Testimony of Ralph E. Roberson
Subcommittee on Energy and Power of the House Committee on Energy and Commerce
"The American Energy Initiative"
February 8, 2012

Chairman Whitfield, Ranking Member Rush, members of the Committee, thank you for the opportunity to provide testimony to you on the American Energy Initiative. My name is Ralph E. Roberson, and I am President of RMB Consulting & Research, Inc. RMB is a multi-disciplinary air quality consulting company providing services to electric utilities and a wide range of industrial sources. We specialize in regulatory analysis, evaluating air pollution control technology, continuous emissions monitoring systems, quantifying hazardous air pollutants emissions, evaluating predictive emissions monitoring systems and developing compliance assurance monitoring plans. I personally have over 40 years of experience in measuring air pollution emissions and evaluating the ability of pollution control technologies to meet air emission standards. My curriculum vitae is attached. More information on my company can be found at http://www.rmb-consulting.com.

Let me begin by saying that I am not representing any of RMB's clients in my testimony today and that the views I express are my own views and do not necessarily reflect the views of any of our clients. I am not being compensated for my testimony today.

My testimony addresses EPA's recently promulgated Mercury and Air Toxics Standards (MATS) rule. The MATS rule addresses the emission of hazardous air pollutants (HAPs) from Electric Generating Units (EGUs). My testimony is that the Maximum Achievable Control Technology, or MACT, standards that EPA has issued for new coal-fired EGUs are so stringent that no technology is available that can meet them. The stringency of the new-unit standards means that no new coal-fired EGU can be built under these standards. In essence, EPA has adopted standards that prevent the country from building new coal-fueled units.[1] Thus, new coal-fired electric generating units in the United States will no longer be an option for the utility industry's generation portfolio.

Electric utilities have always relied on a diverse set of resources as a means of insuring against the uncertainty of the future. Coal has always played a prominent role in utility resource portfolios because it is a domestic fuel and, over the long term, has proved to be reliably available at stable and predictable prices. Banning new coal-fired EGUs would represent a significant shift in U.S. energy policy and the way utilities have planned their portfolios, with potentially significant consequences for electric ratepayers.

As I explained in my comments on the proposed rule, there are several reasons why I believe EPA's new-unit standards will prevent the construction of new coal-fired EGUs. First is what has become known as EPA's "Franken-Plant" approach to setting MACT standards. The Clean Air Act requires that EPA establish MACT standards that reflect "the emission control that is achieved in practice by the best controlled similar source." In applying this standard, EPA has

[1] My conclusion and reference to new coal-fired units does not include IGCC units, which are regulated in a different subcategory from coal-fired units in EPA's final MACT rule.

set emission limits for each HAP based on the best performance achieved in practice by an existing unit for that particular HAP. The problem is that no single existing unit meets all of these standards, just as Dr. Frankenstein's fictitious monster bore no resemblance to an actual human being. It is as if a scholarship is available for the best individual student, and the school based its criteria on the student with the highest spelling score, the student with the highest math score and the student with the highest reading score. If different students had the highest scores on all three tests, no student could win the scholarship.

Second, as EPA recognizes, emissions from any unit can vary over time. EPA based its new-unit standards on the performance of selected units whose emissions were determined by performing short-term stack tests, but these short-term test results are not representative of emissions over time because of process and operating variability.

EPA attempted to address this variability by calculating and applying what is known as the upper prediction limit (UPL). But EPA's UPL approach is fundamentally flawed. EPA used a simple statistical formula to estimate the UPL for the best performing unit. The problem with EPA's approach is that the Agency is applying the UPL formula to very incomplete data. For each HAP, EPA typically has three sampling runs that were performed very close in time (i.e., at a maximum, over 3 consecutive days) for the single, best performing unit. The variance that EPA calculates using its formula is only representative of a very limited set of operating conditions and probably little, if any, fuel variability. Thus, EPA is only predicting the 99th percentile of a very limited range of operation and not a level that can definitely be complied with at all times and under all operating conditions. This is a critical flaw because EPA's standards require compliance on a rolling 30-day averaging period. Because the standards are set at such a low level based on short-term stack tests, and because the variability that will occur over a typical 30-day averaging period is not properly accounted for, the new-unit emission standards are simply not achievable.

In effort to put my concern with EPA's treatment of variability into an everyday example, consider the following questions. Who would claim that the child who makes the highest score on a single test is the smartest or best performing student in the class -- much less in the U.S.? What are the chances the same student will make the highest score on the next test?

