ARGUED DECEMBER 10, 2013
DECIDED APRIL 15, 2014

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

WHITE STALLION ENERGY CENTER, LLC, et al.,	)	
Petitioners,	)	**Case No. 12-1100, and consolidated cases**
v.	)	
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

MOTION OF INDUSTRY RESPONDENT INTERVENORS TO GOVERN FUTURE PROCEEDINGS

INTRODUCTION

Industry Respondent Intervenors[1] respectfully move this Court to remand to the U.S. Environmental Protection Agency ("EPA") for reconsideration its finding under Section 112(n)(1)(A) of the Clean Air Act that it is "appropriate" to regulate fossil fuel power plants under Section 112 (the "Finding") without vacating the Finding. On remand EPA must consider cost, as the United States Supreme Court concluded EPA erred when it "deemed cost irrelevant" to its prior decision. However, the Court should not vacate the Finding, since EPA compiled considerable information about the anticipated costs and benefits of regulation when it adopted its final rule, performing a thorough, peer-reviewed cost benefit analysis. The record before this Court eliminates any meaningful "doubt whether the agency chose correctly" when it determined that it would be "appropriate" to regulate hazardous air pollution from power plants. Moreover, vacatur of the Finding would have severe "disruptive consequences" if the vacatur would disturb the final rule that succeeded the Finding, the Mercury and Air Toxics Standards (the "Rule"). Therefore, while the Finding must be remanded, neither the Finding nor the Rule should be vacated.

BACKGROUND

A. The Finding and the Rule

From the outset, this case has implicated two related but distinct administrative

[1] Industry Respondent Intervenors are Calpine Corporation, Exelon Corporation, National Grid Generation LLC, and Public Service Enterprise Group, Inc.

actions by EPA: (1) the Finding; and (2) the rulemaking that followed the Finding. Notice of these two actions was published concurrently, but the parties and this Court have acknowledged the distinction between the Finding and the Rule. *White Stallion Energy Center, LLC v. EPA*, 748 F.3d 1222, 1240 (D.C. Cir. 2014). Indeed, the Finding under review here was itself a reaffirmation of a finding made by EPA in 2000, notice of which was published long before EPA developed the Rule. 65 Fed. Reg. 79,825 (Dec. 20, 2000).

The Finding consists of EPA's determination under Section 112(n)(1)(A) that it is "appropriate" (and "necessary," though this element is no longer relevant to these proceedings) to regulate power plants under Section 112. 77 Fed. Reg. 9304, 9310-64 (Feb. 16, 2012). Although this Court upheld the Finding against all challenges raised by petitioners, the Supreme Court found that EPA erred when it "deemed cost irrelevant" to its decision whether to regulate. *Michigan v. EPA*, 135 S. Ct. 2699, 2712 (2015). While the Supreme Court held that EPA should have considered cost in some fashion when making the Finding, the Court acknowledged that only a "preliminary estimate" of cost would be available to the agency at that time, since the Finding would precede development of the standards implementing Section 112. *Id.* at 2711.

Having made the Finding, EPA adopted the Rule, carefully developing emission standards for hazardous air pollutants from coal- and oil-fired power plants in accordance with the many requirements of Section 112. 77 Fed. Reg. at 9366-9423, 9463-9513. This Court upheld the Rule in all respects. The Supreme Court granted

certiorari on a single issue concerning the Finding alone, and treated that issue narrowly in its opinion. Only the Finding was found to be flawed, and only the Finding needs to be addressed by this Court on remand. The Rule should not be disturbed.

B. Standard of Decision

This Court has considerable experience in fashioning well-tailored remedies when it (or the Supreme Court) determines that an agency has erred, particularly when the parties have thoroughly briefed the issue. Ordinarily, such a remedy will involve remanding the administrative action to the agency for reconsideration. The Supreme Court has identified an additional factor for EPA to take into account in making its Finding, and the Finding should be remanded to EPA for reconsideration in light of the Supreme Court's decision. On remand, EPA will determine the manner in which cost should be taken into account, consider the information available to it, and ultimately decide whether cost considerations lead to a different conclusion. That is, EPA will decide whether to reaffirm the Finding or to withdraw the Finding.

The key question for the Court in cases such as this is whether the remanded agency action will continue to be given effect during the remand, or whether it will be vacated. With regard to this question, the Court has developed a very practical approach. It considers two factors: (1) "the seriousness of the [action's] deficiencies (and thus the extent of doubt whether the agency chose correctly);" and (2) "the disruptive consequences of an interim change that may itself be changed." *Allied-Signal, Inc. v. U.S. Nuclear Reg. Comm'n*, 988 F.2d 146, 150-51 (1993) (*citation omitted*).

The Court's jurisprudence on vacatur is dominated by pragmatism. Applying the *Allied-Signal* factors, the Court typically does not vacate agency actions that will likely, or even merely plausibly, be reaffirmed after reconsideration. *See, e.g.*, *Davis County Solid Waste Mgmt,* 108 F.3d 1454, 1459 (D.C. Cir. 1997). Similarly, the Court is very sensitive to the harm that vacatur can cause, particularly when the action vacated has been in effect for some time, so it will not vacate when doing so would have "disruptive consequences." *See, e.g., EME Homer City Generation, L.P. v. EPA*, 795 F.3d 118, 132 (D.C. Cir. 2015) (disruption of emissions trading markets); *North Carolina v. EPA*, 550 F.3d 1176, 1178 (D.C. Cir. 2008) (increased pollution emissions impacting public health).

ARGUMENT

A. There Is No Genuine "Doubt Whether The Agency Chose Correctly" In Its Finding.

EPA considered a variety of relevant factors in reaching its conclusion that it is "appropriate" to regulate hazardous air pollutant emissions from power plants, but did not consider cost. *See* 77 Fed. Reg. at 9310-11. EPA must now reconsider the Finding, incorporating some consideration of cost. The question posed by the first *Allied-Signal* criterion is this: what is the "extent of doubt" that EPA – after considering cost – will reach the same conclusion and reaffirm the Finding. In assessing this question, there is no need for the Court to entertain hyperbolic hypotheticals or to embrace artificial ignorance. The record before the Court points

to a self-evident outcome. There is no genuine doubt that EPA will reaffirm the Finding after considering cost, so the first *Allied-Signal* criterion counsels against vacatur.[2]

The Supreme Court held that EPA's deliberations should have included a "preliminary estimate" of costs that might be imposed by a hypothetical future rule, were EPA to find regulation of power plants to be "appropriate." *Michigan*, 135 S. Ct. at 2711. The administrative record before this Court includes cost information compiled by EPA based on the actual final Rule that is far more reliable than any "preliminary estimate" the Supreme Court contemplated. Moreover, EPA will have the opportunity to consider actual implementation costs, which have turned out to be far lower than EPA estimated when it adopted the Rule. These data lead inexorably to the conclusion that EPA will reaffirm its Finding.

1. The peer-reviewed cost-benefit analysis already performed by EPA demonstrates that the Finding should be reaffirmed.

The Supreme Court held that, when making the Finding, EPA was not required to conduct formal cost-benefit analysis, which is among the most rigorous of the many ways in which cost can be considered in rulemaking. *Id.* However, when promulgating the Rule, EPA in fact did perform a peer-reviewed cost-benefit analysis that concluded that the benefits of the Rule far outweigh its costs (between $33 billion and $90 billion in benefits versus $9.6 billion in costs). 77 Fed. Reg. at 9305-06.

[2] *See also* Respondent EPA's Motion to Govern Future Proceedings, Document No. 1574825 at 9-12.

Having reached such a lopsided conclusion, EPA could not conceivably conclude on remand that costs render it "inappropriate" to regulate power plants.

Executive orders governing regulatory review call for agencies to measure the "actual results of regulatory requirements" and require analysis of both direct and indirect costs and benefits of any rule.[3] The Office of Management and Budget published standards for conducting the cost-benefit analysis required by these Executive Orders in Circular A-4, Office of Mgmt. & Budget, *Circular A-4* at 1 (2003). Consistent with these requirements, EPA adopted its own cost-benefit analysis guidelines after extensive peer review by a panel of expert economists. U.S. EPA, *Guidelines for Preparing Economic Analyses* at Ch. 11 (2014).[4] These guidelines instruct the Agency to assess "all identifiable costs and benefits," including direct effects "as well as ancillary (co-) benefits and costs." *Id.* at 7-1.[5]

EPA applied these peer-reviewed guidelines in concluding that the Rule's benefits would be three to nine times greater than its predicted costs. 77 Fed. Reg. at 9305-06. That conclusion was further supported by peer review solicited by EPA,

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[3] Exec. Order No. 13.563 § 1, 76 Fed. Reg. 3821, 3821 (Jan. 21, 2011); Exec. Order No. 12.866 § 6(a)(3)(c), 58 Fed. Reg. 51,735, 51,741 (Oct. 4, 1993).

[4] *Available at* http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0568-50.pdf/$file/EE-0568-50.pdf.

[5] The Supreme Court declined to adopt petitioners' view that EPA should ignore the enormous co-benefits flowing from the Rule. 135 S. Ct. at 2711. Proper cost-benefit analysis considers all of the direct and indirect benefits of a rule. Samuel J. Rascoff & Richard L. Revesz, *The Biases of Risk Tradeoff Analysis: Towards Parity in Environmental and Health-and-Safety Regulation*, 69 U. Chi. L. Rev. 1763, 1772-80 (2002); Cass R. Sunstein, *The Real World of Cost-Benefit Analysis: Thirty Six Questions (and Almost as Many Answers)*, 114 Colum. L. Rev. 167, 190 (2014).

and by independent peer reviews submitted by several commenters, including New York University's Institute for Policy Integrity,[6] energy economist Dr. Charles Cicchetti,[7] and Dr. Josh Bivens of the Economic Policy Institute.[8] Indeed, though EPA's cost estimates were conservatively high, EPA appears to have underestimated the benefits of the Rule.[9]

The Supreme Court did not reject the conclusions in EPA's cost-benefit analysis or these peer reviews, nor did it suggest that these expert facts would not support a determination that regulation of power plants under Section 112 is "appropriate." On remand, while EPA maintains discretion in how to consider cost, it must at least consider the facts it developed in support of its cost-benefit analysis and the multiple peer reviews upholding its conclusions. Given the vast disparity

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[6] The Institute for Policy Integrity at New York University School of Law, Comments on the proposed MATS Rule, EPA-HQ-OAR-2009-0234-17768, at 16.

[7] Exelon Corporation Comments on the proposed MATS Rule, EPA-HQ-OAR-2009-0234-17648, 17650, 17651, Exhibit 21 ("Cicchetti Report") (JA1242-1243, 1248-1260, 1269-1271).

[8] Josh Bivens, "A Lifesaver, Not a Job Killer: EPA's proposed 'air toxics rule' is no threat to job growth," EPI Briefing Paper #312 (June 14, 2011), *available at* http://w3.epi-data.org/temp2011/BriefingPaper312%20%282%29.pdf. *See also* 77 Fed. Reg. at 9415 (discussing Dr. Bivens' findings).

[9] EPA did not attempt to "monetize" – calculate the monetary value of – all of the Rule's benefits. 77 Fed. Reg. at 9306. Dr. Cicchetti conducted additional analysis to monetize these omitted benefits and determined that EPA's analysis significantly understated benefits, economic growth and job benefits. For example, Dr. Cicchetti concluded that the Rule would reduce healthcare costs for businesses by $4.513 billion annually. Cicchetti Report, JA01242-1243, 1268-1288. *See also* 77 Fed. Reg. at 9415 (discussing Dr. Cicchetti's findings).

between the benefits and costs of the Rule, it would likely be arbitrary and capricious for EPA to deem regulation not "appropriate" after considering cost.

2. The actual compliance costs of the generation industry have been substantially lower than EPA estimated.

On remand, EPA will not have to rely exclusively on stale, conservative cost estimates. Given that the Rule has been in effect for over three years, EPA will have the benefit of knowing the actual costs of compliance incurred by industry. As so often happens, the actual costs incurred by industry have been far lower than EPA estimated. James Staudt, Ph.D. Eng., analyzed the actual costs of compliance with the Rule by reviewing control equipment installations through June 30, 2015, and projections of additional controls that might be installed by the extended deadline of April 2016 for complying with the Rule. Dr. Staudt concluded that the industry's annual compliance costs are approximately $2 billion, less than one-quarter of the $9.6 billion annual cost EPA estimated for the Rule. Declaration of Dr. James E. Staudt ("Staudt Decl.") (attached as Exhibit A hereto) ¶¶ 5, 12, 14.

As is typically the case, the power industry and its suppliers in the pollution control industry developed more cost-effective compliance techniques and new technologies that reduced costs significantly from those EPA projected. *Id.* ¶¶ 6-10. The dramatic cost reductions are the result of three key factors: (1) improvements in the materials used to control acid gases and mercury have resulted in reduced operating costs and increased efficiency; (2) far fewer power plants than EPA

estimated (in terms of generation capacity) have required installation of high cost pollution controls, such as fabric filters and flue gas desulfurization systems or system upgrades; and (3) natural gas prices have been significantly lower than EPA projected, reducing the cost of gas conversion and related compliance strategies. *Id.* ¶¶ 6-9, 11.

Dr. Staudt compared the total generation capacity that EPA predicted would install each control technology with the actual generation capacity that had installed such controls by June 2015. He then deducted (or added) the incremental cost (capital and operating) associated with those missing controls from EPA's $9.6 billion annual cost estimate. As a result of the factors described above and others, the amortized capital costs, variable operating and maintenance costs, fixed operating and maintenance costs, and fuel change costs incurred by industry are only a small fraction of the amount EPA predicted. *Id.*

Virtually all capital investments that will be required to comply with the Rule have either been made or contractually committed, and so are included in Dr. Staudt's compilation. Staudt Decl. ¶ 15. Though some power plants have received extensions and will not be required to comply with the Rule until April 2016, those plants that will install capital intensive controls have already contracted for those controls to be installed. *Id.* ¶¶ 3, 15; *see also* Declaration of William B. Berg ("Berg Decl.") (attached as Exhibit B hereto) ¶¶ 14-17. While some minor controls might still be installed, these will not materially affect the industry's annual compliance costs. Accordingly, Dr. Staudt's estimate of $2 billion, less than 23 cents on each dollar estimated by

EPA, reflects not only current compliance costs, but compliance costs through the extended deadline of April 2016. Moreover, of these annual costs, roughly half represent the amortized capital cost of equipment already installed or committed, which cannot now be recovered or avoided. Staudt Decl. ¶ 15.

This difference between EPA's prospective cost projection and industry's actual cost experience is not unusual, but rather is the norm, with actual costs virtually always being lower than the original predictions, sometimes by an order of magnitude. *Id.* ¶ 14. Technological innovation has routinely resulted in environmental rules and legislation costing far less than originally estimated.[10] This is particularly the case with the electricity industry, which "has an uninterrupted, successful history of implementing technical improvements and reducing costs through least cost engineering principles."[11] In the case of the Rule, this history is narrated by the owners of fossil power plants in their securities filings, which show from year to year a consistent downward trend in estimated compliance costs. Staudt Decl. ¶ 13, and Exhibit 3 thereto.

