below the detection limit," and in "few cases were the data for a given run all above the detection level." *Id.* at 25040. Emissions of certain organic HAP were, however, significantly above detection limits. For example, in the case of formaldehyde, of the 150 tests available, 101 were detected above each test's detection limit. It cannot therefore be impracticable to set a floor limit for formaldehyde. And for a significant number of units – providing nearly a third of the test runs – *all* dioxin/furan congeners were above the minimum detection limit. *Id.* Significantly, § 112(d)(3) directs EPA to base floors on the emission limitation achieved by the best performing sources "for which the Administrator has emissions information." 42 U.S.C. § 7412(d)(3)(A). Assuming *arguendo* that test results that fall below a particular source's MDL are not usable for the purposes of standard-setting, EPA must base floors on the sources for which the Administrator does have usable emissions data. EPA does not and cannot dispute that it has significant quantities of emissions information for both dioxins and organic HAPs that do not reflect tests results below MDLs. As the Agency has acknowledged, where "emissions can be precisely measured for at least some units in [a] subcategory . . . the statutory test for establishment of work practice standards – i.e., that measurement of emissions is impracticable due to technological and economic limitations – is not met." 76 Fed. Reg. 15608, 15640 (March 21, 2011).[198]

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[198] EPA explains the inconsistency between its decision here and in previous decisions by noting previous standards shorter sampling times, and units emitting greater quantities of HAP. Neither affects the Agency's primary rationale: whether measurement can be described as impracticable, where some (but not all) units in the category have emissions below a minimum detection limit.

Moreover, even the possibility that some plants might always record emission levels below their particular MDLs is irrelevant. It does not show that application of the measurement methodology is impracticable, but rather, merely that they have low emission levels, high MDLs, or both. And emissions below the "method detection level" can be practicably measured. As the Agency has acknowledged, its tests are designed to provide "only about a 1 percent probability of an error in deciding that the pollutant measured at [or below] the MDL is present when in fact it is absent." 76 Fed. Reg. at 25044. While there may be some imprecision associated with monitoring emissions at levels near the detection level, *see* 76 Fed. Reg. at 25,046 ("the expected measurement imprecision for an emissions value at or near the MDL is about 40 to 50 percent")[199], that imprecision can be addressed by further statistical manipulations, *cf.,* 76 Fed. Reg. 25044 (seeking comment on statistical methods to address measurement imprecision), adjusting the limit (e.g., with a safety factor) that accommodates any uncertainty (e.g., 50% above the detection level), or establishing monitoring protocols that reduce the uncertainty to acceptable level. As we have discussed earlier, we cannot find any support for EPA's alternate triple-MDL floor in the ASME ReMAP report upon which EPA relies.

EPA also attempts to claim that setting emission standards would be economically infeasible by arguing that "[b]ecause the levels of organic HAP emissions from EGUs are so low (at or below the MDL of the available test methods), there is no indication that expending the additional cost (*i.e.*, extending the sampling time) would provide the regulated community the ability to test for these HAP that would provide reliable technically viable results." 76 Fed. Reg. at 25046. EPA provides no basis to believe that plants could not apply measurement methodologies without extending the sampling

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[199] As noted above, the record does not support this assertion. *See* pps. 8-15 and 8-16.

time – and thus without "additional cost." Sample times are only one component in the determination of method detection limits and, indeed, a minor one. But assuming that some additional cost might be incurred, EPA does provides no basis to assume that it would render measurement methodologies economically impracticable.

Finally, even if § 112(h) authorized EPA to set work practice standards in lieu of emission standards for EGUs' emissions of dioxins and organic HAPs – which it does not – the work practice standards EPA has proposed would contravene § 112(h)(1), which provides that such standards must be "consistent with the provisions of subsection (d) or (f) of this section." 42 U.S.C. § 7412(h)(1). To be consistent with subsection (d), any work practice standards for EGU would have to reflect measures that yield the maximum achievable degree of reduction in these pollutants and that at a minimum reflect the measures adopted by the EGUs with the lowest emission levels of dioxins and organic HAPs. EPA's proposal does not purport to satisfy this requirement and is untenable in light of record evidence that EGUs can and do achieve reductions in dioxins through the use of activated carbon injection and reductions in other organic HAPs through the use of selective catalytic reduction systems. If EPA were to set work practice standards, it would have to require the use of these technologies at a minimum.

X. MONITORING AND AVERAGING

A. EPA Should Strengthen Its Monitoring Requirements

1. Continuous Emission Monitoring Systems Should Be Uniformaly Required

The compliance provisions, as drafted, allow monitoring by either continuous emission monitoring systems ("CEMS") or periodic testing of emissions and/or fuel, along with operational monitoring. The latter periodic approach is very complex, including a large and confusing array of options that may prove difficult to enforce. More importantly, the prescribed periodic testing is unlikely to result in continuous compliance; it does not require continuous testing of the subject HAPs, whose emissions are highly variable, even when the operating parameters monitored as surrogates by EPA remain steady. Typically, only monthly or every other month emission testing is required, coupled with monitoring of operating parameters and an annual or every five year checkup to confirm relationships between HAP emission, surrogates, and operating parameters.

The frequency of testing should depend upon the variability of each parameter. When a parameter is variable, more frequent monitoring is required to assure continuous compliance; as a rule, where a parameter fluctuates significantly over a period of time shorter than the specified monitoring interval, the monitoring cannot assure continuous compliance.

EPA's proposed limits are heavily premised upon the claim that the regulated emissions are very highly variable – this is, in essence, the justification for the Agency's use of extraordinarily aggressive statistical adjustments. EPA's calculations predict emissions from existing sources which range from 2 to 56 times greater than the average data yielded from a test. For new sources, EPA's calculations predict emissions from 2 to 6 times greater than the average. *See* Table X-1, below. And according to EPA's

beyond-the-floor analysis (or lack thereof) there are no operational methods available to reduce that variability. Given the unavoidable variation, continuous compliance cannot be determined using the periodic testing proposed in the rule. If emissions vary by a factor of 2 to 50 (or more), and there is no method available to reduce that variability, direct measurement of emissions every month (or every other month) with annual to every five year re-tests, will not ensure continuous compliance between those tests.[1]

The monitoring of operational parameters as proposed under some scenarios does not assure continuous compliance with emissions limits that are only measure annually or every five years. The amount of each HAP that is emitted ultimately depends on the amount in the coal, which is not tested more frequently than monthly (or upon a change of fuel type) under any of the compliance scenarios. The HAP content of fuel is highly variable even within fuel types.[2]

Stack emissions should be directly monitored continuously to assure continuous compliance. Continuous emission monitoring systems directly measure stack emissions and exist for all of the regulated HAPs as well as most of the surrogates. There is, accordingly, no reason to depart from CEMS-based monitoring. All of the direct metal HAP parameters can be

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[1] If, on the other hand, operational constraints can reduce emissions variability, EPA has erred by failing to include such operational methods in a beyond-the-floor analysis.

[2] G.D. Stricker and M.S. Ellis, Coal Quality and Geochemistry, Powder River Basin, Wyoming and Montana, U.S. Geological Survey Professional Paper 1625-A, 1999, available online at http://pubs.usgs.gov/pp/p1625a/; Harold J. Gluskoter and O.W. Rees, Chlorine in Illinois Coal, Illinois State Geological Survey, Circular 372, 1964 (Attachment X-1); David A. Tilman and others, Chlorine in Solid Fuels Fired in Pulverized Coal Boilers – Sources, Forms, Reactions and Consequences: A Literature Review, Fuel Quality Conference, September 28 - October 3, 2008 (Attachment X-2).

monitored by CEMS. The Xact CEMS[3] measures all subject non-Hg metallic HAPs including Sb, As, Be, Cd, Cr, Co, Pb, Mn, Ni, and Se using reel-to-reel filter tape sampling and nondestructive x-ray fluorescence (XRF) analysis. Vapor phase and particulate metals are deposited on the tape and measured continuously. The Xact 640 CEMS, available from Pall Corp., was the first multi-metal CEMS verified through the EPA ETV program.[4] The EPA has approved the Xact 640 CEMS as an alternative method for periodic Method 29 testing (required in the draft EGU MACT regulation) for hazardous waste incinerators.

Total PM, comprising the sum of filterable PM (Method 5) and condensable PM (Method 202), is proposed as a surrogate for non-Hg metal HAPs. As discussed above, we believe that total PM is not an appropriate surrogate for non-Hg metal HAPs – especially since the individual HAPs can be accurately measured by CEMS. However, if EPA retains total PM as a surrogate, a PM CEMS should be required, not optional, to determine compliance. PM CEMS have been required in Consent Decrees and PSD permits to determine compliance, and are in wide use at EGUs.

For SO2 and HCl, EPA's proposal endorses both SO2 and HCl CEMS as methods to determine compliance. We support the use of SO2 and HCl CEMS and believe they should be required, rather than presented as an

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[3] Single Sample Producing Multi Element Measurements (Attachment 11-), available at: http://cooperenvironmental.com/wp-content/uploads/2010/01/Technical-Spotlight-1.pdf.

[4] Xact 640 Monitoring System - Multi-Metal Continuous Emissions Monitoring System, available at: http://www.pall.com/industrialmaterials_54712.asp; EPA, Environmental Technology Verification Report, Cooper Environmental Services XCEM Multi-Metals Continuous Emission Monitor, May 2002, available at: http://www.epa.gov/etv/pubs/02_vr_cooper_xmcem.pdf.

option. HCl CEMS are available, and have been demonstrated to be accurate at the levels required to monitor compliance with the prescribed limits. Exs. 11-a & b.