A third problem is EPA's handling of measurements below the method detection limits (MDLs), which exacerbates the variability flaws discussed above. Specifically, the final emission limits for at least two pollutants (hydrogen chloride and filterable particulate matter) for new coal-fired units are based on measurements below the respective MDLs. This means that the concentration of the emissions required to comply with these new-unit limits cannot be accurately measured. The HCl emission limit is based on three test runs conducted on a unit for which all three test runs are reported to be less the MDL – in other words, the results are below the HCl level that can be reliably detected by the measurement method. EPA's MACT emission limit for HCl was determined by multiplying the highest method detection limit for the three sampling runs times by a factor equal to 3. In other words, the HCl floor is based on one constant (3) multiplied by another constant (MDL). Thus, the proposed HCl limit is not only based on non-detected concentrations, but also fails to account for any process variability. In the final rule, EPA followed a very similar procedure is setting the filterable PM emission limit for new units.

Basing an emission limit on some multiple of an MDL is not justified, especially when one stops to think literally what the MDL is. The universally accepted definition of MDL is the concentration at which we are 99 percent certain the analyte is actually present (i.e., greater than zero). However, the potential measurement error or measurement uncertainty at the MDL is huge. That measurement uncertainty is reduced but not eliminated by multiplying the MDL by a factor of 3. In my view, the concentration of HCl that can be reliably and accurately measured exceeds the level of EPA's new-unit HCl emission limit.

In the final rule, in response to comments on the proposed rule that no existing source met all of EPA's new-source MACT standards, EPA said it had identified a source that did meet all of the standards, even though that source had not been identified in the proposed rule. In my opinion, EPA can only be referring to Unit 1 at the Logan Generating Station because, if for no other reason, Unit 1 is the basis for two of three of the final primary emission limits (HCl and Hg). But EPA's assertion as to the Logan unit is untrue.

In order to collect data on which to base the MACT standards, EPA mandated utilities to conduct short-term stack tests. These short-term data were the basis for EPA's determination of the level of emission control that EPA believes has been achieved in practice by the best-performing units. As noted, however, EPA set standards that must be met on a rolling 30-day average basis. What a unit achieved during a short-term stack test does not represent what a unit can achieve over every rolling 30-day period in the year. Stack testing results are snapshots and cannot be guaranteed to be representative of long-term performance. If the same units undertook the same stack tests again, it is likely that they would yield different results.

This is exactly the case as to the Logan unit (which EPA used to support the new unit HCl emission limit). Logan submitted data pursuant to EPA's information collection request (ICR) demonstrating non-compliance with that very same emission limit. The Logan unit was used by EPA to support the final HCl emission limit of 0.40 lb/GWh. However, within publically available data posted by EPA, there exist five separate HCl test results for the very same Logan unit that report emissions well in excess of the new-unit HCl emission limit. Unfortunately for EPA, there exist no other publically available dataset for the Logan unit that demonstrates compliance with the new unit HCl emission limit. In other words, there are six publicly available stack test results for the Logan unit, and EPA chose to base the new-unit HCl emission limit on the lowest result of the six tests. EPA elected to ignore the other five test results for the Logan unit, all of which show non-compliance with the new-unit emission limit.

An identical situation exists for Chambers Cogeneration Unit 2. Unit 2 was used by EPA to support the final filterable PM emission limit of 0.0070 lb/MWh. However, within publically available data posted by EPA, there exist five separate emission test results well in excess of this filterable PM emission limit. There exist no publically available dataset for the Chambers Cogeneration unit that demonstrates compliance with the new unit filterable PM emission limit other than the single test result used by EPA to set the new-unit PM limit. In sum, EPA falls far short of having a unit that meets all of the new unit emission limits, because this unit does not even achieve compliance with the emission limit for which EPA used it to support. While I disagree with EPA's premise that finding an individual unit that meets all of the new unit emission limits would mean that EPA's emissions limits are achievable, I think it is particularly telling that EPA's claim is simply not true.

Taking all of these problems together, I am convinced that no pollution equipment vendor will offer guarantees that their equipment will meet these standards. Absent those guarantees, developers will be unable to obtain financing of the hundreds of millions of dollars that this equipment will cost. And absent that financing, new units will not get constructed.