On remand, EPA must consider that its own cost-benefit analysis shows benefits far in excess of the projected costs of the Rule, along with other cost information it compiled in the rulemaking. EPA must also consider the dramatic cost

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[10] *See* Robert V. Percival, "Regulatory Evolution and the Future of Environmental Policy," 1997 U. Chi. Legal F. 159, 176-179 (1997) (JA00859-60, 866-67); Cicchetti Report, JA01271-73.

[11] Cicchetti Report, JA01271.

reductions that the electric power industry has actually achieved in response to the Rule, quantified by Dr. Staudt and corroborated by the public statements of major generators. Applying the first *Allied-Signal* factor to these facts, the Court can have no genuine doubt as to EPA's conclusion on remand. Not only is EPA overwhelmingly likely to conclude that it is "appropriate" to regulate power plants after considering cost, it is very difficult to imagine how EPA could possibly defend a contrary conclusion. The first *Allied-Signal* factor weighs heavily against vacatur.

B. The Disruptive Consequences Of A Vacatur Affecting The Rule Would Be Severe.

Allied-Signal also directs the Court to consider the "disruptive consequences" of vacatur. The Court has been particularly concerned about disruption resulting from vacatur of rules affecting the electric power industry. *See, e.g., EME Homer City Generation, L.P.*, 795 F.3d at 132 (remanding without vacatur to avoid disrupting markets); *Delaware DNREC v. EPA*, 785 F.3d 1, 18-19 (D.C. Cir. 2015) (vacating portion of rule but inviting motions for alternative remedies if vacatur would "cause administrative or other difficulties"); *North Carolina*, 550 F.3d at 1178 (remanding without vacatur to allow power plant regulation to serve as bridge to new program). This sensitivity is appropriate, and the Court should not vacate the Finding if to do so would disrupt the efficient operation of the electric power sector, or undermine the generation industry's substantial – and now virtually completed – investment in complying with the Rule.

1. Vacatur of the Finding should not affect the status of the Rule.

The Clean Air Act has been interpreted to require EPA to find that it is "appropriate and necessary" to regulate power plants under Section 112 before adopting a rule imposing such regulation. However, in the present posture of this case it does not necessarily follow that if the Court were to vacate the Finding, it must also vacate the Rule. Congress dispatched EPA on this journey in 1990,[12] and the Finding was but a waypoint on the journey that, 22 years later, produced the Rule. At this point, circumstances have thoroughly upset the timetable laid out by Congress,[13] and this Court would do further injury to Congress' mandate if it were to find that an error at that waypoint – even one that it deems to warrant vacatur – would invalidate the Rule, forcing EPA to begin all over again.

In considering the present relationship of the Finding and the Rule, it is critical that the Rule has survived review, notwithstanding the numerous challenges raised by petitioners. This Court unanimously dismissed each objection raised to the Rule, and the Supreme Court declined to hear any issue regarding the substance of the Rule. Instead, the Supreme Court focused narrowly on the Finding under Section 112(n)(1)(A), and did not suggest that the flaw that it identified in the Finding would have any impact on the form, content or scope of the Rule under Section 112(d).

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[12] Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990).

[13] Congress envisioned that EPA would make its finding in the mid-1990s, and that the rules would be adopted promptly thereafter if EPA found that regulation was "appropriate and necessary." *See* 42 U.S.C. §§ 7412(c)(5), (n)(1)(A).

There is no basis in the Supreme Court's decision on which to disturb this Court's unanimous decision upholding the substance of the Rule.

If vacatur of the Finding would not disturb the Rule, then there is little to say regarding the second *Allied-Signal* factor. As discussed below, a vacatur of the Rule would have enormous "disruptive consequences," but vacatur of the Finding alone would make little difference to either side. Petitioners would not benefit from a vacatur of the Finding alone; EPA already intends to reconsider the Finding, and its reconsidered finding will no doubt be subject to litigation either in this proceeding or a new one. Industry would not be harmed by a vacatur of the Finding alone; it will continue to comply with the Rule as long as it remains in effect, and so industry expectations (not to mention the environmental and public health benefits of the Rule) will remain intact. If vacatur of the Finding does not require vacatur of the Rule, the Court's decision should be guided only by the first *Allied-Signal* factor – the "extent of doubt whether the agency chose correctly."

2. If vacatur of the Finding would affect the Rule, the vacatur would have severe "disruptive consequences."

Vacating the Rule would have severe disruptive consequences to the electric generation sector. The electric power industry is characterized by large capital investment and long-term planning horizons. Berg Decl. ¶¶ 10-13. These investment decisions require some degree of certainty about the conditions in which the industry will operate in the future. For nearly four years the generation industry has

understood that the Rule would go into effect in April 2015, that some power plants might receive extensions until April 2016, and that after April 2016 virtually all coal- and oil-fired power plants in the country would be required to comply with the Rule. *See id.* ¶¶ 5-7. There has been no reason to believe otherwise, and now nearly four years of investment in generation and transmission capacity, plant retirements, sales of generation portfolios and prosecution of electricity rate cases is dependent on the Rule remaining in effect.

The Rule has prompted a variety of responses. Certainly, generation owners have upgraded many power plants with emission controls, but that is far from the only consequence of the Rule. Generators have entirely restructured their generation portfolios, retiring older, inefficient power plants and selling others to reduce exposure to the Rule. *Id.* ¶ 9. Coal plants offered for sale have been targets for speculators. Companies have invested in natural gas generation, which is not covered by the Rule, but which competes directly against coal-fired generation. As Tri-State Generation & Transmission Company's several recent motions demonstrate, companies have invested in new transmission capacity to accommodate new power plants and the retirement of existing plants.[14] All of these plans are economically justified by the reasonable expectation that the Rule would remain in effect.

Pollution control costs such as those necessary to comply with the Rule factor into the price generators must charge for their electricity. Berg Decl. ¶¶ 18-20. Since

[14] Document No. 1569466 at 14, Exhibit 4.

the Rule was adopted, electric generators have based their electricity price predictions on the expectation that the Rule would remain in effect. If the Rule were vacated, all of these price predictions, on which generators based not only their past investment decisions but their future plans, would be undermined. This uncertainty would adversely affect all generators, as price certainty is essential not only to generators in competitive wholesale electricity markets, but also to vertically integrated generators whose "sales" are comprised of state-regulated electricity rates. *Id.* ¶¶ 18-21. Moreover, generators that intended to retire power plants without pollution controls in response to the Rule could keep those plants open. Generators that complied with the Rule in a timely manner would then be at a price disadvantage to the operators of these uncontrolled plants, which will have lower operating costs due to their lack of pollution controls. *Id.* ¶ 20.

Any long term interruption in the Rule would also affect the capacity payments earned by generators. *Id.* ¶ 22. In many areas of the country, in order to assure that adequate generation capacity will be available in the future, the regional transmission organizations or independent system operators that manage the electric grid pay generators to commit their power plants to be available in the future. *Id.* ¶¶ 12-13. For example, each May the country's largest grid operator, PJM Interconnection, Inc., conducts an auction to assure generation capacity three years later (that is, the May 2015 auction covers June 2018 through May 2019). Of course, power plants that are to be retired will not be "available" after they retire, and so capacity prices are very

sensitive to power plant retirements. *Id.* ¶ 12. Again, if the Rule is interrupted for a year or more, plants that were expected to retire may remain open, undermining predicted capacity prices that were relied upon by generators that upgraded their plants to comply with the Rule. *See id.* ¶¶ 18-19, 22.

Furthermore, it is not only the electric generation industry that has responded to the Rule. The pollution control industry has made massive investments to ensure that power plants seeking to comply with the Rule have cost-effective options. The lower-than-expected compliance costs discussed above are due in part to pollution control industry investments in manufacturing capacity and the development of new and improved products, such as activated carbon for mercury removal and sorbents for acid gas removal. These investments, as much as $1 billion, were made to respond to demand created by the Rule; if the Rule does not remain in effect, that demand will dry up and the investments will be devalued. Staudt Decl. ¶ 16.

If the Court were to vacate the Rule, there is a real question about when the Rule could once again go into effect after EPA reaffirms the Finding, and if, when it did, the standards in the Rule would be the same. An administrative rule that is "vacated" is typically void *ab initio*, and if it is to be reinstated absent Court action (as in *North Carolina*), the agency must ordinarily adopt the rule again. Therefore, after EPA reaffirmed the Finding, EPA would still need to propose and readopt a "new" version of the Rule, a process that may take a year or more. Even if this "new" rule is

in all respects the same as the vacated Rule,[15] it would be subject to judicial review to the same extent as any new rule, and petitioners would have the opportunity to raise to this Court many of the same arguments the Court has already heard and dismissed. In any case, if the Rule were vacated, electric generators would certainly be unable to rely on the Rule, or anything like it, to salvage the investments they have already made. Berg Decl. ¶¶ 19-22. Therefore, if vacatur of the Finding would affect the Rule, the second *Allied-Signal* factor weighs heavily against vacatur.

C. The *Allied-Signal* Factors Counsel That The Court Not Vacate Either The Finding Or The Rule.

The *Allied-Signal* factors call upon this Court to exercise practical judgment. EPA has stated in its filings in this case that it intends to reconsider the Finding, and to conclude its reconsideration by Spring 2016.[16] As discussed above, there is no genuine doubt as to the outcome of this process; EPA is overwhelmingly likely to conclude that, even considering cost, it is "appropriate" to regulate hazardous air pollutant emissions from power plants. Even allowing for the remote possibility that

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[15] EPA could be required to develop even more stringent emission standards if the Rule were vacated. Section 112(d)(3) requires that EPA adopt standards no less stringent than the average of the best performing twelve percent of all sources for which EPA has data. 42 U.S.C. § 7412(d)(3). Assuming that EPA has collected data from better performing plants since 2011, standards adopted after a vacatur of the Rule might be required to be more stringent than those in the Rule. Thus, power plants that upgraded to comply with the Rule may be forced to upgrade again to meet the new, more stringent standards.

[16] Document No. 1570353 at 8 n.4.

EPA could reach the contrary conclusion, the practical and equitable approach in this case is to remand the Finding without vacatur.

If the Court were to vacate the Rule in late 2015 only to see EPA reaffirm the Finding a few months later, the disruptive consequences would be severe. *See* Berg Decl. ¶ 21. The electric industry would have been thrown into turmoil for nothing. In that circumstance, the Court would be forced in short order to decide when and how to reinstate the Rule, if the Court indeed retains the authority to do so. Otherwise, EPA would have to readopt not only the Finding but the Rule, at which time the "new" Rule would be subject to review. Until a new rule is adopted and the ensuing litigation is resolved, the power industry would remain in a state of uncertainty as to if and when the standards in the Rule will once again apply, and the value of its investments over the last four years would be jeopardized.

On the other hand, if the Court does not vacate the Finding but EPA concludes in a few months that it is not "appropriate" to regulate power plants under Section 112, the harm will be small. The State petitioners will suffer no harm, and other petitioners will suffer only whatever incremental harm might result from complying with the Rule for the few months between the Court's decision and EPA's hypothetical finding that regulation is not "appropriate." This harm consists primarily of the incremental operating costs of pollution controls already installed to comply with the Rule. There are no material additional capital expenditures planned before April 2016. Staudt Decl. ¶¶ 3-4, 15. Were EPA to decide that it is not "appropriate"

to regulate, EPA could give its new finding immediate effect by administratively suspending the Rule. *See, e.g.*, 72 Fed. Reg. 37,107 (July 9, 2007) (administratively suspending requirements for cooling water intake structures following decision).

Even if the Court believes that the odds of EPA deciding that regulation of power plants is "appropriate" or "not appropriate" are even, the adverse consequences of vacating the Rule for a short time when EPA ultimately reaffirms the Finding are far greater than those of allowing the Rule to remain in effect for a few more months even if EPA ultimately withdraws the Finding. Therefore, the only practical approach consistent with *Allied-Signal* is to remand the Finding without vacatur of the Finding or the Rule.

Since the Rule was adopted, the generation industry has invested billions of dollars in complying with the Rule. That investment has irrevocably transformed the industry. Here, as in *Sugar Cane Growers Co-op. of Florida v. Veneman*, 289 F.3d 89, 97 (D.C. Cir. 2002), "[t]he egg has been scrambled and there is no apparent way to restore the *status quo ante*." Here, it is likely – not merely "at least possible," *id.* at 98 – that EPA will repair its error by reaffirming the Finding after considering cost. To vacate the Rule would elevate process over substance, and conflict with the reasoned, practical approach of *Allied Signal* and its progeny.

CONCLUSION

Given the record before the Court, including the actual cost experience of industry, there is no genuine doubt that EPA "chose correctly" in making the Finding,

and that it will reach the same conclusion even after considering cost. While a vacatur of the Finding alone may be inconsequential, a vacatur of the Rule would have severely "disruptive consequences" for the electric generation industry. Accordingly, consistent with the application of the *Allied-Signal* factors, this Court should remand the Finding without vacatur, and should take no action with respect to the Rule.

September 24, 2015

Respectfully submitted,

/s/ Brendan K. Collins

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CERTIFICATE OF SERVICE

I, Brendan K. Collins, a member of the Bar of this Court, hereby certify that on September 24, 2015, I electronically filed the foregoing "Motion of Industry Respondent Intervenors to Govern Future Proceedings" with the Clerk of the Court for the United States Court of Appeals for the D.C. Circuit by using the appellate CM/ECF system, which will serve registered counsel through the Court's CM/ECF system.

/s/ Brendan K. Collins
Brendan K. Collins

EXHIBIT A

ARGUED DECEMBER 10, 2013
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DECLARATION OF JAMES E. STAUDT, PH.D., CFA

I, James E. Staudt, make the following declaration in support of the Motion of Industry Respondent Intervenors to Govern Future Proceedings, and declare under penalty of perjury that the following is true to the best of my knowledge, information and belief:

1. I am an engineer and Chartered Financial Analyst with decades of experience in all aspects of energy and air pollution control in the electricity generation sector, as reflected in my CV attached hereto as Exhibit 1. I conduct market studies for the air pollution control industry and, as part of my business,

routinely track the installation of air pollution control equipment on power plants. This is done by review of publicly available information and by direct interaction with people who work at air pollution control companies and at power companies.

2. As reflected in the report attached hereto as Exhibit 2, I have conducted a review of the actual costs that have been incurred by the power generation industry to comply with EPA's Mercury and Air Toxics Standards (the "Rule") and compared these costs to those that EPA estimated *ex ante* as reflected in EPA's Regulatory Impact Analysis ("RIA") for the final Rule.

