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Written Testimony of David C. Foerter Executive Director Institute of Clean Air Companies

Before the Subcommittee on Clean Air and Nuclear Safety On The State of Mercury Regulation, Science, and Technology

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Chairman Carper, Senator Voinovich and Members of the Subcommittee:

Good morning, my name is David Foerter and I am the Executive Director for the Institute of Clean Air Companies (ICAC).

ICAC is the national trade association of nearly one-hundred companies that supply air pollution control and monitoring technologies for electric power plants and other stationary sources across the U.S. The industry deploys control technologies for all air pollutants, including all criteria pollutants, air toxics, and greenhouse gases.

ICAC would like to thank Chairman Carper and Senator Voinovich for the invitation to participate in the Subcommittee on Clean Air and Nuclear Safety hearing on, "The State of Mercury Regulation, Science, and Technology." It is my privilege to present this testimony on our current understanding of mercury control technologies for coal-fired power plants and their application to meet regulatory requirements.

As you should be aware, air pollution control technologies follow and respond to regulatory drivers. As you will hear from others today, the synergy of state-specific actions and federal requirements have created control technology markets with considerable certainty as to when and what technologies will be needed. ICAC members, and the industry at large, are responding with an ever increasing suite of technologies to achieve these mercury control requirements. All power plants are not created equally; all are engineered for specific conditions and needs. Likewise, there is no single mercury control technology that will achieve the reductions needed for all coal types and for all electric power plant configurations. Rather, there is an expanding suite of control technology options being deployed today. In addition, flexibility within regulations including tiered approaches are good for technologies such that risks are reduced and lower cost options can be developed and deployed. In these comments, I will focus on two of the primary control options; one a mercury specific sorbent injection technology and the other a collection of technologies integrated to control mercury emissions as a collateral, or co-benefit when controlling for other pollutants.

In general, the science and understanding of mercury control technology has moved rapidly from research through development, demonstration and into full system deployment. The success of this rapid progression is the result of strong support from federal and public-private partnerships, and the ability of regulators, particularly in the states, to enact regulatory programs that harnessed the suite of control options in a flexible regulatory framework. For example, the strong research and demonstration program conducted through the U.S. Department of Energy overturned the previous assumption that sub-bituminous coals would be the most difficult and expensive to control. Through the demonstration program, the better understanding of western, sub-bituminous coals led to successes in dramatically reducing the cost of controlling mercury emissions while increasing the control effectiveness. Today, technology vendors are addressing challenging issues surrounding sorbent injection technology as it applies to eastern, bituminous coals, particularly in the presence of sulfur trioxides (SO_3).

Today, control technology vendors are actively installing mercury control systems across the United States, particularly in states that have called for more aggressive implementation schedules and more stringent requirements than those mandated by the federal Clean Air Mercury Rule. In 2007, state programs in Massachusetts and New Jersey go into effect, with systems and control strategies in place to meet these requirements. Also a few newly built power plants begin operation in 2007 and mercury control has been integrated into their design. In addition, the combination of installed selective catalytic reduction (SCR), primarily designed for NO_x control, and wet flue gas desulfurization (wet FGD), primarily designed for SO_2 control, already achieve mercury control as part of the integrated co-benefits approach. There have been reports of high performance of many systems, however, at a minimum all mercury control systems are designed to meet the regulatory requirements as well as any regulatory flexibility mechanisms. Typically, technology performance guarantees will be written around the performance requirements of regulations.

Over the last year, ICAC members reported booking new contracts for mercury control equipment for nearly thirty-six coal-fired power plant boilers. These contracts are for controlling mercury on new and existing boilers, burning bituminous and sub-bituminous coals, with different particulate capture equipment such as fabric filters and electrostatic precipitators (ESP). The contracts for commercial mercury control systems are attributed to federal and state regulations, including new source permit requirements and consent decrees, which specify high levels of mercury capture. By the end of 2007, vendors anticipate approximately another fifty contracts for mercury control systems will have been awarded.