2. The Standard And Compliance Averaging Times Should Be Consistent

The proposed MACT emission limits were estimated from 1-hour test data by adjusting average concentrations using a 99% upper prediction limit (UPL), rounding up, and otherwise significantly increased – nominally to address HAP emission variability.

The manipulations used to estimate the MACT standards – a 99% UPL, rounding, and miscellaneous other adjustments – result in MACT standards for existing sources that range from 2 to 56 times greater than the average of the same data, and for new sources from 2 to 6 times greater than the average. *See* Table X-1, below. EPA proposes compliance be measured by a straightforward average of three tests, for all parameters not measured by CEMS.

As an initial matter, by comparing *average* emissions of any sort with a standard based upon an 99% Upper Prediction Limit (UPL), EPA departs from the statutory requirement: ensuring that air toxics emissions are no higher than those of the best performing source sources. The 99% UPL is designed to assure that all future measurements fall below the predicted value, with 99% confidence. In other words, the UPL estimates what future values will be, based on present and past values, providing a number higher than future measurements (with a high degree of certainty). EPA's Upper Prediction Limit thus aims at a number that *exceeds* the actual emissions of the best-performing plants from which it is calculated. Any exceedance of the UPL represents pollution in excess of that of those best performing plants.. EPA should not, therefore, permit owners to compare *average* emissions with a standard based upon the UPL; *all* emissions must remain below the UPL,

in order for EPA's standards to remain consistent with the statutory standard.

Table X-1
Ratio of the Proposed Standard for Existing and New Units to the Average of Measured Values

	EXISTING UNITS Ratio of Standard to Average	NEW UNITS Ratio of Standard to Average
Acid Gases		
HCl	9.1	2.3
HF	4.7	2.9
SO_2	2.7	5.6
Non-Hg Metal HAPS		
PM total	2.3	4.6
Metal total	2.7	1.4
Antimony (Sb)	2.9	5.2
Arsenic (As)	4.9	1.6
Beryllium (Be)	4.1	2.9
Cadmium (Cd)	3.0	5.0
Chromium (Cr)	2.3	4.8
Cobalt (Co)	2.8	5.2
Lead (Pb)	3.7	3.1
Manganese (Mn)	3.0	1.5
Nickel (Ni)	2.8	2.9
Selenium (Se)	3.4	2.3
Mercury		
Mercury - All coal	56.5	3.5
Mercury - Coal > 8,300 Btu/lb	56.5	3.5
Mercury - Coal < 8,300 Btu/lb	9.9	3.2
Mercury - ACI	37.9	2.4

Further, fidelity to the statute requires compliance to be measured according to the same basic form and averaging convention whose variability EPA assessed to establish the underlying standard. The variability of

emissions measured over one hour is higher than variability of emissions over thirty operating days. In other words, the worst-case emissions over one hour are higher than the worst-case emissions over a longer period; a standard measured over a thirty-operating-day average, accordingly, cannot be based on worst-case one-hour emissions, without permitting emissions in excess of even the worst-case emissions of the best-performing sources.

The proposed compliance provisions essentially account for variability multiple times – through EPA's statistical manipulations, the use of long averaging times, and the use of boiler operating days – resulting in standards that fail to ensure that EGUs' air toxics emissions are no higher than those of the best performing source or sources. *See* 42 U.S.C. § 7412(d). The EPA proposes to measure compliance using a 30-day rolling average based on a boiler operating day for Hg, SO2, and HCl when measured by CEMS. 76 Fed. Reg. at 25,031. A 30-day rolling average based on boiler operating day dampens out the variability assumed in standard development. For other parameters, the average of three tests is proposed to determine compliance – absent rounding, or any other of the manipulations EPA applies to the test data used to calculate its standards. The result is a standard which permits emissions well in excess of that of the best-performing sources.

3. No Compliance Monitoring Is Required During Startups, Shutdowns, and Malfunctions

Sources must comply with emission standards at all times, including start-up, shut-down and malfunction. *Sierra Club v. EPA*, 551 F.3d 1019 (D.C. Cir. 2008). The monitoring provisions do not require any testing during periods of startup, shutdown, and malfunction and thus provide no means to determine if the standards are met during these periods.

EPA's proposal states that the standards apply at all times and that startups and shutdowns are accounted for by requiring the use of "a default

diluent value of 10.0 percent O2 or the corresponding fuel specific CO2 concentration for calculating emissions in units of lb/MMBtu or lb/TBtu during startup or shutdown periods." 76 Fed. Reg. 25,028. This does not assure continuous compliance during these periods.

First, EPA's proposal does not define startup, shutdown, or malfunction. Second, the Proposal does not require any testing during these periods. So even assuming the diluent requirement would address SSM, it would never have to be used as no SSM testing is required. Third, the Proposal does not explain how the use of a default diluent value would account for periods of SSM , even if testing occurs. Fourth, the Proposal does not explain how these diluent values were selected, nor why EPA believes they address SSM. Fifth, during these events organic HAP emissions are known to increase for short periods due to low boiler combustion temperatures, poor mixing, and low excess oxygen levels. The Proposal is silent as to how an annual tuneup would assure organic HAP emissions remain controlled during these periods.[5]

4. The Agency Should Discard its "Low Emitting Units" Monitoring Protocols.

The proposed rule defines as "a low emitting" EGU (LEE), a unit whose performance test data is less than 50% of the appropriate emission limit for non-mercury HAP, and less than 10% of the mercury limit (or less than 22.0 lb/yr to qualify). 40 C.F.R. § 63.10005(k). Because EPA's standards are based upon a 99% UPL – that is, a level that exceeds the tested emissions of the plants in EPA's dataset – a majority of plants should be able to generate test data sufficient to claim such "low emitting" status. As

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[5] The section of the proposed regulation that includes the default diluent language appears to be in a mis-numbered section of the proposed regulation. It is found at FR 25106 in Sec. 63.10005(k), Low Emitting EGUs, in the second numbered paragraph (1). This appears to be a location error. It is not obvious where this paragraph should be located.

summarized in Table X-1, EPA's proposed MACT standards exceed the tested emissions of the plants for which EPA has data by the ratio greater than 2 for all non-mercury HAPs (i.e., the tested emissions are below 50% of the standard), and greater than 10 for mercury (i.e., tested emissions are less than 10% of the standard). As a result, almost all existing and new units will likely be able to exempt themselves as LEEs; in combination, EPA's variability adjustments and LEE exemption allow most units to avoid any significant monitoring of emissions.

The unavoidable variability claimed by EPA, moreover, indicates that plant emissions range as much as 50 times higher than the results of a three-run test. As a result a plant with test data at 50% of the proposed standard will likely – indeed, almost certainly – exceed the prescribed limit during its operations. Yet the only compliance monitoring required for an LEE is an initial performance test, and subsequent check-up performance tests every 5 years, coupled with monthly fuel sampling. That monitoring provides no assurance of continuous low-HAP emissions. Fuel sampling would reveal no information about HCN, which is a byproduct of combustion and cannot be inferred from fuel sampling. Further, fuel sampling would disclose no information about HAPs that did not originate in the fuel. Additives, such as PVC, are sometimes blended with the fuel to facilitate mercury control. Metals are present in the reagents (limestone, lime) and water used in scrubbers. Metals are also released from the boiler, duct work, and control systems. These would not be detected by fuel sampling.

Monthly fuel testing does not assure continuous compliance. As explained above, EPA's variability analysis indicates HAP emissions are variable. Monthly testing does not reveal any information about emissions between the monthly tests. The LEE monitoring should be expanded to require operational parameter monitoring as required for all other compliance testing. Further, monthly fuel sampling further excludes emissions during startup and shutdown.

The LEE exemption should be eliminated, or the threshold re-defined to capture only those plants whose future emissions are assured to remain below the prescribed limits.[6]

5. EPA Should Strengthen its Monitoring of Acid Gas Emissions.

The compliance provisions for acid gases include periodic performance testing in which the surrogate, regulated pollutants, and operating parameters are monitored for three cases: (1) no CEMS and no SO2 controls; (2) no CEMS and SO2 controls; and (3) CEMS and SO2 controls. However, no periodic performance testing and operating parameter monitoring are specified for units that use CEMS but have no controls – an entirely possible scenario, given EPA's proposed limits.

6. EPA Should Strengthen Its Monitoring for Non-Mercury Metals.

The compliance provisions specify periodic performance testing in which the surrogate, regulated pollutants, and operating parameters are monitored for two cases: (1) no PM CEMS with PM controls and (2) no PM CEMS with no PM controls. However, if a PM CEMS is used, regardless of whether the units is equipped with PM controls, no operational or non-Hg metal HAP monitoring is required except during an every 5-year performance test. This is inadequate to determine continuous compliance. Further, it does not provide any testing for metals present as gases or condensables. Thus, HAPs such as selenium, which EPA admits is frequently present in the gases, would not be measured either directly with Method 29 or indirectly through a surrogate when PM CEMS is used to determine compliance. Finally, initial performance compliance provisions are missing from Table 5 for PM CEMS.