3. The data regarding costs reflect the final data regarding actual compliance costs through June 30, 2015 and projections of additional measures that might be implemented by the extended deadline of April 2016 for complying with the Rule. The data reflect all existing contracts for the installation of any air pollution control systems that represented any material aspect of EPA's cost estimate in the RIA. Further, all contracts that would be required to install equipment to meet the requirements of the Rule by even the extended deadlines will have been executed and will be reflected in the publicly available data.

4. To the extent that a contract has not been executed for a generating unit operating under a compliance extension, the owner of the generating unit will plan to retire that unit or to use natural gas in lieu of coal or oil to fuel the unit.

5. Experience with technologies deployed for compliance with the Rule has shown them to be less expensive and more effective than originally assumed in EPA's analysis. Technological improvements and a lower price of natural gas than originally projected have further reduced costs. As a result, the true cost of complying with the Rule is approximately $7 billion per year less than estimated by EPA, making the true cost of the Rule approximately $2 billion or less than one-quarter of what EPA originally estimated the Rule to cost.

6. The reduced actual cost of meeting the Rule's emissions limits are due to the facts that: (1) improvements in dry sorbent injection ("DSI") and activated carbon injection ("ACI") technologies have significantly lowered the costs of those pollution control systems; (2) natural gas prices have been significantly lower than those upon which EPA's estimates were premised; and (3) EPA overestimated the generation capacity that would require installation of fabric filters (also known as baghouses), dry flue gas desulfurization ("FGD") systems and wet FGD upgrades. As a result of EPA's overestimate of the generation capacity requiring those systems, the amortized capital costs, costs associated with fuel changes, variable operating and maintenance costs, and fixed operating and maintenance costs associated with each of these systems were also overestimated. The effect has been that the actual costs have been significantly lower than EPA's *ex ante* estimates.

7. With respect to fabric filter installations, EPA's Air Markets Program Data show only about 82 GW of Electric Utility or Small Power Producer Generation equipped with baghouses for particulate matter control at the end of second quarter 2015. My firm and its clients, who include manufacturers of pollution control equipment, are aware of about 8.7 GW in capacity of additional fabric filter projects currently underway at power plants that received compliance extensions and are not associated with new FGD systems. In other words, the RIA overestimated the fabric filter installations by about 100 GW (191 GW of total fabric filter projected to be installed versus about 91 GW).

8. With respect to dry FGD, EPA's RIA forecast 51 GW of dry FGD to be installed in the Policy Case versus 29 GW in the Base Case, when, in fact, Air Markets Program Data show that at the end of second quarter 2015 there were only about 33 GW of dry FGD installed, so that the RIA overestimated the required installations by 18 GW. Although additional dry FGD installations are planned in the coming years, these are primarily being installed for Regional Haze Rules or for other SO_2 reduction needs.

9. With respect to wet FGD upgrades, EPA's forecast of 63 GW in wet FGD upgrades is also higher than the actual capacity that has been installed. In 2015 there was about 170 GW of wet FGD installed on coal-fired electric utility units or small power plants and just over 2 GW of additional wet scrubber capacity in

requested compliance extensions. On the other hand, a review of EPA's 2009 Information Collection Request data shows only about 7,600 MW of the roughly 52,000 MW of capacity with wet FGD installed that reported hydrochloric acid emissions to the Information Collection Request, or about 15%, had hydrochloric acid emissions in excess of the Rule's emissions limit. This would suggest only about 30 GW of wet FGD upgrades to be expected. About 16 GW of wet FGD upgrades have been identified in applications for compliance extensions. While there is no official data showing the level of wet FGD upgrades, it is reasonable to assume that at least 16 GW and no more than 30 GW of wet FGD upgrades will be performed for compliance with the Rule. To that point, most of the wet FGD upgrades were justified on the basis of improved SO_2 control for other regulatory programs such as the Cross-State Air Pollution Rule.

10. EPA's estimates for the operating costs associated with DSI and for ACI did not account for the improved performance of these reagents or sorbents in reducing the demand for reagent/sorbent or the cost of waste disposal. EPA also forecast an increase in fuel cost as natural gas replaced coal as utility fuels.

11. EPA's forecast Policy Case projected a cost of natural gas in 2015 of $5.66/MMBtu versus $5.40/MMBtu in its Base Case. Data from the Energy Information Administration indicates that in 2015 natural gas to utility customers has ranged from a high of $4.99/thousand cubic feet down to $3.24/thousand cubic

feet, or about $4.99/MMBtu to about $3.24/MMBtu because a cubic foot of gas has very close to 1,000 Btu's of energy. Therefore, much lower natural gas prices than forecast by EPA have made gas a much more attractive fuel and has resulted in the cost of compliance with the Rule to be much lower than anticipated.

12. Table 1 summarizes the overestimate in costs resulting from EPA's overestimate of the new air pollution control equipment that would be required to comply with the Rule:

Table 1. Approximate overestimate of costs

	FF [1]	dry FGD [2]	DSI [3]	wet FGD [4]	ACI [5]	Total
Capital, million $	$16,072	$8,838	$0	$5,692	$414	$31,016
Annualized, capital, million $	$1,816	$999	$0	$643	$47	$3,505
Operating costs, million $	$102	$391	$1,400	$37	$1,787	$3,718
Total Annual Million $	$1,918	$1,390	$1,400	$680	$1,834	$7,223

Notes:

1. *The overestimate of FF is the amount over actual installations that is not explained by dry FGD*
2. *Dry FGD estimate for excess dry FGD over actual installed*
3. *DSI estimate assumes that actual reagent is roughly one third of EPA assumption.*
4. *Wet FGD upgrade assumes 30 GW of actual upgrade versus 63 GW predicted. No formal data is available. Also factors in the fact that the actual reduction in wet FGD versus the Base Case was greater than forecast by EPA*
5. *Accounts for: EPA assumption about fly ash waste for facilities where fly ash is collected with carbon; higher carbon demand from units with ESP versus TOXECON because EPA assumed more TOXECON installations, which include new baghouses; overestimate of ACI installations after rule is fully implemented*

13. My analysis of the dramatic reductions in cost is also reflected in the securities filings of electricity generating companies, which show a consistent pattern of actual costs falling significantly below those that were originally projected, as reflected in Exhibit 3.

14. EPA's original estimate of cost of $9.6 billion per year in 2015 exceeds the actual cost to utilities by over $7 billion. These results are neither unusual nor are they surprising. In virtually all cases where *ex ante* estimates of the costs of complying with pollution control requirements are compared with actual pollution control costs, the actual costs are significantly lower than the costs originally estimated both by EPA and by industry, sometimes by an order of magnitude.

15. Moreover, at this point all fixed capital expenses have already been incurred or must be paid pursuant to existing contracts. Therefore, a large portion of the expense of the Rule is already committed. I have also conducted a rough bottom up estimate of the costs of the Rule, in which I have used conservative estimates. This estimate is that the total cost of the Rule is now slightly less than $2 billion per year, with almost half of that cost amortized capital that has already been committed. Thus, the remaining costs will likely be less than $1 billion.

16. Finally, the companies that supply activated carbon and DSI reagents have invested at least several hundred million dollars and perhaps close to one billion dollars in the United States into new manufacturing plants, plant expansions, additional personnel, and supply chain infrastructure in order to produce the materials necessary to meet the anticipated ongoing and future demand of the utility industry for these materials in complying with the Rule. These investments were necessary for the development and production of the improved reagents that

have enabled the utility industry to avoid many of the capital costs identified in paragraphs 7 through 9 and are also responsible for the reduction in operating costs associated with DSI and ACI as discussed in paragraph 10. In the event the Rule is vacated, this will dramatically reduce the demand for these products, have a severe negative impact on these companies and their employees, and will disrupt the ability of these companies to serve the electric utility and other markets in the future.

Dated: September 24, 2015

James E. Staudt

Exhibit 1

James E. Staudt, Ph.D., CFA

Dr. Staudt has been involved in the energy sector for several decades, and is a nationally-recognized expert in the energy and air pollution control and monitoring industries. He has experience that spans many aspects of power generation to include use of fossil energy, turbomachinery, nuclear energy, energy storage and process sensor development. His experience also spans other energy-intensive industries, such as Portland Cement, Refining, Iron & Steel, Pulp & Paper and others. Dr. Staudt has a deep knowledge of both the technical issues of the energy industry as well as economics and finance as they relate to this industry.

- Dr. Staudt has authored emissions control technology documents and software that are licensed by professionals in the United States, Europe, and Asia.
- He has worked with state and federal agencies on regulation of emissions from fossil fueled power plants and major industrial facilities.
- He has advised owners of energy and manufacturing facilities on how to most cost-effectively meet their environmental obligations.
- He has advised technology suppliers on business strategy, to include market analysis, mergers and acquisitions, and valuation of businesses.
- He has advised investors in energy and environmental sector companies.to include valuations
- Dr. Staudt is a reviewer for the Mass Ventures START program for the Commonwealth of Massachusetts. START is a program funded by the Commonwealth of Massachusetts to assist Massachusetts-based companies that have been successful in the Federal Small Business Innovation Research (SBIR) program.

Dr. Staudt's experience in the energy and air pollution sectors spans over three decades. Prior to starting his consulting practice, Andover Technology Partners (ATP), in 1997, Dr. Staudt was employed by suppliers of air pollution control or monitoring technology and energy industry equipment. At these employers he was in senior management roles and developed technologies that are widely used at industrial facilities. He was a founder of a process sensor and analyzer company. Previous employment also includes serving as a commissioned officer in the US Navy nuclear power program.

Dr. Staudt has published over 60 technical papers, articles or reports and has also authored numerous reports for clients as part of his consulting practice.

Education and Professional Credentials

- B.S. in Mechanical Engineering from the U.S. Naval Academy (1979)
- M.S. (1986) in Engineering from the Massachusetts Institute of Technology (M.I.T.)
- Ph.D (1987) in Engineering from the Massachusetts Institute of Technology (M.I.T.) with a minor in Business Management
- Chartered Financial Analyst (CFA) designation (2001)

Awards

2007 US Environmental Protection Agency Science and Technology Achievement Award

- *Providing the Public with a Comprehensive Summary of Technologies for Control of Mercury Emissions from Electric Utility Boilers*

Business and Professional Associations

- Member, CFA Institute
- Associate Member, Institute of Clean Air Companies

Military Service

From 1979 to 1984 Dr. Staudt served as a commissioned officer in the U.S. Navy in the Engineering Department of the nuclear-powered aircraft carrier USS ENTERPRISE (CVN-65), attaining the rank of Lieutenant (O-3) prior to leaving the service.

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James E. Staudt, Ph.D.
PUBLICATIONS

1. Staudt J., Macedonia, J., "Evaluation of Heat Rates of Coal Fired Electric Power Boilers", presented at the MEGA Symposium, August 19-21, 2014
2. Staudt, J. "Assessment of Bias in Measurement of Mercury Emissions from Coal Fired Power Plants – Comparison of Electronic CEMS and Sorbent Traps", Presented at the 10th Annual 10th IEA Mercury Emission from Coal Workshop, Clearwater, FL, April 23-25, 2014
3. Staudt, J., "Candidate SO_2 Control Measures for Industrial Sources in the LADCO Region", for Lake Michigan Air Director's Consortium,, January 24, 2012.
4. Staudt, J., "Engineering and Economic Factors Affecting the Installation of Control Technologies– An Update", for US EPA Clean Air Markets Division, December 15, 2011
5. Staudt, J., "Air Pollution Compliance Strategies for Coal Generation", EUCI, Arlington, VA, December 5-6, 2011 available at www.AndoverTechnology.com
6. Staudt, J., "Labor Availability for the Installation of Air Pollution Control Systems at Coal Fired Power Plants" , October 31, 2011, at www.AndoverTechnology.com
7. Staudt. J. and M J Bradley & Associates, for the Northeast States for Coordinated Air Use Management, "Control Technologies to Reduce Conventional and Hazardous Air Pollutants from Coal-Fired Power Plants", March 31, 2011
8. Staudt, J., "Surviving the Power Sector Environmental Regulations", The Bipartisan Policy Center's, National Commission on Energy Policy (NCEP), Workshop on Environmental Regulation and Electric System Reliability, Washington, DC October 22, 2010
9. Staudt, J., "White Paper – Availability of Resources for Clean Air Projects", October 1, 2010, abstract available at: www.AndoverTechnology.com
10. Staudt, J, Hoover, B., Trautner, P., McCool, S., Frey, J., "Optimization of Constellation Energy's SNCR System at Crane Units 1 and 2 Using Continuous Ammonia Measurement", The MEGA Symposium, Baltimore, MD, August 31-September 2, 2010
11. Staudt, J., White , J., Heinlein, C., Hoover, B., Trautner, P., Airey, R., McCool, S., Frey, J., and Afonso, R., "Optimization of SNCR Systems with Continuous Measurement of Ammonia Slip at Constellation Energy's Crane Units 1 and 2", International Power Generation Conference, Las Vegas, NV, December 8-10, 2009
12. Staudt, J., "Commercializing technologies: The buyer's perspective - Experience from the Clean Air Act", 3rd US Carbon Finance Forum, New York City, September 15-16, 2009
13. Yang, X., Tran, P., Shore, L., Mack, S., Staudt, J., "Pollutant emission control sorbents and methods of manufacture", US Patent No. 7,575,629, August 18, 2009.
14. Staudt, J., Erickson, C., "Selective Catalytic Reduction System Performance and Reliability Review – An Update", Power Gen, Orlando FL, December 2-4, 2008
15. Staudt, J., Khan, S., "Updating Performance and Cost of SO_2 Control Technologies in the Integrated Planning Model and the Coal Utility Environmental Cost Model", EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, Baltimore, MD, August 28-31, 2006
16. Erickson, C., Staudt, J., "Selective Catalytic Reduction System Performance and Reliability Review", EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, Baltimore, MD, August 28-31, 2006
17. Srivastava, R., Hutson, N., Princiotta, F., Martin, G., Staudt, J., "Control of Mercury Emissions from Coal-Fired Electric Utility Boilers", Environmental Science & Technology, 41(5):1385-1393 (2006)
18. Mann, A., Sarkus, T., Staudt, J., "SCR Comes of Age", Environmental Manager, published by the Air and Waste Management Association, November 2005, pp. 22-26.
19. Srivastava, R., Neuffer, W., Grano, D., Khan, S., Staudt, J., and Jozewicz, W., "Controlling NOx Emissions from Industrial Sources", Environmental Progress, Wiley Interscience, Volume 24, No. 2, July 2005, pp. 198-213.
20. Srivastava, R., Staudt, J., and Jozewicz, W., "Preliminary Estimates of Performance and Cost of Mercury Emission Control Technology Applications on Electric Utility Boilers: An Update", Environmental Progress, Wiley Interscience, Volume 24, No. 2, July 2005, pp. 181-197.
21. Staudt, J., Khan, S., Oliva, M., "Reliability of Selective Catalytic Reduction (SCR) and Flue Gas Desulfurization (FGD) Systems for High Pollutant Removal Efficiencies on Coal Fired Utility Boilers", presented at the EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, August 30-September 2, 2004, Washington, DC, Paper # 04-A-59-AWMA
22. Srivastava, R., Staudt, J., and Jozewicz, W., "Preliminary Estimates of Performance and Cost of Mercury Emission Control Technology Applications on Electric Utility Boilers: An Update", presented at the EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, August 30-September 2, 2004, Washington, DC, Paper # 04-A-59-AWMA
23. Wicker, K., and Staudt, J., "SCR Maintenance Fundamentals" Power Magazine, June 2004

