Written Testimony

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Re: Coal Combustion Byproducts: Potential Impact of a Hazardous Waste Designation on Small Businesses in the Recycling Industry

Submitted to: U.S. House of Representatives, Committee on Small Business, Subcommittee on Rural Development, Entrepreneurship and Trade

July 22, 2010

Chairwoman Nydia M. Velazquez and members of the Subcommittee:

Thank you for the invitation to provide testimony during the hearing on "Coal Combustion Byproducts: Potential Impact of a Hazardous Waste Designation on Small Businesses in the Recycling Industry." The concrete industry comprises many small businesses, including contractors, design firms, and material suppliers. As the current President of the American Concrete Institute (ACI), I am pleased to represent ACI, one of the world's leading authorities on concrete technology. ACI is a 501(c)(3) non-profit technical and educational society organized in 1904. ACI is not a trade organization and has no commercial interest in concrete or concrete products. ACI members seek to advance concrete knowledge for the benefit of the general public.

ACI is an American National Standards Institute (ANSI) accredited Standards Developing Organization (SDO), and maintains national standards in the area of concrete technology and application. ACI currently supports more than 100 technical committees whose expert members develop these national standards using the consensus process. ACI maintains more than 400 technical documents, including codes, specifications, reports and guides, references, and the annual Manual of Concrete Practice.

As an ANSI-accredited SDO, two of ACI's major contributions to the construction industry are the "*ACI 318 Building Code Requirements for Structural Concrete and Commentary*" and "*ACI 530 Building Code Requirements for Masonry Structures and Commentary*", the latter produced jointly with the American Society of Civil Engineers and The Masonry Society. Both have been used by the major building codes in the past and are currently incorporated by reference in the 2009 International Building Code. ACI 318 contains references to the use of fly ash in concrete construction.

ACI 318 is used worldwide. An official ACI Spanish version is used throughout Central and South America. ACI has also authorized Arabic, Chinese, Korean, and Portuguese translations of ACI 318.

In regard to the beneficial use of fly ash in concrete, I offer the following:

Why is fly ash used in concrete?

Concrete is made by blending sand with crushed stone or gravel, and binding them together in a paste made with water and the powder known as portland cement. The manufacture of portland cement is not only an energy-intensive process, but the production of each ton of cement releases approximately 1 ton of CO_2 into the environment as a result of chemical conversions and the burning of fossil fuels. President Obama pledged at the UN Climate Summit in Denmark, Dec. 2009, to reduce CO_2 emissions 17% by 2020 over a 2005 baseline. Other industrialized nations are looking for U.S. leadership in this effort.

For over 50 years it has been shown that a reduction in the amount of cement required to produce concrete can be achieved by substituting coal fly ash for a significant portion of the portland cement. The resulting concrete not only has a lower embodied energy and CO_2 footprint, but also has improved properties leading to a more durable, longer lasting infrastructure. Fly ash is widely used in concrete produced in the U.S. today, and in this manner an industrial waste product is converted to a valuable resource. According to data from the American Coal Ash Association (ACAA), 15 million tons of fly ash otherwise destined for landfills were incorporated in concrete in 2006, preventing an approximately equivalent amount of CO_2 emissions.

Fly ash contributes to a more sustainable, environmentally responsible infrastructure because its use in concrete can:

- reduce concrete's embodied energy and CO_2 footprint;
- lower coal fly ash landfill volumes;
- increase the service life of concrete;
- tie-up trace metals in ash;
- enable the use of local marginal quality sand, crushed stone, and gravel and thus reduce the need to open new quarries and pits; and
- reduce the need and cost for repairs and maintenance.

Fly ash is vital to concrete performance because it can:

- be an effective ingredient in high-strength and high-performance concrete;
- reduce the porosity and penetrability of hardened concrete;
- be an effective ingredient in minimizing corrosion of reinforcing steel;
- be an effective ingredient in resisting severe environmental exposures;
- reduce the heat produced by chemical reaction of the cement (this is critical in dams, bridge piers, and large foundations);

- increase construction quality by making a more compactable concrete;
- lower concrete's initial and life-cycle cost; and
- reduce the need to import cement

There are no viable replacements for coal fly ash in concrete, in the short term, if its availability is reduced for any reason.

Fly ash used by the concrete industry is specified to meet the requirements of ASTM C618 and AASHTO M295, and as such is well understood. The use of coal fly ash is recognized for improving concrete durability in ACI's reference Code and Specification, and coal ash is discussed in over 100 of ACI's technical documents.

How does beneficial use impact CO_2 emissions for the concrete industry?

Life-cycle assessment research published by the Portland Cement Association (PCA) reported that 96% of the CO_2 embodied in concrete is derived from the manufacture of portland cement. Replacing a portion of the cement with an equivalent amount of fly ash can reduce the CO_2 footprint of concrete by up to 1 ton of CO_2 emissions for every 1 ton of cement replaced. Tracking cement use gives an indication of the concrete industry's CO_2 emissions. By using fly ash, the concrete industry could stay under the pledged target for CO_2 emissions reduction. This is true for every year including the target date of 2020.

How does beneficial use impact the need to import cement?

According to the statistics on cement use complied by the U.S. Geological Survey since 1900, cement use peaked at 128 million tons in 2005. In that year, approximately 100 million tons of cement was produced domestically requiring the importation of approximately 30 million tons of cement.

Based on industry trends and estimates from PCA, in 2009, approximately 75 million tons of cement was used, a 40% reduction from the 2005 level. ACAA's most recent data show that 15 million tons of fly ash was used in concrete construction in 2006. ACAA estimates that for 2008, 12 million tons of fly ash was used, with an additional 42 million tons available. When the economy recovers, fly ash could reduce the need to import cement and improve the balance of trade.

How might "stigma" impact beneficial use?

The title of the *Engineering-News Record* article "Fly Ash Looms as the 'New Asbestos'" (by Nadine Post, Apr. 7, 2010) points out the potentially harmful impact to the public perception toward the use of fly ash. But the EPA has had success in driving the use of materials labeled hazardous waste that have been reconditioned for reuse. Spent sulfuric acid is one example.

What is different about the concrete industry compared with other industries is the many different audiences it encompasses, and each has a stake in the use of fly ash. Fly ash generators have to assent to its use; otherwise, they can simply dispose of it. We Energies, a Wisconsin utility, has embraced the beneficial use of fly ash to the extent that in 2009 they recovered additional fly ash destined for disposal over what they produced that year. Ready mixed concrete suppliers have to be convinced that the improvements that might be needed at their facilities, such as additional silos for fly ash, will represent a return on the investment.

Concrete contractors also have to be in agreement. They are concerned with how fly ash impacts rate of strength gain and setting. The Engineer of Record has to approve the mixture design and must be convinced that fly ash will meet the requirements of the design. And the Owner of the project would question why fly ash is in the structure if it is hazardous. If EPA designates fly ash as special waste, but requires hazardous waste regulations, acceptance throughout the different audiences in the concrete industry will be difficult to maintain.

The American Concrete Institute is pleased to have worked with governmental agencies and industrial practitioners for over 100 years to develop building codes, specifications, standards, and guides that protect human safety and guide the design and construction of concrete infrastructure in the U.S. and around the world. As President of ACI, I am prepared to assist decision makers in selecting the best choices for the effective and responsible use of coal fly ash.