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[6] If EPA were to provide reduced monitoring for certain low-emitting units, it should use an Upper Prediction Limit for its thresholds. If data from a unit indicates that the 99% UPL of that units' emissions are below 10% of the MACT limit, EPA can be reasonably assured that that unit's future emissions will be below that threshold.

7. EPA Should Strengthen Its Compliance Requirements for Organic HAP.

The proposed regulation does not set a specific emission limit for any organic HAP, nor does it require any chemical specific compliance testing. Rather, it sets a work practice standard of an annual boiler tune-up, which can be conducted at intervals of up to 18 months to accommodate routine maintenance shutdowns. 76 Fed. Reg.25,046.

A boiler tune-up is not adequate to assure continuous minimization of organic HAP. The work practice standard assumes that all organic HAPs are created by incomplete combustion. This assumption is incorrect, as discussed elsewhere in these comments – especially for dioxins which are formed after the combustion process and whose emission rate depends in part of coal chlorine content. However, setting aside this issue, and assuming arguendo that organic HAPs originate from incomplete combustion, an annual boiler tune-up is not adequate. The work practice standard should require that all subject EGUs install real-time software to continuously optimize boiler combustion and soot cleaning. These systems continuously monitor the combustion process to determine the optimal balance of fuel and air flows in the furnace to position dampers, burner tilts, overfire air and other controllable parameters at their optimal setting. These systems are already in widespread use throughout the utility industry and have the added benefit of improving efficiency, thus reducing operating costs.[7]

B. EPA Should Not Permit Units to Average Emissions.

EPA proposes "that owners and operators of existing affected sources may demonstrate compliance by emissions averaging for units at the affected

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[7] *See, e.g.*, Rob James and Peter Spinney, Boiler Optimization and SCR Systems: Reducing NOx, Managing Tradeoffs, Power Engineering, July 2008, pp. 102 – 108 (Attachment X-3).

source that are within a single subcategory," so that units would be allowed to "emit[] above the proposed emission limit" so long as "other affected units at the same facility . . . are emitting below the proposed emission limit." 76 Fed. Reg. at 25,053. Such averaging is contrary to the Act, and the central principles underlying Section 112.

The proposed averaging would allow some coal- and oil-fired units to emit HAP in excess of the promulgated standards (so long as a neighboring unit operates below the standards) – a result prohibited by Section 112. Section 112 states that "[a]fter the effective date of any emissions standard . . . promulgated under this section and applicable to a source, no person may operate such source in violation of such standard" unless the Agency provides a more lengthy compliance schedule. 42 U.S.C.§ 7412(i)(3). *See also* 42 U.S.C. 7412(i)(1) (no person may construct "any" new source that does not meet standard). Section 112 incorporates Section 111's definition of "stationary source," as "*any* building, structure, facility, or installation which emits or may emit any air pollutant." Each coal- or oil-fired unit is, under that definition, a "stationary source"; and each coal- or oil-fired unit must, accordingly, satisfy the promulgated standards.

The Agency's discretion to construe the word "source" under the Act is constrained by the congressional policies underlying Section 112. *Chevron, U.S.A. v. Natural Resources Def. Council,* 467 U.S. 837, 866 (1984). Congress intended, in Section 112, to ensure the maximum reduction of hazardous air pollution. To that end, it constrained the Agency's ability to balance pollution-reduction with economic considerations. *See* 42 U.S.C. § 7412(d). Especially where – as here – the Agency has set most standards at the statutory minimum, Section 112 does not allow the agency to permit additional pollution in order to ease compliance. *See* 40 C.F.R. § 63.41 (sources may not average emissions to avoid compliance with Section 112 standards).

If EPA disregards the language and purpose of Section 112, and permits averaging, it should add a "discount factor" requiring lower emissions from plants which comply by averaging the emissions of multiple units. *See* 76 Fed. Reg. at 25,053 (discussing use of such discounting provision). The Agency's standards, as discussed elsewhere, have been aggressively inflated – purportedly to address variability in emissions. The Agency's variability analysis is based on emissions from three test runs from a single boiler, operating over a two (mercury and PM) or three (acid gases) hour period.[8] By allowing averaging, EPA is effectively allowing compliance to be measured based upon a far larger number of test runs, and operating hours – over which there will be far less variability. It thereby allows sources to emit hazardous pollution well in excess of the actual emissions of the best performing similar plant or plants (as EPA has defined those "actual emissions").

EPA should, as a general matter, establish standards that are consistent in their form with those the Agency uses when it assesses variability; its standards will not otherwise reflect the performance of the best source or sources. In this instance, if EPA allows units to combine their emissions for purposes of compliance, it should re-calculate the variability associated with multiple-unit emissions, and establish a corresponding "discount" in the standards for multiple units.

For example, for existing sources burning coal of greater than 8300 Btu/lb, EPA has calculated its UPL based on emissions from a single coal-fired unit at 1.18lb/Tbtu. For two units' emissions, EPA's UPL formula yields a lower floor: 0.85 lb/Tbtu. For three units, the UPL is .71 lb/Tbtu. For the category as a whole, the reduced variability of multiple units' average emissions results (by our calculation) in the following predicted emissions:

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[8] EPA's UPL formula includes amongst its variables the number of units used to calculate the average, as well as the number of runs. 76 Fed. Reg. at 25,042.

Table X-2

Effect of Multiple Units on 99 UPL - Existing Units for Coal>8300 Btu/lb Subcategory						
	Pollutant					
# Units	Mercury		PM		HCl	
	Value	Units	Value	Units	Value	Units
1	1.18	lb/TBtu	0.0264	lb/MMBtu	0.00125	lb/MMBtu
2	0.85	lb/TBtu	0.0221	lb/MMBtu	0.00095	lb/MMBtu
3	0.71	lb/TBtu	0.0202	lb/MMBtu	0.00082	lb/MMBtu

Note: Does not include rounding or the 3xMDL methodology that EPA has used in determining floors.

At a minimum, if EPA chooses to allow units to comply with average emissions, it should apply thusly reduced limits to such units, to reflect the reduced variability in multiple units' average emissions. The Agency's limits cannot otherwise be plausibly described as reflecting the actual emissions of the best performing sources.

The Agency should, moreover, make clear that emissions from units that are shut-down or otherwise non-operational cannot be used to permit adjacent units to exceed MACT standards. As a practical matter, averaging with non-operational units would allow emissions vastly exceeding the proposed standards. And as a legal matter, units that are not operating cannot be properly described as "sources" for purposes of Section 112. *See* 42 U.S.C. § 7411(a)(3) (sources are those which emit air pollutants). Finally, if the Agency retains its "Low Emitting EGU" provisions, units utilizing that relaxed compliance mechanism should not be allowed to average their emissions. The relaxed monitoring associated with such units would render it impossible to ensure continuous compliance, were compliance permitted on an average basis. Nor should LEE units be allowed to average emissions with other units; doing so would effectively permit averaging between units subject to different standards, and destroy the homogeneity which the Agency recognizes as a minimum prerequisite to averaging between units. 76 Fed. Reg. at 25,053.

XI: THE RULE MUST DEFINE AS "NEW SOURCES" ALL SOURCES WHICH COMMENCED CONSTRUCTION AFTER JANUARY 30, 2004

The Act defines a "new source" to include any "stationary source the construction or reconstruction of which is commenced after the Administrator *first proposes* regulations under this section establishing an emission standard applicable to such source." 42 U.S.C § 7412(a)(4) (emphasis added). The Agency first proposed emission standards applicable to oil- and coal-fired electric generating units on January 30, 2004. 69 Fed. Reg. 4,652 (January 30, 2004). All coal- and oil-fired power plants that commenced construction or reconstruction after that date, consequently, are "new sources" under Section 112, and the rule should define them as such.

The clear text of the statute requires that result. The Agency's withdrawal of the standards proposed in 2004 is irrelevant; the statute specifies *proposal* of standards as sufficient to bring subsequently constructed sources within the ambit of the "new source" definition. And likewise, the Agency's subsequent proposal of different emissions standards is irrelevant; the statute expressly provides the *first* proposal as point dividing new from existing sources.[1] That command cannot be reasonably understood to allow the Agency to move that point to the second (or third, or fourth) proposal.

The statutory definition, especially in light of the strict deadlines by which the Act requires EPA to establish effective standards, reflects Congress' intent to ensure maximal reductions in air toxics. It further reflects Congress' desire to prevent industry from relying on administrative lobbying and judicial challenges to delay installation of pollution controls, or to secure weaker restrictions on their hazardous air pollution. And finally, the Act

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[1] Indeed, EPA's effort to replace its section 112 standards with standards under section 111 is a legal nullity that has no effect at all. "When a court vacates an agency's rules, the vacatur restores the status quo before the invalid rule took effect. . . ." *Envtl. Def. v. Leavitt*, 329 F. Supp. 2d 55, 64 (D.D.C. 2004) (citing *Indep. U.S. Tanker Owners Comm. v. Dole*, 809 F.2d 847, 854 (D.C. Dir. 1987)).

discourages manipulation of construction schedules in a similar pursuit of lesser restrictions.