24. Staudt, J., "Minimizing the Impact of SCR Catalyst on Total Generating Cost Through Effective Catalyst Management", Proceedings, ASME Power 2004, ASME Power Conference, Baltimore, Maryland, March 30 - April 1, 2004
25. Staudt, J., "Optimizing Compliance Cost for Coal-Fired Electric Generating Facilities in a Multipollutant Control Environment", Proceedings ASME Power 2004, ASME Power Conference, Baltimore, Maryland, March 30 - April 1, 2004
26. Staudt, J.E., and Jozewicz, W., "Performance and Cost of Mercury and Multipollutant Emission Control Technology Applications on Electric Utility Boilers", EPA-600/R-03-110, October 2003
27. Staudt, J.E., "Optimizing Compliance Cost for Coal-Fired Electric Generating Facilities in a Multipollutant Control Environment" Presented at ICAC Forum 2003, Nashville, TN, October14-15, 2003
28. Staudt, J.E., Engelmeyer, A., "SCR Catalyst Management – Modeling and Experience", presented at Coal Gen, August 6-8, 2003, Columbus, OH
29. Staudt, J.E., Engelmeyer, A., "SCR Catalyst Management – Modeling and Experience", presented at the EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, May 20-25, 2003, Washington, DC, Paper # 03-A-57-AWMA
30. Staudt, J.E., Jozewicz, W., Srivastava, R., "Modeling Mercury Control with Powdered Activated Carbon" presented at the EPA-EPRI-DOE Combined Utility Air Pollution Control Symposium – The Mega Symposium, May 20-25, 2003, Washington, DC, Paper # 03-A-17-AWMA
31. Staudt, J.E., "NOx Emissions Trading Markets – An Approach for Using Them In Your Strategic Planning", DOE SCR/SNCR Conference, Pittsburgh, May 15-16, 2002Staudt, J.E., Andover Technology Partners, "Analysis of the Stationary Point Source NOx Control Market in the Houston Galveston Area", made available under license from Andover Technology Partners, April 2002
33. Staudt, J.E., Engelmeyer, A., Weston, W.H., Sigling, R., "Deactivation of SCR Catalyst from Arsenic – Experience at OUC Stanton and Implications for Other Coal-fired Boilers", DOE SCR/SNCR Conference, Pittsburgh, May 15-16, 2002Staudt, J.E., Andover Technology Partners, "Selective Catalytic Reduction – Operating Principles, Operating Guidelines, Troubleshooting Guide", made available under license from Andover Technology Partners, February 2002
35. Staudt, J.E., Engelmeyer, A., Weston, W.H., Sigling, R., "The Impact Of Arsenic On Coal Fired Power Plants Equipped With SCR", ICAC Forum 2002, Houston, February 12-13, 2002
36. Staudt, J.E., Engelmeyer, A., Weston, W.H., Sigling, R., "Analysis Of Arsenic In Coal, And The Impact Of Arsenic On Coal Fired Power Plants Equipped With SCR", 2001 EPRI SCR Workshop, Baltimore, November, 2001
37. "Status Report on NOx: Control Technologies and Cost Effectiveness for Industrial Boilers, Gas Turbines, IC Engines and Cement Kilns", report for Northeast States for Coordinated Air Use Management, September 2000.
38. Staudt, J.E., "Measuring Ammonia Slip from Post-Combustion NOx Reduction Systems", ICAC Forum 2000, Roslyn, VA, March 23-24, 2000
39. "Status Report on NOx: Control Technologies and Cost Effectiveness for Utility Boilers", report for Northeast States for Coordinated Air Use Management and Mid Atlantic Regional Air Management Association, June 1998.
40. Staudt, J.E., Kehrer, K., Poczynek, J., Cote, R., Pierce, R., Afonso, R., Miles, D., and Sload, A., "Optimizing Selective Non-Catalytic Reduction Systems for Cost-Effective Operation on Coal-Fired Electric Utility Boilers", presented at ICAC Forum '98, Durham, NC, March 19-20, 1998.
41. Staudt, J.E., "Application of Spectrascan□ Tunable Diode Laser Instruments to Fugitive Emissions and Process Monitoring", presented at Clean Air '96, Orlando, November 19-22, 1996.
42. Staudt, J.E., "Post-Combustion NOx Control Technologies for Electric Power Plants", A&WMA Annual Meeting, Nashville, TN, June 23-28, 1996.
43. Staudt, J.E., Casill, R.P., Tsai, T., Ariagno, L., and Cote, R., "Living with Urea Selective Non-Catalytic NOx Reduction (SNCR) at Montaup Electric's 112 MWe P.C. Boiler", ICAC Forum '96, Baltimore, March 19, 1996.
44. Staudt, J.E., Casill, R.P., Tsai, T., and Arigiano, L., "Commercial Application of Urea SNCR for NOx RACT Compliance on a 112 MWe Electric Utility Pulverized Coal Boiler" presented at the 1995 EPRI/EPA Joint Symposium on Stationary Combustion NOx Control, Kansas City, May 16-19, 1995.
45. Staudt, J.E., "Cost-effective Methods for NOx Compliance Through Selective Non-Catalytic Reduction (SNCR) and Combinations of SNCR with Other Technologies", presented at the Competitive Power Congress, Philadelphia, June 8-9, 1994.
46. Staudt, J.E., "Considerations for Retrofit of NOx Control Technologies on Power Boilers", presented at POWER-GEN 1993, Dallas, TX, November 17-19, 1993.
47. Staudt, J.E., "NO_x Control Technologies for Stationary Sources", publication, Hazmat World, May 1993.
48. Staudt, J.E., Confuorto, N., Grisko, S.E., Zinsky, L., "The NOxOUT Process for NO_x Reduction from an Industrial Boiler Burning Fiberfuel and Other Fuel", The American Power Conference, Chicago, IL, April 1993.
49. Staudt, J.E., "Overview of NO_x Emission Control for Utility Boilers", The American Power Conference, Chicago, IL, April 1993.
50. Staudt, J.E., Confuorto, N., Grisko, S.E., Zinsky, L., "NO_x Reduction Using the NOxOUT Process in an Industrial Boiler Burning Fiberfuel and Other Fuel", Presented at Forum '93 - The Institute of Clean Air Companies,

Baltimore, February 1993 Staudt, J.E., "Overview of NO_x Emission Control for Utility Boilers", The American Power Conference, Chicago, IL, April 1993.

51. Benson, C., Staudt, J. E. and Itse, D. C., "Controlling Emissions from Stationary Coal-Fueled Diesel Engines", Contractor's Meeting, Morgantown Energy Technology Center, 1991.
52. Ham, D.O., Persons, J. , technical review by J. Staudt, "High Temperature Reduction of NO_x in Oxygen Rich Environment", Canadian Electric Association Report, 1991.
53. Staudt, J.E., Moniz, G. and Ham, D.O., "Additives for NO_x Emissions Control from Fixed Sources", Final Report to Environmental Protection Agency, August 1990.
54. Swarden, M., Falkner, H., Brassert, W., and Staudt, J., "Jet Shredder Device for Classifying Waste Streams", U.S. Patent #4,986,479, 1989.
55. Staudt, J.E., Jansen, W., Birkholz, D., and Tuzson, J.J., "Intercooled and Recuperated Dresser-Rand DC990 Gas Turbine Engine", ASME Paper 89-GT-3, presented at the International Gas Turbine and Aeroengine Conference, Toronto, June 1989.
56. Staudt, J.E., "High Performance Intercooled and Recuperated Gas Turbine", Gas Research Institute Topical Report, GRI-88/0274, October 1988.
57. Staudt, J.E. and Lidsky, L.M., "An MGR Brayton-Cycle Power Plant Design", 22nd Annual Intersociety Energy Conversion Engineering Conference (IECEC), Philadelphia, August 10-14, 1987.
58. Staudt, J.E., "Design Study of an MGR Direct Brayton-Cycle Power Plant", Ph.D. Thesis, Department of Mechanical Engineering, Massachusetts Institute of Technology, 1987.
59. Toqan, M.A., Srinivasachar, S., Staudt, J.E., and Beér, J.M., "Combustion of High and Low Volatile Bituminous Coal Water Fuel", Coal Water Slurry 12th International Conference, New Orleans, March 31 - April 3, 1987
60. Staudt, J.E., Toqan, M.A., Srinivasachar, S., Beér, J.M., and Tear, J.D., "Fly Ash Particle Size in CWF Flames", Presented at the Eighth International Symposium on Coal Slurry Fuels Preparation and Utilization, Orlando, May 27-30, 1986.
61. Staudt, J.E., "Ash Characterization and Deposition in Coal Water Slurry and Pulverized Coal Flames", Master's Thesis, Department of Mechanical Engineering, Massachusetts Institute of Technology, 1986.
62. Beér, J.M., Farmayan, W.F., Teare, J.D., Toqan, M.A., Benedek, K., Kang, S.W., Srinivasachar, S., Staudt, J.E., Walsh, P.M., and Tae-U, Yu., "The Combustion, Heat Transfer, Pollutant Emission and Ash Deposition Characteristics of Coal-Water Fuels", Phase III Program Final Report, The Energy Laboratory, Massachusetts Institute of Technology, November 1985.
63. Walsh, P.M., Monroe, L., Staudt, J.E., Beér, J.M., Sarofim, A.F., and Toqan, M.A., "Comprehensive Studies of Coal Mineral Behavior During Combustion", Final Report, The Energy Laboratory, Electric Utility Program, Massachusetts Institute of Technology, October 1985.

Exhibit 2

Andover Technology Partners 978-683-9599
Consulting to the Air Pollution Control Industry

REVIEW AND ANALYSIS OF THE ACTUAL COSTS OF COMPLYING WITH MATS IN COMPARISON TO PREDICTED IN EPA'S REGULATORY IMPACT ANALYSIS

At this point we are in a position to make a post-hoc assessment of what the cost has been to comply with US EPA's Mercury and Air Toxics Standards (MATS) for power plants. In its Regulatory Impact Analysis (RIA) for the final rule.[1] EPA estimated a cost for the rule of $9.6 billion (2007 dollars) versus quantified benefits of between $33 billion to $81 billion, depending upon discount rate (plus other unquantified benefits). The $9.6 billion annual cost is primarily the cost to control coal-fired units, at an estimated $9.4 billion. This $9.4 billion includes the following components:

- Amortized capital
- Costs associated with change in fuel
- Variable operating and maintenance (VOM)
- Fixed operating and maintenance (FOM)

These costs are estimated using the Integrated Planning Model (IPM), which is described later. The fuel costs are associated with the costs of switching to natural gas or to lower chlorine coal.

Experience with technologies deployed for MATS compliance has shown them to be less expensive and more effective than originally assumed in EPA's analysis. Technological improvements and a lower price of natural gas than originally projected have further reduced costs. As a result, the true cost of complying with the MATS rule is approximately $7 billion per year per year less than estimated by EPA, making the true cost of the rule approximately $2 billion, or less than one-quarter of what EPA originally estimated the Rule to cost.

Except for the fuel charge, EPA's forecast of the cost impact of the MATS rule is determined in large part by the forecast of installed air pollution control equipment, which is shown in Figure 1. This figure shows the forecast installations (expressed as GW of installed capacity) in the Base Case and forecast installations in the case of the MATS rule. As shown, EPA forecast a reduction in wet FGD systems (fewer FGD retrofits in the policy case than in the Base Case) and increases in dry FGD systems, FGD upgrades, increase in Dry Sorbent Injection (DSI), an increase in Activated Carbon Injection (ACI), and increases in Fabric Filters (FF) and ESP upgrades. These forecasts are determined using ICF International's Integrated Planning Model (IPM), which is described briefly in the insert on the following

[1] Regulatory Impact Analysis for the Final Mercury and Air Toxics Standards, EPA-452/R-11-011, December 2011

page, and the methodology and assumptions for IPM are described in detail in the documentation found on EPA's web site.

Methods to comply with the regulation may include addition of control technology, changing fuels, or even retirement. For every technology considered EPA makes assumptions about the capital and operating cost of the technology and the performance of the technology with regard to emissions control performance. Costs for fuels are considered as well, and this is particularly important when an option is to change to different fuels. IPM selects the approach that provides the lowest cost to comply, or, alternatively, the highest future value for operation of the facility. IPM estimates the future dispatch of the facility based upon the economics of that facility relative to other facilities in the region. In cases where the facility is determined to be uneconomical to operate in the future, IPM will determine that the facility will be retired and electricity supplied from other sources.

According to the RIA issued with the final rule: *"This analysis projects that by 2015, the final rule will drive the installation of an additional 20 GW of dry FGD (dry scrubbers), 44 GW of DSI, 99 GW of additional ACI, 102 GW of additional fabric filters, 63 GW of scrubber upgrades, and 34 GW of ESP upgrades. . . .With respect to the increase in operating ACI, some of this increase represents existing ACI capacity on units built before 2008. EPA's modeling does not reflect the presence of state mercury rules, and EPA assumes that ACI controls on units built before 2008 do not operate in the absence of these rules. In the policy case, these controls are projected to operate and the projected compliance cost thus reflects the operating cost of these controls. Since these controls are in existence, EPA does not count their capacity toward new retrofit construction, nor does EPA's compliance costs projection reflect the capital cost of these controls (new retrofit capacity is reported in the previous paragraph)."*

EPA uses the Integrated Planning Model (IPM) to analyze the projected impact of environmental policies on the electric power sector in the 48 contiguous states and the District of Columbia. Developed by ICF Consulting, Inc. and used to support public and private sector clients, IPM is a multi-regional, dynamic, deterministic linear programming model of the U.S. electric power sector. It provides forecasts of least-cost capacity expansion, electricity dispatch, and emission control strategies for meeting energy demand and environmental, transmission, dispatch, and reliability constraints. IPM can be used to evaluate the cost and emissions impacts of proposed policies to limit emissions of sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon dioxide (CO_2), and mercury (Hg) from the electric power sector. The IPM was a key analytical tool in developing the Clean Air Interstate Rule (CAIR).