In sum, the standards EPA has set forth for new coal-fired EGUs in the MATS rule are so stringent that new units, even using the best technology available in the market, cannot comply. These standards therefore will prevent new coal-fired EGUs from being built.

Thank you.

RALPH L. ROBERSON

EDUCATION

1971	M.S. in mechanical engineering, University of Virginia
1969	B.S. in mechanical engineering, University of Virginia

PROFESSIONAL CERTIFICATION

Professional Engineer: Virginia

SPECIALIZED TECHNICAL EXPERTISE

- Expert testimony: statistical analyses, opacity and particulate matter relationship, emission limits based on maximum achievable control technology, probability of exceedances, correlation analyses, hazardous air pollutant emissions from coal-fired boilers, and status of emerging continuous monitoring technology.

- Data analysis: use of state-of-the-art statistical techniques to estimate emissions and to analyze emissions and opacity data: to determine achievability of emission standards; to assess emission increases; to evaluate control technology effectiveness; and to estimate exposure to various air pollutants.

- Continuous emission monitoring systems (CEMS): regulatory analysis, alternative monitoring methods and procedures, quality assurance/quality control plans, and design/purchase specifications, with emphasis on particulate matter (PM) and mercury (Hg) continuous emission monitoring systems.

- Hazardous air pollutants: emissions from electric utility boilers, regulatory analysis, risk analysis, and assessment of control technology performance.

PROFESSIONAL EXPERIENCE

Mr. Ralph Roberson is one of the founders of RMB Consulting & Research, Inc. and serves as president of the company. His recent experience includes technical assistance to electric utility companies in complying with EPA's 2010 information collection request (ICR), detailed statistical analysis of mercury emission data and statistical assessment of data collected by continuous particulate matter (PM) monitors. He was a technical consultant to EPRI for a project that developed emission factors for hazardous air pollutants (HAPs) for coal-fired power plants.

Mr. Roberson has over 40 years of experience in conducting air pollution emission measurements, analyzing air pollution emission test data, preparing air pollution estimates and air permit applications, and assessing the performance of air pollution measurement technologies at numerous combustion sources, including at least 100 coal-fired electric generating units (EGUs). During the past 20 years, he has also: developed and used state-of-the-art statistical techniques to estimate hazardous air pollutant (HAP) emissions and analyze

HAP data from EGUs; determined whether proposed emission standards and limits are achievable; evaluated control technology effectiveness and performance; and assessed the performance of continuous emission monitoring system (CEMS) for various pollutants, including particulate matter, sulfur dioxide (SO_2) and hydrogen chloride (HCl).

He provided technical assistance to electric utility companies in complying with EPA's 1999 mercury information collection request (ICR), analyzing hazardous air pollutant emission data from coal- and oil-fired power plants in order to estimate accurately power plant health risks; conducting CEMS quality assurance training at six coal-fired power plants that are subject to EPA's Part 75 CEMS monitoring requirements; participating in the Acid Rain Advisory Committee (ARAC) process that assisted EPA's development of regulations pursuant to the acid rain provisions of the 1990 Clean Air Act Amendments; managing a project that utilized state-of-the-art statistical techniques to demonstrate that short-term ambient air quality standards can be protected by long-term source emission standards; managing a nationwide exposure assessment of asthmatics to short-term elevated SO_2 concentrations; directing a preliminary impact analysis of the effects of electric utility plants on short-term ambient NO_2 concentrations; serving as peer reviewer for EPA's development of toxic air pollution emission factors for combustion sources; and conducting an analysis to estimate the impact on ambient air quality and MEI risks of co-firing hazardous wastes in utility boilers.

Mr. Roberson has conducted a nationwide risk assessment of trace pollutant emissions from coal- and oil-fired utility plants. This project involved development of trace pollutant emissions factors, specification of nine reference utility plants, and coordination of computerized modeling utilizing EPA's HEM and EPRI's AERAM. He also managed a project that assessed radiological risks posed by emissions from coal-fired power plants. Activities in this effort involved developing a radionuclide sampling protocol, coordinating radiochemical analysis of samples, preparing quality assurance procedures, and preparing input parameters for AIRDOS-EPA computerized modeling runs.

In addition to these projects, Mr. Roberson has performed particle size analysis; directed emission tests for criteria and hazardous air pollutants (particulate matter, sulfur dioxide, oxides of nitrogen, mercury, lead, and fluoride); and consulted with industry to define and solve environmental and industrial hygiene problems.