The sources encompassed by the statutory definition of new sources face no unfair burden. Section 112(i)(2) allows such sources to delay compliance with the new source standards for up to three years, if the source meets the standards as initially proposed. 42 U.S.C. § 7412(i)(2). Most such sources should already have MACT limits meeting the same substantive criteria by which EPA is devising these nation-wide standards, 42 U.S.C. § 7412(g)(2)(B); accordingly, the main pollution-control equipment required under the rule should be in place.[2] To the extent that plants with final and effective MACT limits procured to comply with section 112(g) require additional time to comply with the new-source standards, EPA's regulations allow EPA or other permitting authorities to delay compliance for up to 8 years from the promulgation of final standards. 40 C.F.R. § 63.44(b)(1). That delay should be more than adequate for such plants to undertake any necessary further modifications.

To our knowledge, only 37 coal-fired plants commenced construction after January 2004 (we have identified 3 oil-fired units built during the same period). *See* Ex. 11-1. If any of those plants emit significant quantities of hazardous air pollutants, they should have procured case-by-case MACT limits pursuant to Section 112(g)(2)(B), 42 U.S.C. § 7412(g)(2)(B), and should therefore be capable of meeting new-source standards. As a practical matter, none of the plants constructed since 2004 should have any significant difficulty meeting either the proposed or final new source standards. Seven coal-fired plants have not begun any physical, on-site construction (the American Falls plant in Idaho, the Decatur plant in Illinois, the Fuel

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[2] The only plants which commenced construction after January 2004, but nevertheless lack case-by-case MACT limits, are either: in violation of the Act, *Sierra Club v. Sandy Creek Energy Assocs.,* 627 F.3d 134 (5th Cir. 2010); or relying on exceedingly dubious claims to minor status, *see* Chapter V, above.

Frontiers plant in Kentucky, the Lake Charles Plant in Louisiana, the Kemper Plant in Mississippi, the Wellington Plant in Pennsylvania, and the Brazoria Plant in Texas). Another is less than three-quarters complete (the Turk plant, in Arkansas).

All of the plants scheduled to begin operation within the next year (or which have commenced operation) should already have the pollution-control equipment in place to meet the proposed or final new-source standards. All non-gasification units constructed since the Agency first proposed air-toxics standards for power plants are equipped with flue-gas desulfurization devices (scrubbers) and fabric filters, which are likely capable of meeting the proposed HCl and PM limits, and may well suffice to meet the proposed mercury limit. More than two thirds of new units have also installed activated carbon injection, ensuring their ability to meet the new-source mercury standard. All of the plants should be capable of meeting the new-source limits when they become effective, or (at a minimum) the proposed limits (allowing up to three additional years for those plants to install any necessary additional equipment).

XII. New Source Performance Standards

A. Introduction

EPA also proposes revised section 111(b) New Source Performance Standards ("NSPS") for SO2, NOx, and PM emissions. The new source standards, which are output- or alternatively percent reduction-based, are an improvement over the standards they replace, but are at best disappointing in several respects, and unlawful in others. Rather than engaging in a serious review of the levels of control reflecting the "best" demonstrated systems of emissions reduction, or looking forward to what might be achieved over the 8-year regulated period with the application of new strategies, EPA proposes standards based on emissions levels that are achieved already by many sources in the existing fleet, using controls that in many instances have been available for over a decade. While EPA's record includes information about emerging control options, including some multi-pollutant technologies that reportedly offer the potential for significant controls not only of SO2, NOx, and PM, but also of carbon dioxide,[1] EPA does not exercise its authority to set standards that create incentives for the use of such technologies, but rather impermissibly looks to what is routinely achieved in practice as the basis for its *new* source standard.

In addition to proposing less protective standards than the Act and court precedents support, and that are less technology-forcing than Congress intended, EPA also offers up a suite of unlawful provisions further weakening the standards, including "exemptions" from the NSPS for "commercial demonstration permits" and

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[1] *See* U.S.EPA, OAQPS, Memorandum to EGU NSPS Docket, "Control of Total PM Emissions" (Mar. 2011), Docket ID EPA-HQ-OAR-2011-0044-0003-1 ("Total PM TSD"); U.S.EPA, OAQPS, Memorandum to EGU NSPS Docket, "Control of SO2 Emissions" (Mar. 2011), Docket ID EPA-HQ-OAR-2011-0044-0004-1 ("Total SO2 TSD"); U.S.EPA, OAQPS, Memorandum to EGU NSPS Docket, "Control of NOx Emissions" (Mar. 2011), Docket ID EPA-HQ-OAR-2011-0044-0005-1 ("NOx TSD"); U.S.EPA, OAQPS, Memorandum to EGU NSPS Docket, "Multi-pollutant Control Technologies" (Mar. 2011), Docket ID EPA-HQ-OAR-2011-0044-0006-1 ("Multi-pollutant TSD").

units burning coal refuse, and also less stringent 'modified source' standards intended to preserve the use of a specific technology. These unlawful exemptions must not be finalized as proposed. EPA must shore up and tighten its new source standards in the final rule, so that they truly reflect the application of the "best" systems of emissions reduction, including emerging technologies, and so the final standards actually have the effect of stimulating "the innovative character of industry in reaching for more effective, less costly systems to control air pollution." *Sierra Club v. Costle*, 657 F.2d 298, 347 n.174 (D.C. Cir. 1981).

B. Congress Intended NSPS to be Forward-Looking and Technology-Forcing, Not Based on Emissions Levels Readily Achieved By Existing Sources

Clean Air Act section 111 requires EPA to establish, and at least every 8 years review and revise as appropriate, new source standards of performance in listed industries "reflect[ing] the degree of emission limitation achievable through the application of the best system of emission reduction which (taking into account the cost of achieving such reduction and any nonair quality health and environmental impact and energy requirements) the Administrator determines has been adequately demonstrated." 42 U.S.C. §§7411(a)(1); (b). It is the system of emission reduction (also called the "best demonstrated technology" or "BDT") that must be adequately demonstrated, and the standard achievable. *National Asphalt Pavement Ass'n, v. Train,* 539 F.2d 775, 785-86 (D.C. Cir. 1976). "Adequately demonstrated" however does not mean that existing plants must be capable of meeting the new source standard; on the contrary, section 111 looks toward the capabilities of future technology, not the state of the art at present. *Id.*; *see also Portland Cement Ass'n v. Ruckelshaus*, 486 F.2d 375, 391 (D.C. Cir. 1973) (finding that the 1970 Senate Report made clear that NSPS are not to be based on technologies in routine use: "section 111(b) looks toward what may fairly be projected for the regulated future, rather than the state of the art at present, since it is addressed to standards for new plants."). An "achievable standard" does not necessarily mean an emission limit that is "routinely achieved in practice" prior to

the adoption of the standard, but rather means an emissions rate within the realm of the adequately demonstrated systems' efficiency, not set at a theoretical level. *Id.*

Because NSPS apply to *new* sources, and must reflect application of the *best* demonstrated system of reduction, they need not be achievable for all types of existing sources in the listed category. *Portland Cement Ass'n*, 486 F.2d at 391. Moreover, by using the expansive term "system of emission reduction" and providing that NSPS must be based on the "best" system that is "adequately demonstrated," Congress in section 111(a) made clear that EPA must evaluate all "adequately demonstrated" systems to determine which is "best" – not merely list the options and then set the standards on some other basis. See 42 U.S.C. §7411(a)(1). Nor can EPA avoid setting limits reflecting the best demonstrated system merely because some sources may choose a different control method to meet the standard. *ASARCO v. EPA*, 578 F.2d 319, 322 (D.C. Cir. 1978).

In short, section 111 is meant to be technology-forcing – one of the enumerated purposes of the provisions was to "create incentives for technology to stimulate and augment the innovative character of industry in reaching for more effective, less costly systems to control air pollution."[2] *Sierra Club*, 657 F.2d. at 347 n.174; *see also ASARCO*, 578 F.2d at 322 & n.6 ("[NSPS] are designed to force new sources to employ the best demonstrated systems of emission reduction;" the language of § 111(a) evinces Congressional "commitment to requiring the best technology."). Towards that end, a new source standard can be fuel neutral and set on an output basis, and furthermore an "achievable standard" can be one that is based on extrapolations of technology performance on facilities in other countries or in other industries. *Lignite Energy Council v. EPA*, 198 F.3d 930, 933-934 & n. 3 (D.C. Cir. 1999). While the language of section 111(a) clearly authorizes EPA to

[2] *See also* Sen. Rep. No. 91-1196, at 16, 91st Cong. 2d Sess., (1970); H.Rep. No. 91-1146, at 10, 91st Cong.2d Sess. (1970) – the technology must be available for application on new plants, and although it may not be purely theoretical or experimental means of controlling air pollution, need not be in actual routine use anywhere.

take economic costs and "any nonair quality health and environmental impact and energy requirements" into account, the statute does not describe the weight to be given each factor, and the Agency has discretion to balance them, up to the point at which the standard would impose economic or environmental costs that are "exorbitant." *Id.* at 933 (citing *New York v. Reilly*, 969 F.2d 1147, 1150 (D.C, Cir. 1992); *National Asphalt*, 539 F.2d at 786 (D.C. Cir. 1976)).

Given this legal framework, and the information available to EPA in this record (and indeed since 2005), EPA's actions in setting this NSPS are very disappointing. As noted above, the record includes several current memoranda cataloguing available technologies and strategies for SO2, NOx, and PM control, including several new and innovative multi-pollutant control options. EPA does not analyze what emissions rates could be fairly projected for the regulated future (the up to 8 years when this standard will be in place before another mandatory review), based on the application of those strategies,[3] however, but instead looks to emissions rates that are achieved by existing sources (even those not employing state of the art systems of emissions control) at present. Evidence in the record shows the proposed NSPS are easily met by many existing sources for which EPA regularly collects information or collected information in its MACT ICR.