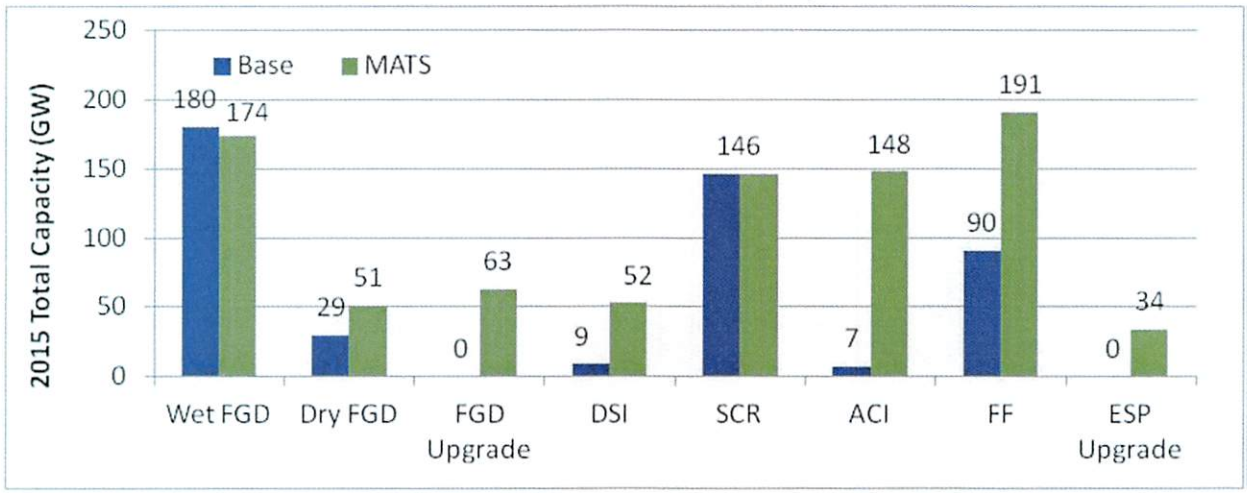
Among the factors that make IPM particularly well suited to model multi-emissions control programs are (1) its ability to capture complex interactions among the electric power, fuel, and environmental markets; (2) its detail-rich representation of emission control options encompassing a broad array of retrofit technologies along with emission reductions through fuel switching, changes in capacity mix and electricity dispatch strategies; and (3) its capability to model a variety of environmental market mechanisms, such as emissions caps, allowances, trading, and banking. IPM's ability to capture the dynamics of the allowance market and its provision of a wide range of emissions reduction options are particularly important for assessing the impact of multi-emissions environmental policies like CAIR.

http://www.epa.gov/airmarkets/progsregs/epa-ipm/

Now that we know what companies have done to comply with the MATS rule, we are in a position to determine how accurate this forecast was. There are a few things that stand out about the methods that were projected by EPA for industry to comply with the rule:

- The very high level of projected fabric filter systems
- The level of projected dry FGD systems
- The level of scrubber upgrades
- The high cost of dry sorbent injection ("DSI") and activated carbon injection ("ACI") systems that did not take account of technological advances reducing those costs
- The limited amount of fuel switching compared to actual levels driven by low shale gas prices

Figure 1. Operating Pollution Control Capacity on Coal-fired Capacity (by Technology) under the Base Case and with MATS, 2015 (GW)[2]



Fabric Filter - EPA's Air Markets Program Data shows only about 82 GW of Electric Utility or Small Power Producer Generation equipped with baghouses for particulate matter control at the end of second quarter 2015. Another 8.7 GW of fabric filter projects – not part of dry FGD projects - are underway with extensions for a total of perhaps 91 GW.[3] In other words, IPM overestimated the baghouse installations by about 100 GW (191 GW of total FF projected to be installed versus 91 GW) as shown in Figure 2. This is related to assumptions about DSI, dry FGD and the need for PM upgrades.

Dry FGD - IPM forecast 51 GW of dry FGD to be installed in the MATS policy case versus 29 GW in the Base Case when, in fact, AMPD data shows that at the end of second quarter 2015 there were only about 33 GW of dry FGD installed – or an overestimate of 18 GW as shown in Figure 2. Although there are an estimated 22 GW of dry FGD projects underway to be completed in the coming years and MATS extensions have been permitted associated with these projects,[3] these

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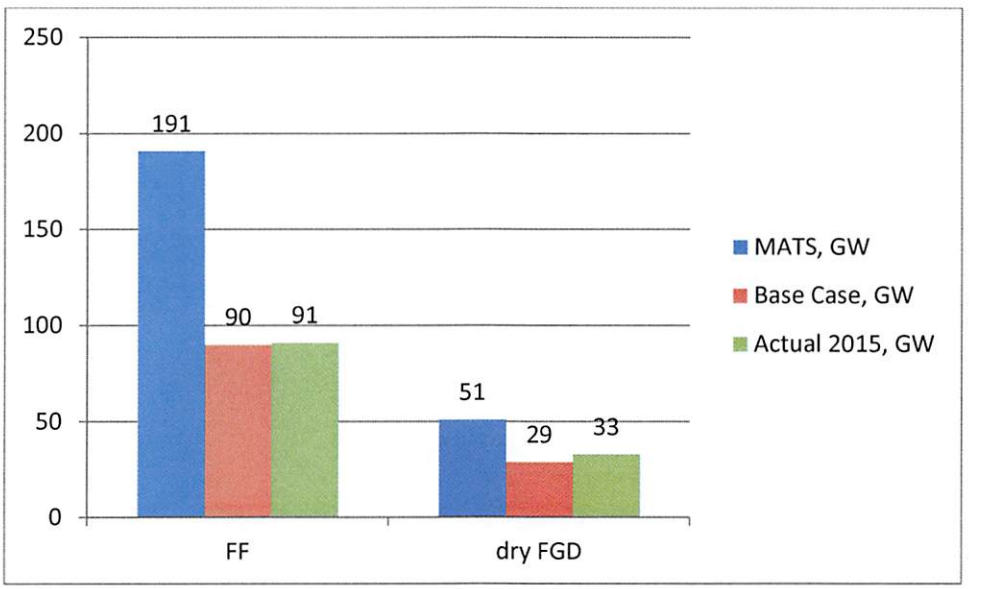
2 Note: The difference between controlled capacity in the base case and under the MATS may not necessarily equal new retrofit construction, since controlled capacity above reflects incremental operation of dispatchable controls in 2015. Additionally, existing ACI installed on those units online before 2008 are not included in the base case to reflect removal of state mercury rules from IPM modeling. For these reasons, and due to rounding, numbers in the text below may not reflect the increments displayed in this figure. See IPM Documentation for more information on dispatchable controls.

3 Michael J. Bradley and Associates, "MATS Compliance Extension Status Update", MJB&A Issue Brief, June 24, 2015. Examination of the underlying data showed that of the 17 GW of FF with extensions, 8.3 GW were associated with FGD systems, leaving 8.7 GW of FF not associated with FGD.

dry FGD systems are primarily part of plans for compliance with the Regional Haze Rule or other SO_2 control requirements.

Scrubber upgrades – EPA's forecast of 63 GW in wet FGD upgrades is higher than actual. In 2015 there was about 170 GW of wet FGD installed on coal fired electric utility units or small power plants. On the other hand, a review of the Information Collection Request (ICR) data shows only about 7,600 MW of the roughly 52,000 MW of capacity with wet FGD installed that reported HCl emissions to the ICR, or about 15%, had HCl emissions in excess of the MATS limit. This would suggest only about 30 GW of FGD upgrades to be expected. About 16 GW of scrubber upgrades have been identified in applications for MATS extensions.[3] While there is no official data showing the level of wet FGD upgrades, it is reasonable to assume that at least 16 GW and no more than 30 GW of scrubber upgrades were performed. To that point, most of the FGD system upgrades were justified on the basis of improved SO_2 control for CAIR or CSAPR rather than MATS.

Figure 2. MATS and Base Case projections, and 2015 actual or planned installations of FF and dry FGD, expected to be directly a result of MATS, GW



The projected fixed and variable operating costs are also impacted by the type of equipment projected to be used and the assumed reagent usage rates for this equipment. Of particular concern with regard to variable operating cost are reagent usage assumptions relating to dry sorbent injection (DSI).
This Report will review each of the following as they relate to EPA's projection of cost to the MATS rule.

- Capital and operating cost projections relating to EPA forecasts for DSI
- Capital and operating cost projections relating to EPA forecasts for dry FGD
- Forecasts for PM control retrofits to fabric filters
- Forecasts for ACI variable operating and maintenance costs

- Fuel cost projections

Projections for the capital and operating costs for Dry Sorbent Injection (DSI)

In practice, DSI may be deployed for control of SO_3, HCl or SO_2. For SO_3 control the DSI system may be deployed in combination with an ACI system to enhance the Hg capture of the ACI system. On the other hand, IPM only forecasts DSI systems for MATS compliance as a means for controlling HCl. Therefore, many of the DSI systems installed to enhance Hg control in response to the MATS rule were not installed to control the pollutant EPA targeted DSI for. By and large, DSI systems for SO_3 control, however, are quite inexpensive to own and operate compared to those used for SO_2 or HCl control as a result of the comparatively very low reagent demand necessary to control SO_3. Therefore, the costs of the DSI systems associated with SO_3 capture can be ignored when compared against these other costs.

DSI capital cost

EPA's assumptions regarding use of a fabric filter in combination with DSI and EPA's assumptions about DSI treatment rates for controlling HCl introduce a number of issues. As described in Section 5.5.3 of the IPM documentation, EPA assumes that facilities that select DSI for reduction of HCl emissions always install a fabric filter. Treatment rate is assumed by EPA to be at a Normalized Stoichiometric Ratio of 1.55 using milled Trona per Appendix 5-4 of the IPM v4.10 documentation.[4] Experience has shown that lower treatment rates are possible without the need to retrofit a fabric filter.

Sodium based sorbents, such as Trona actually improve ESP capture efficiency due to the beneficial impact on fly ash resistivity making a fabric filter retrofit unnecessary. In fact, very few DSI systems that have been installed in response to the MATS rule entailed installation of a fabric filter. EPA's overestimation of fabric filters is due in part to the assumption that use of DSI for HCl control requires a baghouse. Assuming that the 9 GW of DSI forecast in the Base Case does not have FF, this means that IPM forecast at least an additional 43 GW of DSI that was equipped with FF (52 GW projected in the policy case versus 9 GW in the Base Case). Fabric filters increase the installed cost of a DSI system by a substantial amount – costing on the order of $150-$250/kW, depending upon the size of the facility and other factors.

Although EPA assumed that a fabric filter would be necessary for control of HCl, it is also worth examining the capital costs EPA uses for use of DSI upstream of an ESP, because this is by far the most common application of DSI. Appendix 5-4 of the IPM documentation describes the cost estimating approach developed by Sargent & Lundy for use in the IPM.[4] This methodology predicts capital costs of $40/kW for a 500 MW plant and costs well in excess of $100/kW for plants of about 100 MW in size. Discussions of these costs with both utilities and technology providers indicates pretty clearly that these capital cost estimates are well above what has been experienced in practice. This may be the result of the overestimation of Trona demand – that would necessitate more equipment than in fact is necessary.

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[4] Sargent & Lundy, "IPM Model – Updates to Cost and Performance for APC Technologies Dry Sorbent Injection for SO2 Control Cost Development Methodology Final", August 2010 Project 12301-007

DSI operating costs

DSI operating costs are also lower than estimated. EPA assumed that DSI would provide 90% HCl removal and would require a normalized stoichiometric ratio (NSR) of 1.55 when using DSI in combination with a baghouse for capturing HCl. Studies by Solvay[5] showed DSI achieving over 98% HCl removal at much lower treatment rates. They examined several sorbents at different milling levels.

- Trona (S200) - d50 : 30 µm
- Milled Trona (S250) - d50 : 15 µm, d90 : 60 µm
- Milled Sodium Bicarbonate (S350) - d50 : 12 µm, d90 : 40 µm
- Finely Milled Sodium Bicarbonate (S450) - d50 : 7 µm ,d90 : 17 µm
- Hydrated Lime - d90 : 45 µm, purity: 96.8%

Figures 3a and 3b show the results of pilot tests performed with injection upstream of an ESP and Figures 4a and 4b show the results of pilot tests performed with injection upstream of a baghouse. As demonstrated by Figure 3a, 90% HCl capture was achieved with milled Trona (D250) with an NSR or roughly 0.3 and 99% capture was achieved with an NSR of roughly 0.6. This compares to an assumed forecast of 1.55 for 90% capture. EPA's assumed treatment rate at 90% removal was therefore almost five times what is shown in this data. As demonstrated in Figure 3a, with an ESP milled trona produced 90% capture at an NSR of about 0.35 and 99% capture with an NSR of about 0.70. However, in this case much better performance was provided by the more reactive sodium bicarbonate (S350 and S450). While any given facility may experience slightly different results than shown in these pilot tests, it is clear that whether using trona or sodium bicarbonate it is possible to achieve well in excess of 90% without a fabric filter at treatment rates well below those assumed by EPA.

SO_2 capture is normally well below that of HCl because SO_2 is slower to react, and Figures 3b and 4b confirm that. At treatment rates where milled trona is expected to achieve 90% HCl capture, roughly 20% SO_2 capture is expected, and at treatment rates where 99% HCl capture is achieved, roughly 40% SO_2 capture is expected. These significant levels of SO_2 capture are nonetheless lower than the 70% assumed by EPA.

Another aspect of operating costs is waste disposal. EPA assumes that the by-product must be disposed of at a much higher cost than normally used for landfill of coal combustion products. This is an unnecessary cost because sodium by product can be blended or neutralized and disposed of as a non-hazardous waste at a much lower cost. Moreover, if this were a sufficiently large concern, the facility owner could use calcium-based reagent, such as hydrated lime, which produces a highly stable product.

Other factors that caused the IPM forecast of fabric filters to be too high was the result of overestimation of dry FGD, overestimation of waste disposal costs associated with ACI, and underestimation of the ability of existing ESPs to achieve the MATS PM emission standard with simple upgrades.