Mr. Roberson was project leader on a U.S. EPA project to develop a National Emission Standard for hazardous air pollutants from the oil shale industry. He also worked with EPA's Oil Shale Working Group, which was responsible for directing development of the Pollution Control Guidance Document for Oil Shale. In a series of tasks for EPA's Division of Stationary Source Enforcement, he worked with the national CEMS program to assess levels of source compliance, evaluate reporting requirements, and review excess emission and performance specification test reports. He also directed development of a computerized, nationwide CEMS data base under a task coordinated through Edison Electric Institute and all EPA regional offices as well as many state and local air pollution control agencies.

PROFESSIONAL AFFILIATIONS

Air and Waste Management Association, Emeritus Member
- Member of AM-4 Source Monitoring Committee
- Member of EI-2 Power Generation Committee

American Society for Mechanical Engineers
Sigma Xi

SELECTED PRESENTATIONS AND TECHNICAL REPORTS

"Data Collection Plan for a Particulate Matter Continuous Emissions Monitoring System," prepared for Tampa Electric Company, Tampa, FL, March 2009.

"Rebuttal Expert Report," prepared for Tennessee Valley Authority, Knoxville, TN, November 2008.

"Status of Particulate Matter Continuous Emission Monitoring Systems 2007," prepared for EPRI, Palo Alto, CA, 1014180, December 2007.
"Report of Ralph L. Roberson for Dayton Power & Light Company, Inc.," Expert Report on Analyzing and Using Opacity Data for Compliance Assessments, July 2007.

"Report of Ralph L. Roberson for American Electric Power Company, Inc. and Southwestern Electric Power Company," Expert Report on Using Opacity Measurements for Compliance, prepared for American Electric Power, September 2006.

"Expert Report on Measuring Opacity and Using Compliance Assurance Monitoring (CAM) Plan Results for Compliance Determinations," prepared for Mountain Cement Company, August 2005.

"Technical Report: Relative Stringency of Periodic Measurement Versus Continuous Emission Monitoring," prepared for Ohio Electric Utility Institute, July 2005.

"Technical Review Comments, EPA's 'Proposed National Emission Standards for Hazardous Air Pollutant; and in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units' and 'Supplemental Notice for the Proposed National Emission Standards for Hazardous Air Pollutant; and in the Alternative, Proposed Standards of Performance for New and Existing Stationary Sources: Electric Utility Steam Generating Units," (with R. McRanie) prepared for the Utility Air Regulatory Group, Washington, DC, June 2004.

"Expert Report on Alternative Methods for Measuring Opacity for Coal-Fired Power Plants," prepared for Georgia Power Company, December 2003.

"Characterizing Coal-Fired Power Mercury Emissions Variability at Low Concentrations," prepared for EPRI, Palo Alto, CA, 1009150, October 2003.

"Characterizing Variation in Mercury Emissions from Coal-Fired Power Plants," prepared for EPRI, Palo Alto, CA, and U.S. Department of Energy, Pittsburgh, PA, 1005401, June 2003.

"Characterization of 'Longer-Term' Mercury Emissions from Coal-Fired Power Plants," (with P. Chu et al.) in *Proceedings of the Combined Power Plant Air Pollution Control Mega Symposium*, Washington, DC, May 2003.

"Expert Report on Stringency of Opacity Standard Based on Continuous Opacity Monitoring (COM) Data," prepared for Public Service New Mexico, December 2002.

"Continuous Emission Monitoring Guidelines - 2002 Update," (with R. Berry and D. Sanders) prepared for EPRI, Palo Alto, CA, 1004179, September 2002.

"Technical Review Comments on EPA's Proposed Rule Regarding Particulate Matter (PM) Continuous Emission Monitoring Systems (CEMS)," prepared for Utility Air Regulatory Group, Washington, DC, March 2002.

"Status of Particulate Matter Continuous Emission Monitoring Systems," prepared for EPRI, Palo Alto, CA, 1004029, October 2001.

"Analysis of the Stringency of the Tennessee Opacity Standard Based on Continuous Opacity Monitoring System Measurements as Compared to Periodic Method 9 Readings," prepared for Tennessee Valley Authority, July 2001.

"Results of Continuous PM Monitor Testing at Pleasant Prairie Power Plant," (with J. Koning and C. Dene) presented at the EPRI CEM Users Group Meeting, Charlotte, NC, May 2001.