Nor does the Agency evaluate the efficacy of basing new source standards on application of systems of emissions reductions that allow control as well of greenhouse gas emissions, despite having information about those technologies,[4] and despite the fact that the Agency has announced its intention to issue NSPS for greenhouse gas emissions from this industry in the near term. 75 Fed. Reg. 82,392

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[3] *See, e.g.,* Total PM TSD (listing and generally describing, but not analyzing, multiple control options for PM, describing existing source performance, and then determining to set the NSPS emissions rate at the "top 20 percentile of [existing source] performance test data" as reported to EPA as part of the EGU NESHAP information collection request); NOx TSC (same, based on data from existing facilities reported to the Clean Air Markets Division); SO2 TSD (same).
[4] *See* Multi-pollutant TSD.

(Dec. 30, 2010). Indeed, the proposed new source standards, while an improvement over the standards they replace, are not technology-forcing at all, nor do they create incentives to develop better and less costly controls. While EPA has discretion in standard setting, that discretion is not unfettered – particularly where the standards being set defeat the purpose of the statute – namely the creation of incentives to develop more effective and less costly air pollution controls.[5]

C. The Proposed New Source Performance Standards Do Not Reflect the Application of "Best Demonstrated Systems of Emission Reduction"

EPA proposes fuel-neutral new source performance standards for SO2, and Total Particulate Matter, and a combined NOx+CO standard or in the alternative a NOx standard for new coal and oil-fired EGUs. EPA requests comment on the emissions limits proposed, and on the Agency's methodology in setting the standards. We address the proposals for each pollutant in turn.

1. The Agency's Proposed New Source SO2 Performance Standards Clearly are Not "Forward Looking" and Do Not Reflect the Application of BDT Systems of Emissions Reduction

EPA proposes fuel-neutral new source standards for SO2 at a level of 1.0 lbs SO2/MWh or alternatively 97 percent reduction from uncontrolled potential to emit, averaged over a 30-day period, but also says it is considering new source limits in the range 0.80-1.2 lbs SO2/MWh or 96-98 percent reductions from potential to emit. 76 Fed. Reg. at 25,065-066. The Agency's methodology as outlined in the proposal clearly shows these emissions rates are not the result of an analysis of the application or performance of BDT systems of emission reduction– instead they are based on emissions rates that are already achieved by existing sources, albeit

[5] *Cf. Sierra Club*, 657 F.2d at 348 (holding that more scrutiny is appropriate in the converse situation, where EPA sets more stringent standards to provide incentives for control technology development – by the same token, a court should take a closer look at any final rule that sets less stringent standards than are required to actually achieve more cost-effective and deeper reductions in air pollution, through the technology-forcing purposes of section 111).

among the cleaner sources in the fleet. Even at the low end of the ranges EPA says it is considering, the data available to the Agency and reported in this proposal support lower standards for *new* sources. *See* 76 Fed. Reg. at 25,065, Table 17 (showing 5 *existing* sources meeting a standard below 0.80 lbs/MWh-30 day rolling average, and all 15 sources showing greater than 96 percent reductions from potential to emit).

EPA furthermore has had before it since 2005 evidence supporting new source SO2 emissions standards at or below 0.70 lbs/SO2/MWh—30 day average, and scrubber vendors even in 2005 were reporting removal efficiencies of 99.5 percent of sulfur from high sulfur coal.[6] Clearly the standard set by the Agency in 2006 was insufficient – but the Agency's current proposal also is insufficient to meet the statutory requirement that NSPS reflect the application of BDT systems, in a forward looking fashion, at new sources.

And in the current proposal, the Agency does not even identify an emissions rate associated with applying BDT systems at new units. While EPA may not base an NSPS emissions limit on any particular technology configuration, it does under the statute have the obligation to do more than simply catalogue all available control options – it is tasked with ensuring that the NSPS are based on the application of BDT, which is defined as a "system of emission reduction" and can include the use of lower sulfur coal and precombustion processes as well as add-on controls. EPA has not supported its proposed standard in this way (indeed it is not completely clear whether EPA has even identified a BDT control strategy for SO2). Instead the proposed standards are based on the status quo emissions profiles for existing sources – EPA sets SO2 standards that are "achievable" by all new sources (and even many existing sources) rather than standards that are "achievable"

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[6] *See* Final Rule, Standards of Performance for Electric Utility Steam Generating units For Which Construction Is Commenced After September 18, 1978, 71 Fed. Reg. 9,866, 9,871 (Feb. 27, 2006) (describing evidence received by the Agency in 2005 supporting standards lower than the 0.80-1.2 lb/MWh range currently under consideration by EPA).

through the application of the best adequately demonstrated system of emissions control, as the statute requires.

2. The Agency's Proposed New Source NOx+CO Performance Standards Clearly Are Not "Forward Looking" – A Lower Standard Is Justified On the Record

EPA co-proposes a (preferred) combined NOx+CO new source performance standard, of 150ng/J m (1.2lb [NOx+CO]/MWh) or an alternative NOx-only standard of 88 ng/J (0.70 lb NOx /MWh). EPA further says it is considering a range of emissions rates for its preferred NOx+CO standard, of between 130-180 ng/J or 1.0-1.4 lbs [NOx+CO]/ MWh. In this instance, EPA does identify a BDT system of emission reduction for NOx, which it says is selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) for some generating unit types, and advanced combustion controls. 76 Fed. Reg. at 25,066, *see also* NOx NSPS TSD at unnumbered page 5), but no BDT system is reported for CO. EPA also asserts and evaluates potential greenhouse gas co-benefits in setting a combined NOx+CO standard, in particular the "flexibility to minimize nitrous oxide (N2O) emissions" particularly at fluidized bed boilers. *Id.* at 25,068. Where a NOx+CO standard allows optimization of controls and avoidance of emissions of N2O (a very potent greenhouse gas), as EPA posits, *id.*, the result is a net benefit for the environment. But the question remains, does the proposed NOx+CO emissions rate actually represent BDT systems, and the answer, unfortunately is "no."

The information underlying this proposal show a wide variety of controls available for NOx control, and additionally that EPA is aware of a variety of new multi-pollutant control options. NOx TSD, Multipollutant TSD. For CO, the Agency asserts good combustion efficiency and combustion optimization is the appropriate control strategy – which the Agency asserts must be considered together with NOx control options to assure that controlling for one air pollutant does not result in increases of another. *Id.* at 25,067-68. But EPA fails to demonstrate that this is the case with all available strategies for NOx and CO control, rather than only EPA's preferred "BDT" technology choice. *See id.* Indeed,

EPA fails to analyze the potential for deeper reductions in NOx and CO from any of the alternative controls it lists in the TSD, as the basis for the proposed standard. EPA admits this, noting that its TSD contains only "a brief summary of some of the NOx control technologies…not a comprehensive list of available technologies. NOx TSD at unnumbered page 1.

EPA also fails to adequately explain why it proposes a NOx+CO limit at a significantly higher emissions rate than its NOx-only emissions rate proposal. The agency asserts only that it has limited CO CEMS data and that it proposes a rate that includes what it refers to as "sufficient compliance margin[s] to not inhibit … the owners/operators of EGUs to comply with NOx specific … BACT requirements or requirements that result from compliance with EPA's proposed Transport Rule." 76 Fed. Reg. at 25,068. On the same preamble page where this statement appears, however, EPA presents NOx+CO data that is up to six years old in some cases, showing 6 out of 10 *then-existing* units – not new units or permits—meeting or *doing better than* the currently proposed 1.2 lb [NOx+CO]./MWh standard for *new* sources. EPA further seeks comment on a range of NOx+CO emissions rates, between 1.0-1.4 lbs [NOx+CO]/ MWh. Table 20 in EPA's preamble shows that 2 of 10 existing sources (again based on old data) meet or do better than the low end of the proposed range. *Id.*

EPA completely fails to explain why it believes that a NOx+CO rate of 1.2 lb/MWh for new sources reflects BDT systems of emission reduction. With respect to NOx-only limits, the Agency acknowledged *in 2005* that at that time many new power plants were able to achieve NOx limits better than 1.0 lb/MWh, and, indeed that a good number of existing units equipped with SCR were achieving NOx emission rates of 0.70 lb/MWh. EPA-HQ-OAR-2005-0031-0027, Response to Comments at 3-2. There is no analysis in this record supporting the need to set a combined NOx+CO rate higher than that. Nor has EPA actually evaluated the performance of the best system of emission reduction for the combined pollutant NOx+CO and set the NOx+CO rate on that basis, in contravention of the statutory

requirements. Clearly EPA's proposed standards for NOx, and for NOx+CO, are not based on BDT systems, and should be tightened. At the very least, EPA must select a standard at the low end of the proposed range under consideration.