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[5]. Yougen Kong, Mike Wood, Solvay Chemicals Inc.," HCl Removal in the Presence of SO2 Using Dry Sodium Sorbent Injection", Houston, Texas, available at www.solvay.com

Figure 3a. HCl removal with injection upstream of an ESP

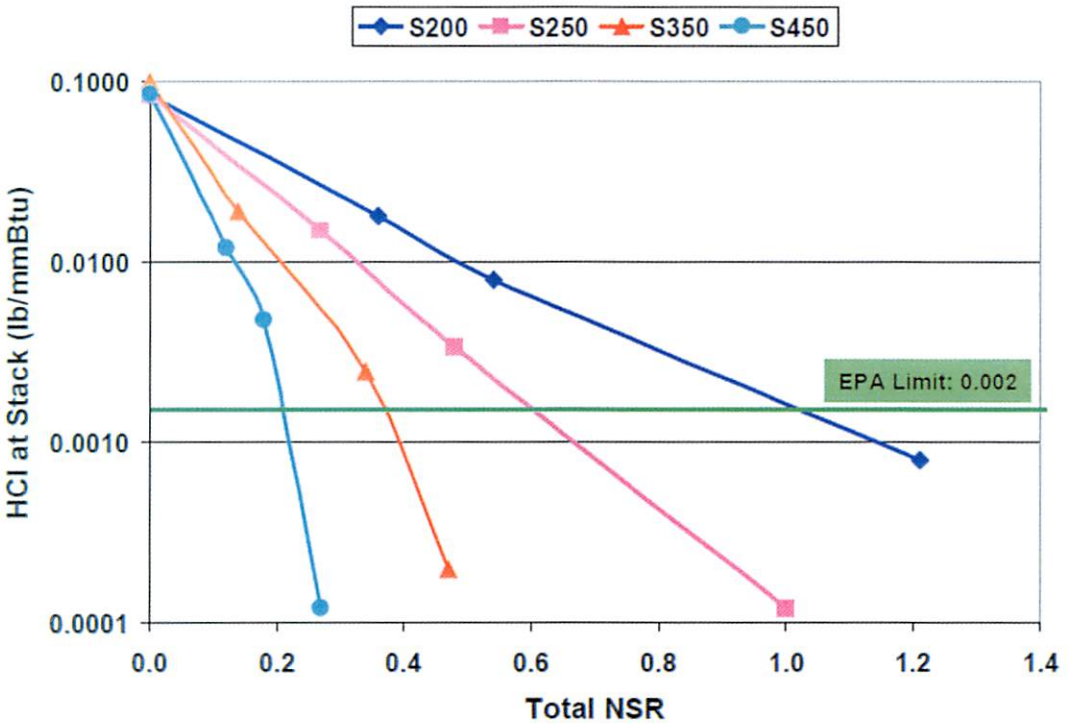


Figure 3b. SO_2 reduction with injection upstream of an ESP

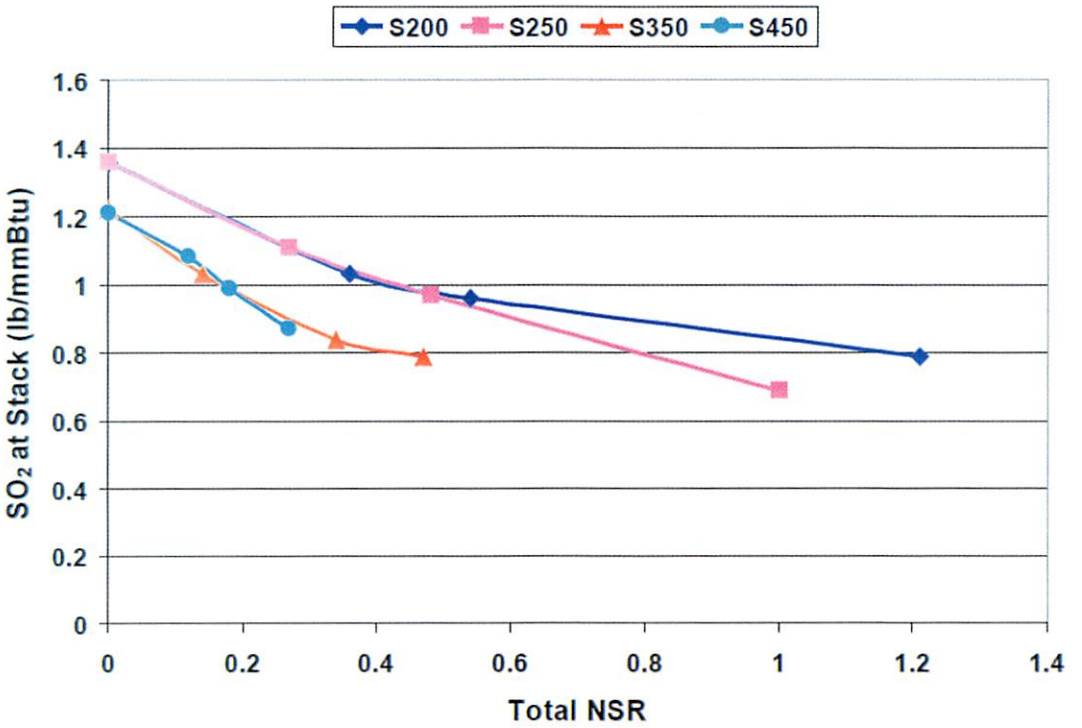


Figure 4a. HCl removal with injection upstream of baghouse

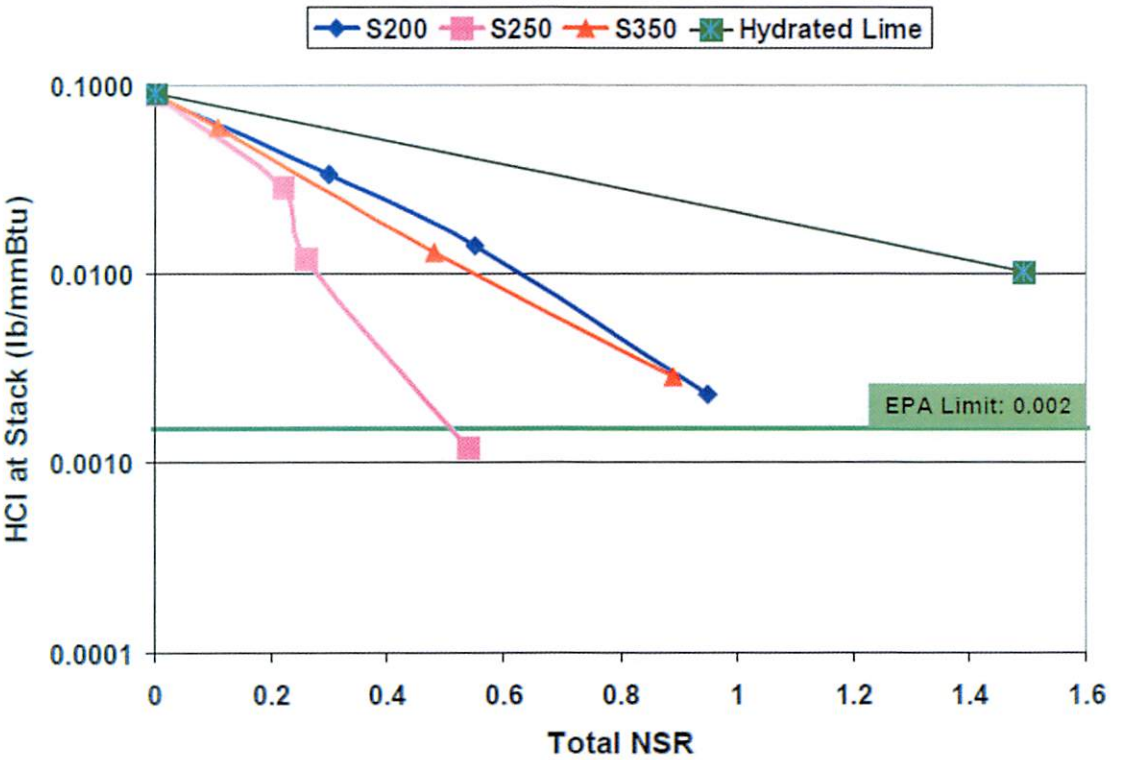
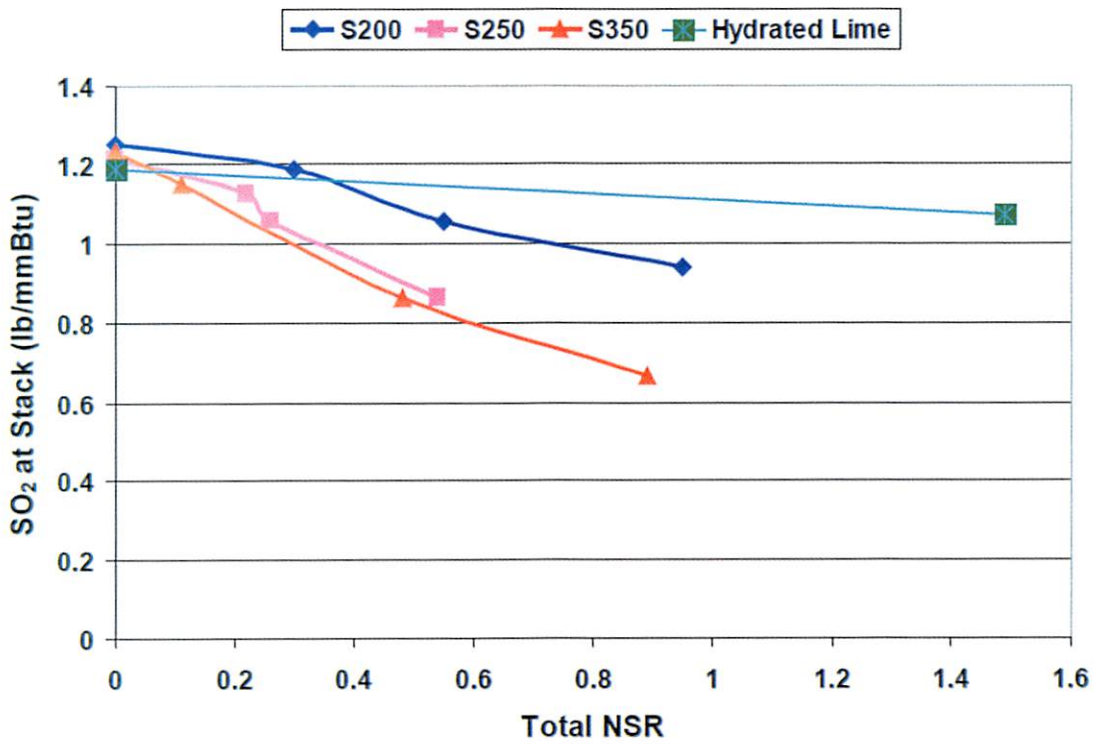


Figure 4b. SO_2 reduction with injection upstream of a baghouse



Projections for dry FGD

Dry FGD systems are commonly installed with fabric filters. As a result, an overestimation of dry FGD installations will result in an overestimation of fabric filter installations. The reason for the high forecast for dry FGD is likely the result of forecasts for DSI costs with a fabric filter (that may have made the incremental cost for dry FGD more acceptable) or the assumption by EPA that DSI is limited to only 90% HCl capture (that would force dry FGD to be selected by the IPM if greater than 90% HCl reduction was necessary). These assumptions would cause IPM to project that companies would select dry FGD for acid gas control rather than DSI in situations where DSI is, in fact, capable of providing adequate acid gas control. But, the effects of DSI and dry FGD can explain about 65 GW[6] of the roughly 100 GW of FF that were forecast but are not actually installed.

Projections for PM control

EPA's assumptions regarding DSI and dry FGD do not adequately explain the overestimation of fabric filters in their MATS cost estimate. EPA also made assumptions about the need to retrofit fabric filters for PM control to meet the MATS PM standard or for use in ACI systems. The assumptions for PM were used in a spreadsheet to identify facilities projected to need upgrade of their ESP or retrofit of a fabric filter. The projection developed with the spreadsheet was exogenously input to the IPM model to determine if improvement in PM collection efficiency was needed and, if so, what kind of improvement would be performed and what it would cost. In this manner that spreadsheet determined if a PM retrofit with a baghouse was necessary or if ESP upgrade was adequate. The approach used apparently underestimated the ability of the existing ESP to achieve the MATS PM emission standard. In fact, most ESPs were capable of achieving the emission standard without any modifications or with relatively modest changes – at most changes to the transformer rectifier sets and perhaps electrodes. In many cases rebalancing of flows was adequate at minimal cost.

The result is that EPA projected more fabric filter retrofits than were, in fact, built. EPA's modeling attributes 101 GW of FF to MATS versus the Base Case, some of which are attributed to dry scrubbers. Moreover, EPA also likely overestimated the cost of modifying existing ESPs to comply with the regulation. ATP's estimate of the market size for ESP upgrades in 2014 was only in the range of about $50 million based upon interviews with discussions with suppliers of these services and equipment.

ACI variable operating and maintenance costs

According to Appendix 5-3 to Chapter 5 of the IPM documentation,[7] EPA assumes that when activated carbon and fly ash are collected in the same PM control device that the cost of disposal for all solids – fly ash and activated carbon – are increased. The effect is that the projected cost of waste disposal exceeds that of the carbon sorbent – more than doubling the VOM. This is based upon the presumption that addition of activated carbon renders beneficial reuse of fly ash impossible. In practice, this does not

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[6] 22 GW of additional dry FGD for MATS versus the Base Case plus 43 GW of additional FF on DSI for MATS versus the Base Case

[7] Sargent & Lundy, "IPM Model – Revisions to Cost and Performance for APC Technologies Mercury Control Cost Development Methodology, Final", March 2011, Project 12301-009

happen. First, despite the desirability of beneficially reusing fly ash as a concrete additive, in practice most fly ash is not used for this purpose because of local market conditions or other reasons. Furthermore, activated carbon suppliers have developed "cement friendly" carbons that do not have the adverse impact of conventional carbons. The assumption that waste disposal costs increase so much may also partially account for the overestimate of fabric filters, as installation of an additional fabric filter would facilitate segregation of fly ash from activated carbon.

EPA also overestimated the ACI that is attributable to MATS – 148 GW of ACI forecast for MATS versus 7 GW in the Base Case. According to ATP's estimates, *at least* 20 GW of ACI was in operation in 2014, clearly well over the 7 GW attributed by EPA to the Base Case. Furthermore, EPA's estimate of 148 GW of ACI exceeds somewhat ATP's estimates of total ACI systems, which is about 120 GW once MATS is fully implemented. ATP estimates that with the rule fully implemented, about 100 GW of ACI is attributable to MATS.

Fuel Costs

Facility owners will convert to natural gas or switch to higher cost coal if in their estimation this is a less costly approach to complying with the MATS rule. EPA's forecast Policy Case projected a cost of natural gas in 2015 of $5.66/MMBtu versus $5.40/MMBtu in its Base Case. Data from the Energy Information Administration indicates that in 2015 natural gas to utility customers has ranged from a high of $4.99/thousand cubic feet down to $3.24/thousand cubic feet, or about $4.99/MMBtu to about $3.24/MMBtu because a cubic foot of gas has very close to 1,000 Btu's of energy. Therefore, much lower natural gas prices than forecast by EPA have made gas a much more attractive fuel and has resulted in the cost of compliance with the rule to be much lower.

Impact on cost

A rough estimate of the impact on cost of the various assumptions addressed in this memo is shown in Table 1. This shows the estimated excess costs associated with:

- the fabric filter overestimate that is not associated with dry FGD,
- the overestimate of dry FGD
- the overestimate of reagent consumption associated with DSI
- the overestimate of capital cost associated with wet FGD upgrades,
- the overestimate associated with waste disposal assumptions for ACI,
- an adjustment to account for the underestimate of carbon use if the facilities that are assumed to install TOXECON systems do not,
- the overestimate of the ACI systems attributable to the MATS rule

Section 8 of the IPM documentation states that a capital charge rate of 11.3% is used for environmental retrofits, which is what is used to determine amortized capital charges. the assumed capacity factor is 65%. Cost estimates are developed using capital costs ($/kW), VOM ($/MWh) and FOM ($/kW-yr) rates taken from the IPM v4.10 documentation used to develop the MATS rule. The fabric filter overestimate

is clearly the most significant, followed by the overestimate of dry FGD and the overestimate associated with DSI.