"Status of Mercury Continuous Emission Monitoring Systems," prepared for EPRI Energy Conversion Division, September 2000.

"Evaluation of Continuous Particulate Matter (PM) Monitors for Coal-Fired Utility Boilers with Electrostatic Precipitators," (with C. Mitchell and C. Dene) presented at the EPRI CEM Users Group Meeting, Cincinnati, OH, May 1999.

"EPA's Mercury Information Collection Request," presented at the Electric Utilities Environmental Conference, Tucson, AZ, January 1999.

"Status of CEM Systems for Particulate Matter (PM) Emissions and Selected Non-Criteria Pollutants," prepared for EPRI Energy Conversion Division, September 1998.

"Status of EPA's Continuous Particulate Mass (PM) Monitor Demonstrations," presented at the EPRI CEM Users Group Meeting, Denver, CO, May 1997.

"Mercury Measurement Methods for Electric Utility Plants" (with B. Nott and P. Chu), presented at A&WMA Conference, Acid Rain and Electric Utilities II, Scottsdale, AZ, January 1997.

"Mercury and Other Trace Elements in Coal" (with S. Baker), EPRI TR-106950, prepared for Electric Power Research Institute (1997).

"Mercury Speciation Methods for Utility Flue Gas" (with D. Laudal, et al), *Fresenius Journal of Analytical Chemistry*, in press.

"Status of CEM Systems for HAP Emissions," presented at the EPRI CEM Users Group Meeting, Kansas City, MO, May 1996.

"Status of Flue Gas Mercury Measurement Methods for Electric Utility Power Plants" (with B. Nott), prepared for the Electric Power Research Institute (1996).

"Overview: Mercury Emissions from Fossil Fuel-Fired Electric Generating Units" (with S. Baker), prepared for the Florida Electric Power Coordinating Group (1994).

"Review and Critique of EPA's Proposed CEM Accuracy and Bias Test Procedures," prepared for Utility Air Regulatory Group (1992).

"Review of Proposed Amendments to New Mexico Air Quality Control Regulation 603 - Coal Burning Equipment - Nitrogen Dioxide," prepared for Arizona Public Service Company (1991)

"Analysis of Ethyl Emission Test Data" (with D. Dickey), prepared for the Ethyl Corporation (1990).

"Continuous Emission Monitoring and Quality Assurance Requirements for New Power Plants." Presented at the 1989 Joint Power Generation Conference, Philadelphia, PA (1989).

"Compliance with Appendix F Requirements by Subpart Da Facilities During 1988," prepared for Utility Air Regulatory Group (1989).

"Assessment of Ambient Air Quality Impacts from Co-Firing Hazardous Wastes in Electric Utility Boiler," prepared for Utility Air Regulatory Group (1989).

"Degree of Protection Against NAAQS Violations Provided by 30-Day Rolling Average Emission Limits at Public Service of Indiana Cayuga Generating Station" (with others) (1989).

"Assessment of Risks Posed by Radionuclide Emissions from Coal-Fired Power Plants," prepared for Utility Air Regulatory Group (1988).

"Assessment of the Impact of the Subpart Db New Source Performance Standards on Electric Utility Auxiliary Boilers," prepared for Utility Air Regulatory Group (1987).

"Quality Assurance Plan for Continuous Emission Monitoring Systems," prepared for Intermountain Power Project (1986).

"Nationwide Assessment of Risks Posed by Coal and Oil Combustion in the Electric Utility Industry," prepared for Utility Air Regulatory Group (1986).

"Continuous Emission Monitoring Guidelines" (with T. Eggleston), EPRI CS-3723, prepared for Electric Power Research Institute (1984).

"Quality Assurance Plan for Continuous Emission Monitoring Systems," prepared for Montana Power Company (1984).

"Characterization of Radionuclide Emissions from Coal-Fired Utility Boilers," prepared for Utility Air Regulatory Group (1983).

EMPLOYMENT HISTORY

RMB Consulting & Research, Inc.	President	1994 to present
Systems Applications International	Vice President	1990-1994

Roberson Pitts, Inc.	President	1987-1990
Kilkelly Environmental Associates, Inc.	Vice President	1981-1987
Research Triangle Institute	Senior Environmental Engineer	1979-1981
Commonwealth Laboratory, Inc.	Manager, Technical Services Division	1973-1979
Newport News Shipbuilding and Dry Dock	Senior Analyst	1971-1973