3. EPA Must Set Separate Condensable and Filterable PM Standards

EPA proposes a fuel-neutral, output based particulate matter (PM) standard based on Total PM, rather than separate standards for condensable PM and filterable PM. The Agency takes this approach despite acknowledging that there are compatible BDT strategies for each kind of PM. 76 Fed. Reg. at 25,060, 25,064 (BDT for condensable PM is a Wet Electrostatic Precipitator (WESP) system in combination with Dry Sorbent Injection (DSI); BDT for filterable PM is a "Fabric Filter (FF) with coated or membrane filter media bags"). Most of these technologies have been in wide use for decades; dry sorbent injection is possibly the newest, and it is a mature, readily available control option.[7] Despite the availability of other control options (including newer options outlined in the TSD) for controlling condensable and filterable PM, EPA says it need not set separate standards in part because it believes there are no present methods for assuring compliance with a fine filterable PM standard "in wet stack conditions." *Id.* 25,060. Even if this were true, this does not excuse the agency from setting separate filterable and condensable standards, particularly as EPA's proposed monitoring requirements belie the Agency's statements that it cannot keep track of condensable PM and filterable PM separately. EPA's proposed rule requires PM monitoring that includes:

> Method 202 at 40 CFR part 51, Appendix M of this chapter for condensable PM emissions from units and Method 5 (positive pressure fabric filters must use Method 5D) at 40 CFR part 60, Appendix A-3 or A-6 of this chapter for filterable PM emissions.

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[7] URS Corporation, Lipinski, G., *et al.*, "Assessment of Technology Options Available to Achieve Reductions of Hazardous Air Pollutants," A-9 to A-11 (April 2011), available at: http://www.supportcleanair.com/resources/studies/file/4-8-11-URSTechnologyReport.pdf.

76 Fed. Reg. at 25,129 (Proposed rule text: "Table 5 to Subpart UUUUU of Part 63 – Performance Stack Testing Requirements"). Clearly EPA has at its disposal sufficient methodologies to allow it to keep track of condensable and filterable PM separately.

Moreover, as noted *supra*, EPA is charged with setting new source standards based on "what may fairly be projected for the regulated future, rather than the state of the art at present." *Portland Cement Ass'n,* 486 F.2d at 391. Setting separate condensable and filterable PM standards would comport with Congress's intention in enacting section 111 to induce industry to bring to market the systems and technologies for assessing particle size in wet stack conditions, which EPA acknowledges are now in development. 76 Fed. Reg. at 25,060. EPA should revisit this question in a supplemental notice proposing separate condensable and filterable PM standards.

4. EPA's Proposed Total PM Standards Do Not Reflect the Application of BDT Systems of Emission Reduction

Not only has EPA refused to set separate standards for the condensable and filterable species of PM, but the total PM standards EPA proposes do not reflect the application of the BDT systems identified by the Agency, contrary to the clear requirements of the statute. EPA proposes, for new sources, a total PM standard of 7 ng/J or 0.055 lb/MWh, and says it is considering a range of emissions rates from 15 ng/J (or 0.34 lb/MWh) to 5.0 ng/J (0.40 lb/MWh). Information before the Agency however, shows that many existing facilities already meet the proposed 0.055 lb/MWh emissions rate. 76 Fed. Reg. at 25,064 (EPA selected the proposed Total PM standard based on "the top 20 percentile of the performance test data" it acquired under the MACT ICR from existing sources); PM TSD at unnumbered pages 4-6, Table 1 (showing that many existing facilities meet the proposed total PM standard). EPA's proposal to require new facilities simply to meet the same limits already achieved by many existing sources is contrary to the clear requirements of the statute and Congressional purpose to require *new* sources to

apply the *best* demonstrated systems of pollution control – those technologies, methods, or systems that look to the future and yield lower emissions levels of air pollution. *See, e.g.* infra Chapter IX. D. and Table IX- "Permitted Filterable PM/PM10 Emission Limits" (summarizing recent permit limits for filterable PM). Instead, EPA sets PM standards that are "achievable" by all new sources (and even many existing sources) rather than standards that are "achievable" through the application of the best adequately demonstrated system of emissions control, as the statute requires.

5. IGCC Is a Demonstrated System of Emission Control for EGUs, Indeed IGCCs *Are* EGUs Even When They Produce By-product Hydrogen and Hydrocarbons

EPA again asserts, as it did in 2006, that NSPS emissions limits need not be based on the performance of IGCC units – in this proposal asserting that the emissions benefits resulting from the use of IGCC do not justify the higher capital costs associated with the technology. 76 Fed. Reg. at 25,061. EPA acknowledges that IGCC can be considered a control strategy. *Id.* at 25,066 (describing the "use" of IGCC as a control strategy for SO2). But the Agency impermissibly limits its assessment of its potential to the benefits of IGCC to potential NOx, SO2 and PM emissions reductions, rather than considering the environmental benefit IGCC technologies offer in terms of the potential for easier and less expensive carbon dioxide controls. Nor does EPA consider the non-air quality environmental benefits of reduced water use, and reduced coal ash resulting from the production of electricity using an IGCC. *Id.* at 25,061.

New EGUs can achieve far better emission levels using IGCC technology – as EPA stated in 2005, IGCC plants have "only trace SO2 emissions" and "minimal PM emissions" and achieve significantly lower NOx emission rates than pulverized coal plants. See 70 Fed. Reg. 9705, 9715 (Feb. 28, 2005), 2005 RTC at 2-12. IGCC is clearly an available control technology and, where the costs of the near-term need for carbon dioxide control at EGUs is included in the calculation, significantly

beneficial. EPA's decision to dismiss it from consideration as BDT is simply based on the Agency's policy preference for the continued use of pulverized coal and fluidized bed technologies for generating electricity from coal. But the Agency may not elevate its policy preference above the directive to base NSPS on "best systems of emission control" applicable to new sources. *New York v. EPA,* 443 F.3d 880, 889 (D.C. Cir. 2006).

EPA also (somewhat bizarrely) seeks comment on "whether an IGCC unit that co-produces hydrocarbons or hydrogen should be subject to the [combustion turbine] NSPS instead of the EGU NSPS," even when only 20 percent of the coal would be used to produce such byproducts. 76 Fed. Reg. 25,071. EPA's idea does not make sense – indeed it seems logically backwards. IGCC is, as EPA recognizes, a process for converting coal to electricity. *Id.* While not defined in section 111, an "electric utility steam generating unit" is defined elsewhere in the statute as combusting fossil fuel and of a size "more than 25 megawatts that serves a generator that produces electricity for sale." See 42 U.S.C. §7412(a)(8); *see also* 40 C.F.R. § 60.2 (defining an EGU for NSPS purposes as generating more than 25 MW and more than one-third of its potential electric output capacity for sale to any utility power distribution system). EPA offers no reasoned suggestion why an IGCC that sells more than 25 MW electricity or one third its potential electric output capacity for sale to a utility distribution system should be treated any differently from other kinds of processes with by products, for example, steam. The regulations for NSPS make clear that they encompass facilities that co-produce steam, so long as the "electricity sold onto the grid" characteristics are met.

It would seem to defy logic to on the one hand assert, as EPA does, that it seeks to avoid providing incentives to owners or operators of IGCC to circumvent the EGU NSPS, and by the same token to offer them that option if they use a mere 10-20% of their input coal to make byproducts, no matter how much electricity they sell to the grid. IGCCs that sell more than one third their potential electric output capacity and more than 25 MWe to the grid are and should be classified as EGUs,

whether or not they produce useful by products, just as are such turbines that co-produce steam.

6. EPA's Proposed Exemptions Are Unlawful

   a. EPA's Proposed Weaker "Modified Unit" and "Reconstructed Unit" Standards Are Not Lawful.

The Agency also proposes revised SO2 standards for reconstructed units, revised modified and reconstructed unit standards for total PM for NOx+CO or alternatively NOx only for these EGUs. 76 Fed. Reg. at 25,061-63. These "modified" and "reconstructed" unit standards are not authorized by the statute, and therefore unlawful. Moreover, by permitting modified and reconstructed EGUs to escape NSPS, they directly contradict Congressional intent that as existing sources are upgraded they control their emissions to a rate reflecting "best demonstrated technology" for the industry.

Clean Air Act section 165(a) requires owners and operators of major new sources and major modifications of existing sources to undertake preconstruction review and obtain a permit including emissions limits representing the best available control technology ("BACT") for such new and major modified units. 42 U.S.C. §§ 7475(a), 7479(2)(C). "Modification" of an existing source is defined with reference to section 111 of the statute – and BACT is defined as prohibiting any emissions limit that "results in emissions of any pollutant which will exceed the emissions allowed by any applicable [NSPS]." 42 U.S.C. §§7479(2)(C), (3); 7411(a)(4). Congress intended through the interplay of these sections to require existing major stationary sources to meet at *least* the *new source* emissions levels for regulated air pollutants they emit. *See ASARCO*, 578 F.2d at 322. The *ASARCO* court in 1978 made clear that:

> Under the Act the NSPSs apply to "new sources." A "new source" is defined as "*any* stationary source, the *construction or modification* of which" begins after the NSPS covering that type of source is published. … The statute thus directs that the NSPSs are to apply to any building, structure, facility, or installation which emits or may emit

> any air pollutant and which is either (1) newly constructed or (2) physically or operationally changed in such a way that its emissions of any air pollutant increases.

Id. (emphasis in original). Furthermore, section 111(b)(2) permits EPA to "distinguish between classes, types and sizes *within categories of new sources* for the purpose of establishing standards," 42 U.S.C. §7411(b)(2), this language does not authorize the Agency to set less lenient standards for "modified sources" or "reconstructed" sources. Indeed, separate modified and reconstructed unit standards violate not only the language but the purpose of this section of the Act. *See ASARCO*, 578 F.2d at 322 (Section 111 designed to force "new sources" to employ the *best* demonstrated systems of emissions reduction) (emphasis added). Tellingly EPA offers no legal support for this aspect of this proposal, merely announcing that it is revising existing modified unit standards. But just because EPA has in the past issued an unlawful regulation does not mean that regulation is any more lawful when it is revised and reissued. *F.J. Vollmer Co. v. Magaw,* 102 F.3d 591, 598 (D.C. Cir. 1996).