The overestimate of FF that is not explained by dry FGD is 82 GW. 43 GW of this is explained by DSI attributed to MATS, leaving 40 GW unexplained by DSI or dry FGD. This results in an additional 40 GW that can be ACI systems in TOXECON arrangements. As a result, there are roughly 101 GW (141 GW – 40 GW) that are ACI systems without TOXECON that where waste-disposal costs are overestimated. This is offset in part by the underestimate of sorbent costs if the 40 GW of forecast TOXECON systems are made to be conventional ACI systems upstream of an ESP.

Table 1. Approximate overestimate of costs

	FF [1]	dry FGD [2]	DSI [3]	wet FGD upgrade [4]	Wet FGD [5]	ACI Waste [6]	ACI carbon [7]	ACI excess [8]	Total
million $	$16,072	$8,838	$0	$4,700	$992	$0	$0	$414	$31,016
Annualized, capital, million $	$1,816	$999	$0	$531	$112	$0	$0	$47	$3,505
Operating costs, million $	$102	$391	$1,400	$0	$37	$1,196	-$207	$798	$3,718
Million $	$1,918	$1,390	$1,400	$531	$149	$1,196	-$207	$845	$7,223

Notes:

1. *The overestimate of FF is the amount over actual installations that is not explained by dry FGD*
2. *Dry FGD estimate for excess dry FGD over actual installed*
3. *DSI estimate assumes that actual reagent is roughly one third of EPA assumption.*
4. *Wet FGD upgrade assumes 30 GW of actual upgrade versus 63 GW predicted. No formal data is available.*
5. *The actual reduction in wet FGD versus the Base Case was greater than forecast by EPA*
6. *Accounts for EPA assumption about fly ash waste for facilities where fly ash is collected with carbon*
7. *Accounts for higher carbon demand from units with ESP versus TOXECON. EPA assumed more TOXECON installations, which include new baghouses.*
8. *Accounts for overestimate of ACI installations after rule is fully implemented. Only includes carbon for VOM as waste already addressed.*

Conclusion

Experience with technologies deployed for MATS compliance has shown them to be less expensive and more effective than originally assumed in EPA's analysis. As a result, the true cost of complying with the MATS rule is more than $7 billion per year less than estimated by EPA, making the true cost of the rule about one quarter of what EPA originally estimated the rule to cost.

Exhibit 3

Company	Original Compliance Cost Estimates	Actual Cost of Compliance
FirstEnergy	Respecting the pending maximum achievable control of technology rules for mercury and hazardous air pollutants, *we still expect investments of about $2 billion to $3 billion in our generation fleet to comply*. Our investments are expected to primarily focus on reducing mercury, and particulate emissions at our supercritical units. -- 2011 Q3 Earnings Call, Anthony Alexander CEO Now last year, I told you that our spend -- *our capital spend was $2 billion to $3 billion to comply with this rule when it was MACT. Now that we understand the rule and we've dug into it and analyzed the situation more deeply, we are right now looking at a $1.3 billion to $1.7 billion spend to comply*. And we continue to work further to reduce that cost. And we will be in compliance by the spring of 2015. – 2011 Q4 Earnings Call, James H. Lash The new MATS were finalized at the end of 2011, ... *Our current estimate is that it may cost approximately $1.3 - $1.7 billion to bring our remaining units into compliance*.-- 2012 10-K As a result of this analysis, we have significantly reduced our projected capital investment related to MATS compliance. *We now estimate investment of about $975 million across our Fossil Fleet. This is down from the $1.3 billion to $1.7 billion estimate we provided in February and well below our initial projections of $2 billion to $3 billion*. While we still have work to do to confirm and refine our current estimate, we're clearly moving in the right direction. -- 2012 Q2 Earnings Call, Anthony Alexander, CEO "As a result of this analysis, we have significantly reduced our projected capital investment related to MATS compliance. *We now estimate investment of about $975 million across our Fossil Fleet. This is down from the $1.3 billion to $1.7 billion estimate we provided in February and well below our initial projections of $2 billion to $3 billion.* While we still have work to do to confirm and refine our current estimate, we're clearly moving in the right direction. -- 2012 Q2 Earnings Call, Tony Alexander We also significantly decreased our competitive cost structure. Annual operating expenses have been reduced through our continued focus on managing fuel costs and O&M expense. And more importantly, our projected capital spending in the generation group over the next several years has been reduced by more than	On December 28, 2012, the WVDEP granted a conditional extension through April 16, 2016 for MATS compliance at the Fort Martin, Harrison and Pleasants stations. On March 20, 2013, the PADEP granted an extension through April 16, 2016 for MATS compliance at the Hatfield's Ferry and Bruce Mansfield stations. In December 2014, FG requested an extension through April 16, 2016 for MATS compliance at the Bay Shore and Sammis stations and await a decision from OEPA. In addition, an EPA enforcement policy document contemplates up to an additional year to achieve compliance, through April 2017, under certain circumstances for reliability critical units. MATS was challenged in the U.S. Court of Appeals for the D.C. Circuit by various entities, including FirstEnergy's challenge of the PM emission limit imposed on petroleum coke boilers, such as Bay Shore Unit 1. On April 15, 2014, MATS was upheld by the U.S. Court of Appeals for the D.C. Circuit, however, the Court refused to decide FirstEnergy's challenge of the PM emission limit imposed on petroleum coke boilers due to a January 2013 petition for reconsideration still pending but not addressed by EPA. On November 25, 2014, the U.S. Supreme Court agreed to review MATS, specifically, to determine if EPA should have evaluated the cost of MATS prior to regulating. Depending on the outcome of the U.S. Supreme Court review and how the MATS are ultimately implemented, *FirstEnergy's total capital cost for compliance (over the 2012 to 2018 time period) is currently expected to be approximately $370 million (CES segment of $178 million and Regulated Distribution segment of $192 million), of which $133 million has been spent through 2014* ($56 million at CES and $77 million at Regulated Distribution). -- 2014 10-K, p. 16 *We're investing $370 million in upgrades to comply with MATS. Most of [the investments] will have been made by the time the Supreme Court rules*. – First Energy spokeswoman Stephanie Walton in March 30, 2015 in RTO Insider article

Company	Original Compliance Cost Estimates	Actual Cost of Compliance
	$1 billion through our recent actions. *This includes additional reductions in our expected spend for compliance with Mercury and Air Toxics Standards , which is now at $465 million across the entire generation fleet, with only an estimated $240 million at our competitive units.* The majority of the remaining capital will be invested in projects to extend the life of our nuclear assets, with new steam generators at Davis-Besse in 2014 and new steam generators and reactor head at Beaver Valley 2 in 2017. – 2013 Q3 Earnings Call, Anthony Alexander, CEO	
Southern Company	As you'll recall, we previously provided a MATS compliance capital projection of up to $2.7 billion for the 2012 through 2014 time frame. We also indicated that this amount could be reduced by $500 million to $1 billion, depending primarily on the number of baghouses in our final compliance strategy, bringing the final number to between $1.7 billion and $2.2 billion....*Based on our current analysis, our projection for MATS compliance for 2012 through 2014 now totals $1.8 billion, representing a reduction of $900 million from our previous estimates.* While the number of baghouses has been reduced to 4 or 5 from a high of as many as 17, other costs have been added to our plan to reflect the need for additive injection systems and related plant modifications. As before, this plan also includes significant investment in transmission projects as well as fuel switching to natural gas. – 2012 Q2 Earnings Call, Art Beattie, CFO So it's -- so at least in terms of kind of what we said before with respect to MATS, we said $2.7 billion. And then we -- as we got kind of the new rule, not the proposed rule, we said it could be between *$0.5 billion or $1 billion less, and therefore, we said $1.7 billion to $2.2 billion. Well, sure enough, it ended up at $1.8 billion. When you think about the total amount of CapEx, it was $18.2 billion or $18.3 billion, and now we kind of think it's going to be $16.4 billion, $16.3 billion, somewhere in that realm.* -- 2012 Q2 Earnings Call, Thomas Fanning, CEO With respect to the impact of the MATS rule on capital spending from 2012 through 2014, the Southern Company system's preliminary analysis anticipates that potential incremental environmental compliance capital expenditures to comply with the MATS rule are likely to be substantial and could be up to *$2.7 billion from 2012 through 2014*. – 2012 10-K p. II-22	The Company has developed a compliance plan for the MATS rule which includes reliance on existing emission control technologies, the construction of baghouses to provide an additional level of control on the emissions of mercury and particulates from certain generating units, the use of additives or other injection technology, the use of existing or additional natural gas capability, and unit retirements. Additionally, certain transmission system upgrades are required. 2015 10-K p II-134 The Southern Company system expects that capital expenditures to comply with environmental statutes and regulations will total approximately *$2.1 billion from 2015 through 2017, with annual totals of approximately $1.0 billion, $0.5 billion, and $0.6 billion for 2015, 2016, and 2017*, respectively. -- 2015 10-K p. II-22 Southern Company has made about *$9 billion in investments in environmental control technology and anticipates spending an additional $2.1 billion over the next three years to comply with MATS* and other environmental regulations – Southern Company spokesman Jack Bonnikson to Bloomberg BNA via e-mail for April 2015 article

Company	Original Compliance Cost Estimates	Actual Cost of Compliance
AEP	Estimating the capital spend for our environmental effort. *Originally, we started with a $6 billion to $8 billion anticipated capital outlay for these types of requirements. And that changed, from $5 billion to $7 billion, over a period of time when the EPA came up with the -- came out the rules, particularly on particulate matter.* We had one situation where, instead of achieving 99.7% removal rate, the proposed rule was saying you had to achieve 99.9%, and that 0.2% was costing us about $800 million. So the EPA did listen and made the adjustments, so that adjusted reduction down as a result. *And then now, we're saying the cost is going to be from $4 billion to $5 billion.* And we've looked at technologies. We believe from a compliance standpoint that we can achieve further compliance reductions as a result of technology improvements, but also how we run the generation. So those are the kinds of things that we're looking at as well. -- 2012 Q4 Earnings Call, Nicholas Akins, CEO *So we believe it's going to be $4 billion to $5 billion, and we're committed to continuing down that process. But now, right now, it says $4 billion to $5 billion.*– 2012 Q4 Earnings Call, Nicholas Akins, CEO "So we continue to also move forward on the EPA-related mandates, such as Mercury HAPs MACT and others, as we transition our fleet with the planned . . . retrofits and refueling of 11,000 megawatts at a cost of around $*4 billion to $5 billion over the 2012 to 2020 time period.* - 2013 Q1 Earnings Call, Nicholas Akins, CEO	Emissions of nitrogen and sulfur oxides, mercury and particulates from fossil fueled generation plants are subject to increased regulations, controls and mitigation expenses. Compliance with these legal requirements requires us to commit significant capital toward environmental monitoring, installation of pollution control equipment, emission fees and permits at all of our facilities and could cause us to retire generating capacity prior to the end of its estimated useful life. . . . *If we retire generation plants prior to the end of their estimated useful life, there can be no assurance that we will recover the remaining costs associated with such plants. We typically recover our expenditures for pollution control technologies, replacement generation, undepreciated plant balances and associated operating costs from customers through regulated rates in regulated jurisdictions.* -- 2014 10-K p 41 (See table below as well) We continue to refine the cost estimates of complying with these rules and other impacts of the environmental proposals on our coal-fired generating facilities. *Based upon our estimates, additional investment to meet these proposed requirements ranges from approximately $2.8 billion to $3.3 billion through 2020. These amounts include investments to convert some of our coal generation to natural gas..* -- 2014 10-K p 10

Company	Original Compliance Cost Estimates	Actual Cost of Compliance
DTE	These rules have led to additional controls on fossil-fueled power plants to reduce nitrogen oxide, sulfur dioxide, mercury and other emissions. To comply with these requirements, DTE Electric has spent approximately $1.9 billion through 2012. *The Company estimates DTE Electric will make capital expenditures of approximately $335 million in 2013 and up to approximately $1.6 billion of additional capital expenditures through 2020 based on current regulation* – 2012 10-K p 90	DTE Electric is subject to the EPA ozone and fine particulate transport and acid rain regulations that limit power plant emissions of sulfur dioxide and nitrogen oxides. The EPA and the State of Michigan have issued emission reduction regulations relating to ozone, fine particulate, regional haze, mercury, and other air pollution. These rules have led to controls on fossil-fueled power plants to reduce nitrogen oxide, sulfur dioxide, mercury and other emissions. *To comply with these requirements, DTE Electric spent approximately $2.2 billion through 2014. The Company estimates DTE Electric will make capital expenditures of approximately $100 million in 2015 and up to approximately $30 million of additional capital expenditures through 2019 based on current regulations*. -- 2014 10-K p 25 Estimated $400 million capital investment for environmental compliance for the years 2015-2019 -- August 2015 Business Update
PPL	...from an environmental perspective, I think you're aware that on a competitive fleet side, we're very well equipped to deal with the MATS and the CSAPR. *So we're not looking at any major new incremental investments on the environmental side*.- 2012 Q1 Earnings Call, William Spence, CEO Now that we've signed contracts with various vendors, we've updated our estimate of capital spending necessary to complete our previously discussed environmental compliance projects [MATS and CSAPR]. *We now estimate these projects will come in closer to $2.5 billion, a reduction of $500 million from our original forecast.* We're able to deliver these savings to customers in Kentucky because we proactively addressed EPA regulations and were able to secure bids before others. - 2012 Q3 Earnings Call, William Spence, CEO "I think at this juncture, we don't see a lot of incremental CapEx required on the environmental front, for either Brunner Island or Montour stations in Pennsylvania. I think we are in fairly decent shape. There is some related to the math. Really, folks more around mercury control than it is around SOX or NOX. So at this point, I don't see any significant addition that we would need to make." -- Q1 2014 Earnings Call, William Spence, CEO	LG&E, KU and PPL Energy Supply have received compliance extensions for certain plants. PPL, PPL Energy Supply, LKE, LG&E and KU are generally well-positioned to comply with MATS, primarily due to recent investments in environmental controls at PPL Energy Supply and approved ECR plans to install additional controls at some of LG&E's and KU's Kentucky plants. With respect to PPL Energy Supply's Pennsylvania plants, PPL Energy Supply believes that installation of chemical additive systems and other controls may be necessary at certain coal-fired plants, the capital cost of which is not expected to be significant. PPL Energy Supply continues to analyze the potential impact of MATS on operating costs. *PPL Energy Supply is retrofitting the scrubbers at its Colstrip, Montana plant, the cost of which is not expected to be significant.. … LG&E's and KU's anticipated retirement of certain coal-fired electricity generating units located at Cane Run and Green River is in response to MATS and other environmental regulations. The retirement of these units is not expected to have a material impact on the financial condition or results of operations of PPL, LKE, LG&E or KU….*– 2014 10-K p 102