As reported by ICAC as the federal Clean Air Mercury Rule was being promulgated and as states prepared their response, and in many cases their own programs, mercury specific control technologies such as sorbent injection systems have been commercially available after being demonstrated at full-scale on various coal-fired boilers, coal types, and emissions control equipment configurations. Typically, these mercury control systems require relatively small capital investments for material storage, handling and delivery systems. Initially, sub-bituminous coals posed the greatest challenge for sorbent injection technology. Today these challenges have been largely overcome, and the technical challenges are mostly for bituminous coal systems.

Once a sorbent injection system is installed, the sorbent, typically powdered activated carbon is delivered into the flue gas where it mixes with the gas and flows downstream. This provides an opportunity for the mercury in the gas to contact the powdered activated carbon and be removed. This is called "in flight" capture. The sorbent is then collected in the particulate control device where there is a second opportunity for sorbent to contact the mercury in the gas. Many sorbent injection systems have already been installed, although deployment of the systems will typically conform with the regulatory schedule. It is noteworthy that the same sorbent injection system can be used to achieve different levels of mercury control, with the level of control modified by the type and amount of the sorbent injected into the flue gas. It is also noteworthy that sorbents other than activated carbon continue to be tested for application to full-scale deployment.

As predicted based on technology demonstrations, significant amounts of mercury are being removed through the use of existing control technologies. Installed technologies including fabric filters, electrostatic precipitators, flue gas desulfurization, selective catalytic reduction, and others currently achieve high levels of mercury reductions. Although these processes were not originally intended, designed, nor optimized for mercury capture, the collateral mercury control is often sufficient to meet current requirements. Because mercury is captured as a co-benefit from these control technologies, the reductions are cost effective. Many other power plants are anticipated to install SCR and FGD in response to the Clean Air Interstate Rule over the next several years, and are likely to be able to meet requirements through these integrated co-benefit approaches, with the potential to add additional mercury-specific control technologies as needed. Integrated systems can also be optimized to achieve greater amounts of mercury. For example, catalyst manufacturers can reformulate catalysts to increase the oxidation of mercury, making it more soluble for wet removal, or change catalyst formulations to lower the conversion of sulfur dioxide to sulfur trioxide.

Given that a number of power plants sell flyash that is captured in a particulate control device such as an electrostatic precipitator (analogous to a large scale home electric air cleaner), the presence of activated carbon in flyash became a challenge. Notably, the Electric Power Research Institute (EPRI) developed two control systems to meet these challenges including: TOXECON™ and TOXECON II™. TOXECON allows flyash to be collected by the electrostatic precipitator, then injects the sorbent downstream where it is collected in a fabric filter. This preserves the flyash for sale, and controls mercury emissions. A full scale demonstration at the Presque Isle Power Plant in Marquette, Michigan, demonstrated a 90 percent mercury control at relatively low activated carbon injection rates (2.5 pounds per million cubic feet). In a second system, TOXECON II™ injects the sorbent between the last two fields in an electrostatic precipitator, allowing at least 90 percent of the flyash to be sold and only 10 percent of the flyash to be commingled with activated carbon. The activated carbon can be either regenerated, recycled or disposed of with the flyash. Both systems continue to be tested to optimize their performance, and both systems preserve most of the flyash for sale for cement manufacturing.

Recognizing the market demand for activated carbon driven by regulations, the air pollution control industry continues to make plans and investments into new and expanded production facilities. Activated carbon is manufactured using lignite coal as the raw material, and manufacturing is typically performed close to this source of coal. For example, the largest powdered activated carbon plant in North America is now in the pre-construction permitting stage to build on multiple sites up to four production lines. The goal of this $280 million project is to manufacture enough product to satisfy 50 percent of the U.S. market in 2015. Facilities would be constructed in close proximity to mine sites in Louisiana, and two in North Dakota. The total activated carbon market in the U.S. is anticipated to be less than 600 million pounds per year in 2010 and approximately 1 billion pounds per year in 2015.

The air pollution control industry continues to work responsibly with power plant operators to ensure that mercury control systems are integrated into the facility's design and specific coal requirements, and that any operational issues can be addressed. Significant advances continue to be made in mercury control technology performance and commercial deployment is ongoing.

Thank you for the privilege to testify before the Subcommittee on these critically important matters.

Sincerely,

David C. Foerter
Executive Director