EPA also has provided no technical justification for the proposed "modified unit" standards – the record does not contain analyses demonstrating that modified sources could not meet the new source standards. The Agency's Technical Support documents merely make unsupported references to difficulties with retrofitting certain technologies in certain situations – but that is not sufficient to show that Congress did not mean what it said in requiring new and modified sources to meet at least NSPS emissions limits. Nor does it support EPA's attempt to exempt modified sources from the "new source" NSPS, rather than requiring them to achieve deeper reductions through application of a more stringent BACT limit, are required by sections 165(a) and 169. Nor has EPA shown that *reconstructed* units -- which under EPA's rules are essentially new units[8] -- cannot meet EPA's proposed "new source" NSPS emissions rates.

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[8] *See* 40 C.F.R. §60.15(b)(1) (defining a "reconstructed" unit for NSPS purposes as "the replacement of components of an existing facility to such an extent that (1)

EPA's modified and reconstructed unit standards seem designed to provide incentives to owners and operators of existing sources to continue running them as modified sources subject to the less stringent emissions rate, rather than ever replacing them with newer, more efficient, and better controlled generation. Clearly that purpose is outside of the authority granted EPA in section 111 – and just as clearly it represents EPA unlawfully elevating a policy preference over the plain text requirements of the statute. *See New York,* 443 F.3d at 889 ("EPA may not 'avoid the Congressional intent clearly expressed in [statutory text] simply by asserting that its preferred approach would be better policy' " (quoting *Engine Mfrs Ass'n v. EPA*, 88 F.3d 1075, 1089 (D.C. Cir. 1996)).

b. EPA's Proposal for "Commercial Development Permits" that Would Completely Exempt EGUs Using "Innovative Technologies" From the New NSPS Contravenes the Plain Language of the Statute, the Statute's Purposes, and Moreover, Defies Logic

EPA proposes to completely exempt from the new NSPS the "first 1000 MW of full-scale demonstration units of pressurized fluidized bed technology and EGUs using a multi-pollutant control technology," through a "commercial demonstration permit." 76 Fed. Reg. at 25,069 . EPA also proposes to issue commercial demonstration permits to for the first 1000 MW of units with "advanced combustion controls." *Id.* Units with such permits will be exempt from the proposed NSPS, and instead required only to meet the existing NSPS. These proposals completely contravene the plain text of section 111(j), and undermine its purposes, as well as the larger purposes of section 111 generally.

Section 111(j) does include express authority for a *temporary case-by-case* waiver from the NSPS, in order to "encourage the use of an innovative technological system or systems of continuous emission reduction," 42 U.S.C. §7411(j)(1)(A), that are *not* "adequately demonstrated," *and* that have a "substantial likelihood"

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fixed capital cost of the new components exceeds 50 percent of the fixed capital cost that would be required to construct a comparable entirely new facility, and (2) It is technologically and economically feasible to meet the applicable [NSPS].").

(considering any previous failures to operate effectively or to meet NSPS) of achieving "*greater continuous emission reduction* than that required to be achieved under the standards of performance which would otherwise apply, or achieve *at least an equivalent reduction*, at lower cost in terms of energy, economic, or nonair environmental impact…." *Id.* § 7411(j)(1)(A)(i) & (ii)(emphases added). The waiver applies to the portion of the source on which the innovative system is used. *Id.* § 7411(1)(F).

The statute however does not offer a *complete exemption* from the requirement to meet NSPS, but rather provides *additional time* for an owner or operator to meet the NSPS where a truly innovative and undemonstrated control system is utilized. The source is allowed an extended period of time: up to 7 years after the waiver is granted, or 4 years after source commences operation, whichever is earlier, *id.* § 7411(j)(1)(E), to bring the new technology *into compliance with* the applicable NSPS.[9] Clearly then, the Act does not authorize the Administrator to permanently exempt even first movers from the applicable NSPS, in the name of promoting "innovative technologies." EPA cannot by creating a specific standard for some first mover technologies subvert the clear Congressional purpose that all innovative technologies will meet the new source standards within the 8 year period before the standards are again up for review.

The Administrator is just as clearly not authorized to issue blanket exemptions for particular "innovative technologies." The statute requires that any waivers the Administrator is authorized to make must be granted only on a case-by-case basis, and with the consent of the relevant State Governor,[10] where the owner

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[9] That Congress intended the waivers to be temporary is further illustrated by the detailed requirements to get an extension of a waiver once granted; the statute says an extension is only possible if the system fails to perform as expected, and then only for "such minimum period as necessary to comply" with the otherwise applicable NSPS, and extending up to 3 years. *Id.* § 7411(j)(2).

[10] The Governor as a general rule may delegate this authority to consent, to the relevant person at the state permit-issuing authority.

or operator of the proposed system demonstrates "that the proposed system will not cause or contribute to unreasonable risk to public health, welfare, or safety in its operation, function, or malfunction" (considering effects on other pollutants and methods for reducing risk to public health, among other factors listed in the statute). *Id.* §7411(j)(1)(A)(iii) & final paragraph. And, the Administrator is authorized to set permit terms and conditions as necessary to assure that emissions from the source will not prevent attainment or maintenance of any NAAQS and the proper functioning of the system. *Id.* §7411(j)(1)(B). While the Administrator also can determine the number of waivers that may be granted overall to a particular system of continuous emission reduction, that number "shall not exceed such number as the Administrator finds necessary" to ascertain whether the proposed system will operate effectively, and satisfy the other criteria of § 7411(j)(1)(A)(ii) and (iii). *Id.* §7411(j)(C).

Given the detail with which Congress crafted and limited EPA's authority to provide any exemption from the NSPS, it is unimaginable why EPA thinks it has authority to issue the "commercial demonstration permit" offramp from NSPS it proposes. EPA cites the 1973 opinion in *Essex Chemical v. EPA,* 486 F.2d 427 (DC Cir. 1973). 76 Fed. Reg. at 25,068. However, that case had *nothing* to do with "innovative technology" exemptions, but rather required EPA to consider nonair environmental impacts when setting an NSPS, as required by Section 111(a)(1). More pertinent legal doctrine may be found in the recent D.C. Circuit Court opinion holding invalid EPA's decision in the Clean Air Interstate Rule to limit or terminate acid rain program allowances issued under Title IV of the Clean Air Act, and stating that EPA "'is a creature of statute,' and has 'only those authorities conferred upon it by Congress'; 'if there is no statute conferring authority, a federal agency has none.'" *North Carolina v. EPA,* 531 F3d 896, 922, *modified on reh'g* 550 F.3d 1176 (D.C. Cir. 2008).

EPA also offers is its *policy* perspective that these Congressional provisions "are not adequate to encourage certain capital intensive technologies." 76 Fed. Reg.

at 25,068. That may be true, but it does not authorize EPA to ignore or circumvent them. EPA's statements make clear that the proposed "commercial demonstration permits" are really an unvarnished – and unlawful-- attempt by the Agency to elevate its policy preferences over the plain requirements of the statute. *See New York,* 443 F.3d at 889.

Of course, an alternative approach to encouraging the development of new technologies that are already in limited use would be to do as Congress intended, and establish them within the ambit of "best demonstrated systems of emission control" on which the NSPS is required to be based. This is the approach EPA used in selecting SCR as the BDT system of emission reduction for the 1998 NSPS for EGUs and industrial boilers, an approach that was upheld in federal court. *Lignite Energy Council,* 198 F.3d at 932-933. EPA's 1998 approach in forcing the development and application of relatively new control technologies with stringent NSPS is consistent with the Act, and as a policy matter, far preferable to the approach proposed in this rulemaking – that is, setting relatively lax NSPS and then proposing further exemptions even from those standards in the name of "encouraging" development of innovative control technologies. Far better to "stimulate and augment the innovative character of industry in reaching for more effective, less costly systems to control air pollution" by setting standards that industry must reach to meet, as Congress intended. *Sierra Club*, 657 F.2d. at 347, n. 174.

Finally, EPA has made no real showing that exemptions are even needed to encourage application of the specified 'innovative technologies"—pressurized fluidized beds, multi-pollutant controls, and advanced combustion controls. In fact, one of the listed technologies—advanced combustion controls—is already part of NOx best demonstrated technology (along with SCR), and thus is one of the bases EPA relies on in setting the NSPS. Exempting such technology from the proposed NSPS would have the perverse effect of providing an economic incentive for a unit to forgo SNCR or SCR and thereby obtain a lower control requirement.

c. EPA's Proposed Exemption for Units Burning Coal Waste Is Unlawful

As part of the NSPS proposal, EPA creates "exemptions" for units burning coal refuse. EPA proposes to exempt units burning more than 75% coal-refuse (on an annual basis) from the proposed new SO_2 NSPS, and to require such units instead to only meet the existing, more lenient standard. 76 Fed. Reg. at 25,066. EPA suggests that these units "warrant special consideration" because of the "unique environmental benefits" that such units provide – but the Agency does not provide any reasoning why it proposes to offer such "consideration" in the form of an unlawful exemption, instead of through the mechanism provided by the statute – namely to distinguish a subcategory of these units. See 42 U.S.C. §7411(b)(2) ("the Administrator may distinguish among classes, types and sizes within categories of new sources for the purpose of [setting NSPS]. While we do not concede, based on the information provided in the proposal, that such a subcategory would be sufficiently justified if EPA had offered it, at least the mechanism chosen would be lawful. EPA would then of course need to show what constitutes BDT systems of emission reduction for the subcategory and propose an NSPS for the subcategory at that level, not simply revert to the NSPS currently in place.