Company	Original Compliance Cost Estimates	Actual Cost of Compliance
Duke Energy	One of the reasons that we were pursuing the variance from the Multi-Pollutant Standard with the Illinois Pollution Control Board was in fact that we were able to comply with the MATS rules without that scrubber. And it was really these Illinois rules that were imposing the need to construct that scrubber…*So, we do believe that the capital expenditure plans that we've laid out, will -- while as to comply with MATS.* And it's really a function of a number of things. It's a function of the investments that we've already made in our plans overtime. We've made significant investments in pollution control equipment…We also burned low sulfur coal, which helps with our overall emissions. And as a result of compliance with the Multi-Pollutant Standard Illinois we are already using significant amounts of activated carbon for control of mercury. *So, through the -- I'd say the compliance with the Multi-Pollutant Standard, we've actually built into our operations of those things that are needed to comply with the MATS rules*. -- Q3 2012 Earnings Call, Marty Lyons, Senior Vice President and CFO "At the end of this year we expect to have retired more than 3800 megawatts of this capacity. *As a combined company we have already invested around $7 billion in control equipment for our existing coal plants positioning now for compliance with more stringent air emission regulations. However we estimate we will spend an additional $5 billion to $6 billion over the next decade to comply with pending environmental regulations on air, water and coal ash*." -- Q4 2012 Earnings Call, Jim Rogers As a group, these non-GHG environmental regulations will require the Duke Energy Registrants to install additional environmental controls and accelerate retirement of some coal-fi red units. While the ultimate regulatory requirements for the Duke Energy Registrants from the group of EPA regulatory actions will not be known until all the rules have been finalized, for planning purposes, the Duke Energy Registrants *currently estimate the cost of new control equipment that may need to be installed to comply with this group of rules could total $5 billion to $6 billion, excluding AFUDC, over the next 10 years. This range includes estimated costs for new control equipment necessary to comply with the MATS of $650 million to $800 million.*– 2012 10-K p 67 *$1.4 billion in environmental capex from '13-'15 (Includes $600-$650 million for MATS compliance*) –2013 Analyst Meeting *Anticipated ~$5-6 billion in compliance costs for approved or pending air, water, and waste regulations over the next 10 years* – Q2 2014 Earning Review and Business Update	Duke Energy Registrants are on track to meet the requirements. Strategies to achieve compliance include installation of new air emission control equipment, development of monitoring processes, fuel switching and acceleration of retirement for some coal-fired electric-generation units. – 2015 Q2 10-Q p 116 "As of June 30, we now have total ARO obligations of *$4.5 billion*, which represents our best estimate to comply with state and federal rules. These costs will be spent over the next several decades. We will continue to refine this estimated liability as plans are finalized." Q2 2015 Earnings call, Steve Young, EVP, CFO "Duke Energy is currently reviewing today's ruling by the Supreme Court…*at this time, there will be no immediate effect on Duke Energy's MATS compliance program. All Duke Energy power plants will continue existing compliance activities."* – June 29, 2015 Spokesman Chad Eaton, via email for an article in Platts

AEP 2014 10K p 13

Historical and Projected Environmental Investments

	2012 Actual	2013 Actual	2014 Actual	2015 Estimate	2016 Estimate	2017 Estimate
			(in thousands)			
Total AEP (a)	$ 241,000	$ 424,200	$ 539,800	$ 661,000	$ 401,000	$ 531,000
APCo	52,400	44,800	31,300	70,000	53,000	151,000
I&M	30,000	28,300	51,400	40,000	49,000	84,000
OPCo (b)	70,300	129,300	—	—	—	—
PSO	26,300	56,100	72,100	85,000	49,000	9,000
SWEPCo	24,200	135,700	225,300	316,000	86,000	66,000

EXHIBIT B

ARGUED DECEMBER 10, 2013
DECIDED APRIL 15, 2014

UNITED STATES COURT OF APPEALS
FOR THE DISTRICT OF COLUMBIA CIRCUIT

WHITE STALLION ENERGY CENTER, LLC, et al.,	)	
Petitioners,	)	Case No. 12-1100, and consolidated cases
v.	)	
UNITED STATES ENVIRONMENTAL PROTECTION AGENCY,	)	
Respondent.	)	

DECLARATION OF WILLIAM B. BERG

I, William B. Berg, make the following declaration in support of the Motion of Industry Respondent Intervenors to Govern Future Proceedings, and declare under penalty of perjury that the following is true to the best of my knowledge, information, and belief:

1. I currently serve as Vice President of Wholesale Market Development for Exelon Corporation. In that capacity, I manage Exelon's wholesale policy development and advocacy in all competitive wholesale electricity markets in which

Exelon is engaged (PJM, ISO New England, Electric Reliability Council of Texas, Southwest Power Pool, Midcontinent Independent System Operator, and New York Independent System Operator) to ensure outcomes that are aligned with Exelon's business strategy. In this role, I work closely with the various business units within Exelon (electric generation, retail, demand response, commodities trading, and utility interests) to understand the business needs of the Corporation, and I participate in strategic decisions regarding whether to make capital investments in generation capacity and pollution controls and whether to retire units.

2. I have worked in the electric power industry for 23 years, and in that time I have developed an understanding of market dynamics in regulated and deregulated markets. I have served in my current position as Vice President of Wholesale Market Development at Exelon since July 2014. Prior to that, from 2005 to 2014, I held positions of increasing responsibility at Exelon and performed many of the same functions I perform in my current role except with respect to a smaller geographic area. Before joining Exelon, from 2001 to 2004, I worked for Reliant Energy and was responsible for wholesale market development for the PJM region. Throughout my time with Exelon and Reliant, I have consistently worked closely with the various commercial units to understand the business needs of the companies to ensure alignment with competitive market development. From 1992 to 2001, I worked for the Florida Public Service Commission, a state regulatory agency that regulates a traditional cost of service, rather than a competitive, electric system. I held

many roles of increasing responsibility while at the Commission, and my last role was Chief Advisor to its then Chairman, J. Terry Deason, providing technical analysis on federal initiatives and state electric policy.

3. I hold a Bachelor of Arts in Business Administration with a Minor in Economics from Lenoir-Rhyne University and a Master of Arts in Applied Economics from the University of Central Florida, College of Business.

4. From my experience and training, I have personal knowledge of the matters on which I testify in this declaration. In particular, I am aware of the electric generation industry's response to the Mercury and Air Toxics Standards ("Standards"), the impact of the Standards on generators that participate in competitive electricity markets, and the likely consequences to electric generators and their customers should the Court disturb the Standards.

5. The Standards were released by EPA to the public in December 2011, although they were not published in the Federal Register until February 2012, effective April 16, 2012.

6. The Standards gave electric generators three years to comply – the maximum time permitted by the Clean Air Act. The Act allows permitting authorities to grant an additional one-year extension when "necessary for the installation of controls." In promulgating the Standards, EPA made clear that it would adopt a very broad interpretation of this term. EPA further indicated that it would also allow

additional time beyond the four-year extended compliance period for plants that were necessary to preserve electric reliability.

7. The Standards had been anticipated for several years, and prudent generators had long taken the forthcoming standards into account in making capital investment decisions for their generating fleets. Many generators began to develop their final plans for complying with the Standards when the proposed Standards were published and, with the release of the final Standards, all electricity generators either finalized or began to develop plans to comply with the Standards.

8. The capital decisions made by industry were not limited to coal- and oil-fired power plants to which the Standards apply. Because the electric generation industry is interconnected, the Standards also were directly relevant to decisions as to whether to invest in maintaining or expanding existing nuclear, natural gas-fired, and renewable generation, and whether to invest in new capacity of all fuel types.

9. Generators adopted a number of different strategies for compliance with the Standards. Some had already transitioned their fleets away from the coal-fired generation most affected by the Standards. Some had already upgraded their coal-fired plants in response to state laws or other obligations and could achieve the Standards without further investment. Others chose which of their existing plants justified the investment needed to comply with the Standards, and which plants would be "retired," that is, permanently closed.

10. Electric generators base capital investment (such as that necessary to add or to upgrade pollution controls) on long-term operational plans. Whether participating in competitive electricity markets or traditional state-regulated resource planning, generators base investment decisions largely on the same set of considerations: the remaining useful life of a plant; the expected cost to maintain the plant in good working order; the cost of the required emission controls; and the revenue that the plant is expected to generate. Absent specific local reliability concerns, which are rare, generators will ordinarily choose to retire plants when expected revenues do not justify the cost of maintaining those plants, whether due to ordinary repairs or emission control or other necessary upgrades, such as for safety.

11. Power plant revenues typically include revenue from direct or indirect wholesale sales of electricity to local distribution companies (that is, retail electric suppliers like PEPCO and Baltimore Gas & Electric), industrial users, and others. Depending on the level of electricity demand and the available generation resources, wholesale power prices can fluctuate from $0 per megawatt hour (and less in some circumstances) to hundreds of dollars per megawatt hour. Often power plant owners will sell their electricity output in advance, entering contracts to deliver electricity months or years ahead. This approach allows generators and their customers to lock in prices to avoid the risk posed by highly variable wholesale power prices. These advance sales provide generators with a measure of revenue certainty and customers with a measure of cost certainty.

12. Power plant revenues can also include "capacity payments" – payments for ensuring that a plant will be available in the future to generate electricity if called upon. In much of the Northeastern and Midwestern regions of the country, forward capacity markets ensure that adequate generation resources will be available in future years. For example, PJM – which operates the electric power grid in all or part of 13 states and Washington, D.C., and is the largest power grid operator in the country – conducts a capacity auction each year for a period beginning three years later. So in 2015, PJM conducted an auction to acquire adequate generation capacity in the 2018/2019 delivery year. Power plants selected through that auction, held this summer, are required to do what is necessary to remain operational for the 2018/2019 delivery year, and those plants will receive capacity payments during that period, in addition to any revenues they receive from electricity sales. Because capacity prices are dependent on the amount of generation capacity that will be available, prices are very sensitive to power plant retirements, which reduce the available capacity.

13. Long-term capacity commitments require that electric generators develop and follow through on long-term capital planning. Generators responded quickly to the proposed and final Standards, evaluating available control options and identifying plants where additional investments would – and would not – be justified by projected revenues. PJM conducted its capacity auction covering the 2015/2016 delivery year (the first in which the Standards would be in effect) just five months after the Standards were released. That auction saw increased capacity prices

reflecting the additional investment some generators would have to make to comply with the Standards, and those generators whose plants cleared that auction are now receiving those higher payments.

14. Many generators with power plants subject to the Standards received one-year compliance extensions from their state permitting authorities, deferring compliance at specific power plants until April 16, 2016. With that deadline now less than seven months away, those generators have certainly decided whether to upgrade those plants to comply with the Standards or to shut the plants down when the deadline arrives.

15. Where material additional investments are to be made at a power plant, a number of arrangements must be made long before the actual upgrade work can be performed at the plant. Because power plants must be turned off in order for upgrade work to be performed, the generator must obtain permission from the grid management authority or resource planning agency to schedule an "outage" to allow the work to proceed. Outages must be scheduled at times of low electricity demand, when the power plant's output would be more easily replaced by other generators, typically in the Spring or Fall. This planning requires a long lead time, and planning for any outages required to install controls before April 2016 has been completed.

16. Based on the planning work and the schedules set by the grid operator, generators must engage pollution control contractors to install the equipment during the scheduled outage, and those contractors in turn must order any equipment that

must be installed during the project. For any significant upgrade project, these interlocking arrangements are made long in advance, ordinarily one year or more before the actual work will be performed. Thus, these decisions and the vast majority of this work have already happened, and these improvements have been priced into the market.

17. With all of these long-term planning criteria in mind, the electric generation industry moved quickly after the Standards were released in December 2011 to ensure a smooth transition to compliance by the April 2015 deadline, and where necessary, by the extended April 2016 deadline. According to industry and third-party reports, the majority of generation capacity subject to the Standards met the April 2015 compliance date. But for the few plants that obtain further extensions required to preserve reliability, the remaining power plants will be retired or upgraded by April 2016. Grid operators have long accounted for this deadline in planning.

18. As is clear from the above, all generators have had good reason to incorporate the Standards into their long-term planning. This is true not only of generators that are directly affected by the Standards, but also of generators that use natural gas, nuclear, hydropower, wind, solar, and other means to produce electricity. Because the air pollution reductions required by the Standards impose significant capital and operating costs on previously uncontrolled coal-fired generation, the Standards were expected to affect – and have affected since April 2015 and before – the wholesale price of electricity and capacity prices where such markets exist. These

price impacts have been relied upon by *all generators* in making investment decisions: by coal-fired generators deciding whether to upgrade or retire their plants; by gas generators deciding whether to build new power plants; by nuclear generators deciding whether to increase output from existing plants; and by renewable developers deciding whether to build new wind or solar projects. These price impacts are also relevant to owners of nuclear and other non-emitting sources that must decide whether to retire existing plants or to make capital investments necessary to keep those plants operating or to increase capacity.

19. Now, nearly four years after adoption of the Standards, virtually all generators are either in compliance with the Standards or have finalized plans to come into compliance by April 2016. Any vacatur or stay of the Standards would disrupt the market's reasonable expectations and jeopardize the investments that the electric power sector has made over the past four years and earlier.

20. An interruption in the applicability of the Standards would disrupt wholesale electricity prices and disadvantage generators that timely complied with the Standards. Those generators would have to compete for a prolonged period of time against coal-fired plants that would otherwise retire by April 2016; a vacatur or stay would allow those non-compliant power plants to continue to operate, selling power at prices unaffected by any incremental compliance costs. This price uncertainty would disadvantage compliant generators and, ultimately, their customers.

21. Moreover, any vacatur or stay of the Standards would deprive the electric power industry of the ability to predict when the Standards would be reinstated after EPA reaffirms its finding, or whether the Standards would be replaced with different, more stringent requirements. In any case, if the Standards were vacated or stayed, the power industry would have complied with the Standards since April 2015, then would suffer an indeterminate period during which the Standards were nullified, and finally would have the Standards or some other (possibly more stringent) requirements imposed again. Such a moving target would be highly disruptive to the electric power industry and the markets and other regulatory regimes in which its participants operate.

22. This uncertainty could persist long enough even to disturb the long-range capacity markets. Each year those regional transmission organizations that conduct capacity markets hold one or more auctions to ensure capacity in later years. In February and May 2016, ISO New England and PJM, respectively, will conduct capacity markets for the delivery year 2019/20, and in April 2016, the Midcontinent Independent System Operator will conduct a capacity market for the delivery year 2016/17. If uncertainty continues to exist during those auctions – the first of which is only five months from now – electric generators may be reluctant to commit their power plants to operate in the subsequent years, or may commit those plants only to find that even greater investment will be required than anticipated. This uncertainty is

likely to cause higher bids and higher costs for electricity consumers than would otherwise occur.

September 24, 2015

William B. Berg
Vice President of Wholesale Market
Development for Exelon Corporation