While we may have no quarrel with the assertion that such units can *potentially* provide environmental benefits by allowing coal refuse piles to be cleaned up and the relevant land to be reclaimed, there is absolutely no assurance that burning coal refuse will by itself provide these benefits, and indeed, there is no requirement in EPA's proposal for such units to do so. Furthermore, EPA has offered *no* showing that such units (particularly newly built units, which EPA seemingly seeks to encourage) cannot meet the proposed NSPS SO_2 standards, or alternatively, that the existing NSPS actually represent BDT for such units. Rather, EPA seems to be simply proposing a weaker emission standard for such units in an effort to reduce their construction costs.[11] Like the "commercial

[11] EPA offers no justification for exempting rebuilt or modified coal refuse units from the proposed NSPS.

demonstration permit" exemption, this is clearly a situation where EPA unlawfully puts its policy preferences above the plain text of the statute. *See New York,* 443 F.3d at 889.

Similarly, EPA seeks comment on whether to create a separate sub-category for coal refuse-burning EGUs due to the lower Btu content of the fuel, and *then* to exempt such units from both the proposed SO2 and NOx NSPS, and instead require that they only meet the more lenient existing NSPS. 76 Fed. Reg. at 25,072. But EPA has not shown (and it must) that the existing NSPS represent application of BDT systems of emissions reduction for the coal refuse-burning subcategory. Indeed, EPA has stated elsewhere in its proposal that it desires to establish "emission standards that encourage unit efficiency by relating emissions to the amount of useful-energy generated, not the amount of fuel burned." 76 Fed. Reg. at 25,063. We support this principle, and see no reason that it should not be applied to all EGUs, including those burning coal refuse with lower Btu content.

7. EPA's Proposal to Remove the Vacated CAMR Provisions From the NSPS Rules is Long Overdue.

In 2008, the D.C. Circuit ruled that EPA had unlawfully delisted coal- and oil-fired EGUs, and therefore vacated the "Clean Air Mercury Rule," under which EPA had attempted to regulate new and existing EGU mercury emissions by setting NSPS, in its entirety. *New Jersey v. EPA,* 517 F.3d 574, 577-578 (D.C. Cir. 2008), *cert. denied,* 129 S.Ct. 1308 (2009). EPA now proposes to deleted the vacated provisions, along with regulations promulgated as part of CAMR, as they are no longer valid or enforceable. This action is long overdue and we support the Agency taking affirmative steps, now to remove the vacated provisions from the published regulations.

CHAPTER XIII: EPA'S AFFIRMATIVE DEFENSE FOR MALFUNCTIONS IS UNLAWFUL.

Although EPA has eliminated its unlawful compliance exemption for periods of startup, shutdown, and malfunction, the agency's final rule includes an "affirmative defense to penalties that purports to bar courts from imposing any penalties on sources that violate their emission standards during a malfunction and satisfy certain agency created conditions related to preventing malfunctions and controlling malfunction emissions. 76 Fed. Reg. at 25029 (affirmative defense for 112 standards); 25064 (affirmative defense for 111 standards).

The Clean Air Act makes clear how the courts are to assess civil penalties, whether a case is brought by EPA or a citizen. 42 U.S.C. § 7413(e). Congress intended citizens to be able to enforce emission standards under the CAA using the full range of civil enforcement mechanisms available to the government, and, in the HAP context, subject only to the limitation that government not be "diligently prosecuting" its own civil enforcement action, CAA § 304(b)(1)(B), 42 U.S.C. § 7604(b)(1)(B). EPA's rule proposal, by shifting this careful balance and contravening these mandates, violates the CAA.

The affirmative defense that EPA proposes to allow in case of malfunctions goes directly against congressional intent in two ways. First, Congress expressed a clear intent as to how judges should determine the size of civil penalties whenever they are sought and thus Congress flatly barred EPA from limiting when civil penalties can be assessed. *See Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842-43 (1984). In this proposal, EPA acts outside of its delegated authority to limit civil penalties available in citizen suits or its own enforcement actions. Second, the proposal will impermissibly chill citizen participation, and the ability to win an effective, deterrent remedy, in CAA enforcement actions.

The affirmative defense is fatally flawed because EPA cannot decide when civil penalties will not be allowed. The CAA itself spells out the only limits that Congress intended to impose on citizens' ability to seek and recover penalties in enforcement suits under CAA § 304, 42 U.S.C. § 7604. See 42 U.S.C. § 7413(e). By

attempting to impose additional agency-created limits, EPA exceeds its authority.

Congressional intent on civil penalties is clear-they are a remedy available to citizen plaintiffs, and the Act gives judges a list of factors to consider in assessing them. As such, EPA cannot interpret the statute to contravene that intent. By attempting to rewrite this provision, via regulation, EPA has done just that.

The CAA grants EPA minimal discretion that only applies to administrative penalties, allowing EPA to "compromise, modify, or remit, with or without conditions, any administrative penalty which may be imposed under [subsection 113(d)]." 42 U.S.C. § 7413(d)(2)(B). However, there is no similar grant of authority to EPA to compromise, modify or limit civil penalties that a court may impose under section 113(e) or section 304. Section 304(a), 42 U.S.C. § 7604(a), grants courts the sole authority "to apply appropriate civil penalties" in citizen suits. The explicit reference to EPA's ability to modify penalties in one subsection and its absence in the other subsection of the same provision can only be understood as an intentional decision by Congress that EPA cannot contravene by rule.

Citizen participation in CAA enforcement also will be hampered, in violation of citizens' rights to protect themselves from pollution and in direct conflict with congressional intent. The affirmative defense would likely be used on a routine basis by polluters seeking to avoid penalties, just as the malfunction exemption was. As a result, citizens who seek civil penalties against polluters in order to protect themselves and achieve the Act's goals may be forced to engage in fact-intensive disputes over the cause of emission violations and adequacy of responsive measures - an outcome Congress intended to prevent with the simple straightforward enforcement and penalty provisions in the Clean Air Act. As a result, enforcement of the Act could suffer, for civil penalties provide a powerful deterrent to violators as Congress intended.

Thus, the affirmative defense also runs counter to two clearly expressed intentions of Congress: (1) the burden it places on citizens makes it less likely that they will enforce the Act, see, e.g., *Pennsylvania v. Del. Valley Citizens' Council for Clean Air*, 478 U.S. 546, 560 (1986); and (2) several of the factors at issue in the

affirmative defense undercut Congress's intent that citizen suit enforcement should avoid re-delving into "technological or other considerations," *NRDC v. Train*, 510 F.2d 692, 700 (D.C. Cir. 1974). Both result from the technical burden EPA imposes on citizens with the affirmative defense, and both render the defense impermissible.

In addition to these problems, there is simply no need for an affirmative defense to penalties to be written into the regulations and cause the harm that will result. EPA has discretion to decide what cases to prosecute, to consider settlements, and to request civil penalties in a case-by-case manner, as long as it acts consistent with the Clean Air Act to protect clean air as its top priority, see 42 U.S.C. § 7401. Promulgating this affirmative defense is equivalent to giving polluters "get out of jail free" cards for serious emission exceedances and MACT violations. Polluters are likely to claim that any violation of the standard is due to a malfunction in order to evade the requirements. Allowing polluters to evade financial penalties - which are the real teeth of the standards - through this type of measure is likely to lead to polluters simply ignoring or factoring potential standard violations into their cost of doing business, rather than actually trying to prevent malfunctions and violations of the standards as a way to avoid financial losses from the application of penalties.

Assuming arguendo that EPA had authority to promulgate any type of affirmative defense to penalties for malfunctions, EPA should also promulgate the following provisions:

1. A specific amount of compensatory damages should apply to each reported malfunction. These funds should be dedicated to enforcement, inspections, and monitoring in the local community around the specific facility, to create greater assurance that malfunctions will not happen again.

2. EPA should modify the regulations so that the affirmative defense cannot be used by a specific facility or company more than once within a set period of time, such as 10 years. The affirmative defense should become automatically unavailable to a facility that has previously had a malfunction within the last 10 years, to ensure that this defense does not swallow the value of the standards.

3. EPA should promulgate specific public reporting and notification requirements for malfunctions, or any emission exceedance that occurs of which an operator is aware. Specifically, EPA should require that when a facility provides EPA with a notification of a malfunction or emission standard exceedance under the regulations, this notice will be made publicly available on EPA's website within 14 days. In addition, EPA should promulgate the requirement that when such notification is made, the facility must also provide for community notification of the malfunction or emission standard exceedance within 2 business days, through an appropriate public forum that is designed to reach residents who live near the facility, including but not limited to a notice on the facility's own website (if it has one), a written notice to the local municipality and local school district, a press release to the local newspaper, radio, and TV news station that contains information community members may need to protect themselves and their families from the additional air pollution.