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House Energy and Commerce

Subcommittee on Energy and Environment

Hearing Entitled: "Drinking Water and Public Health Impacts of Coal Combustion Waste Disposal"

December 10, 2009

Mr. Chairman, Honorable Members of the Subcommittee, I am honored to have been invited to participate in this subcommittee hearing entitled, "Drinking Water and Public Health Impacts of Coal Combustion Waste Disposal."

As a physician trained and practicing for some 30 years in the area of Occupational and Environmental medicine, I have had countless occasions to address issues of both individual and public health concerns. In the context of today's hearing, I have examined as many as a half dozen individuals who were exposed to fly ash when an accidental spill occurred on January 25, 2005 in the Forward Township of Western Pennsylvania. These individuals included both adults and children and involved a large collection of ash, which slid down a hillside and covered the ground in and around several homes and at least one business on this neighborhood. While there were some complaints registered of non-specific airway irritation, I was able to identify no objective clinical findings among the individuals evaluated. These same individuals and several others were also separately examined and tested utilizing both blood and urine studies for possible heavy metal poisoning, by the Allegheny County Department of Public Health, with no resultant evidence of any abnormalities detected. On the follow-up examinations of these individuals by the Health Department in the spring of 2009, they were again found to have normal assessments. It should be noted that these individuals were exposed for a period of days to weeks, to ash, which covered the ground to a depth of one to two feet in some areas, Several of them were involved with shoveling and otherwise cleaning and removing the ash from their neighborhood.

I also had the opportunity to participate in addressing similar potential human health issues related to a fly ash release in the Emory and Tennessee Rivers and surrounding countryside near Kingston, Tennessee, which occurred on December 22, 2008. In this instance, it was a Tennessee Valley Authority (TVA) facility containing coal fly ash in a retention pond, which gave way following a long period of heavy rainfall. On this occasion, though I did not personally evaluate any individuals, I visited the site, reviewed data collected by both the TVA and the EPA, and assessed potential human health concerns regarding fly ash contamination to air, soil, and water in the vicinity of the Kingston TVA facility. I had the opportunity to speak with residents of the area and interested individuals about their specific health concerns. In that setting, among several concerns voiced were the potential for arsenic contamination of the drinking water of residents both in the area and downstream from the TVA facility. Various water samples, some of which I had the opportunity to examine, were collected in the Tennessee River near the intake of the Kingston utility water treatment intake and demonstrated no evidence of abnormally high levels of arsenic or other potentially toxic materials.

In addition, I have had the opportunity to address the potential toxicity of heavy metals such as arsenic in the course of my working practice in the setting of various industrial sites and among individuals working in facilities where arsenic and/or other potentially toxic compounds might exist as possible contaminants or intended production constituents. In my work as an occupational health physician, I have examined, tested, and counseled individuals who have been exposed to arsenic and other potentially toxic materials in the workplace over many years.

It would be perhaps constructive to appreciate a basic understanding of the nature of the material, namely, in this instance arsenic, in order to more realistically assess the potential for a human health hazard for exposure through drinking water. Arsenic is a ubiquitous element, widely distributed in nature in a number of minerals, especially as arsenides of copper, nickel, and iron or as arsenic sulfides or oxides. Arsenic is naturally present in virtually all soils, with a range of levels from 0.1-40 ppm, and an average of about 5-6 parts per million (ppm). Soils which contain arsenic as part of sulfide ore deposits can demonstrate concentrations of several hundred ppm. Arsenic is also a naturally present in all waters, including rivers, lakes, springs, and wells. The arsenic content of hot springs is especially notable, with extremely high concentrations being reported in ground waters from areas of normal thermal activity and in wells from areas high arsenic rock content, such as Oregon, Utah, Nevada, and several locations in Canada.

Arsenic is ingested daily through virtually all food stuffs at a level of usually 1 mg/kg. Meat, fish, and poultry generally have the highest levels. Fish usually contain 1-10 mg/kg, and some crustaceans and algae may contain more that 50 mg/kg. Beverage, especially bottle water and wine, contribute significant amounts of arsenic to the human diet. The toxicology of arsenic is a complex subject, for arsenic exists as trivalent (+3) arsenite, pentavalent (+5) arsenate, and also in multiple organic forms. It is thought by some investigators to be an essential trace element, necessary to human metabolism. Medicinal uses of arsenic have included historically anti-parasitical therapies, especially in the treatment of syphilis, psoriasis, and ingestion as a tonic. Arsenic may be toxic to plants, animals, and bacteria, but in a very selective fashion. The acute

toxicology of inorganic arsenic has been well known for a long time, with the trivalent species is considered to be more toxic than the pentavalent forms. With
the levels that have been mentioned in the preceding, and understanding that the permissible arsenic level in domestic water supply has been set at 0.01 mg/L, one realizes that despite regular daily exposures in both water and foodstuffs, there have been no identifiable adverse human health effects seen in the U. S. to date. There is, of course, considerable variation to exposure levels of arsenic throughout the world, and studies have been conducted in sites in Taiwan and Bangaladesh, demonstrating extremely high levels of arsenic in regularly used potable water supplies. For example, arsenic concentration in various Taiwanese Villages has ranged from very low levels to more than 600 *mcg/L* with no evidence of excess risk of significant adverse health effects in some studies even above these levels. (Brown and Chen 1995 and Guo, et.al., 1994). Even higher concentrations have been identified in various wells in Bangaladesh. There are unfortunately many common misconceptions about exposure to elements such as arsenic, which we all experience on a daily basis, and the potential for adverse human health effects. It is obviously a very important goal to protect the safety of our public drinking water in the United States and avoid the potential for risk from over-exposure to toxic contaminants, but regulatory decision-making is appropriately based on sound science and reason. The history of exposure to arsenic in the air and water in North America is one which has not identified any significant adverse human health effects. Our practical and epidemiologic experience has shown that the presence of fly ash contaminated with trace amounts of arsenic and/or other elements does not represent a significant human health hazard. While the level of possible arsenic and other heavy metal contamination might temporarily

increase in waterways such as the Tennessee River in the Kingston incident, this represents an extremely transient and clinically insignificant event. It also is well known that while arsenic may be conceivably temporarily increased in the water supply in such instances, its insolubility in water affords a natural level of protection from untoward exposure.

In summary, on the basis of my own clinical experience and review of the literature regarding the potential for human adverse health effects secondary to accidental contamination of potable water sources by fly ash and/or its constituents, it is my reasoned professional judgment that any such risks would be extremely unlikely and limited. This does not mean that every effort should not be made to properly and safely contain fly ash wherever it is stored or used in some practical application and that potential exposures be minimized. That is only good and prudent practice. Such practice should be based on sound science, measurement and practical experience, and not on presumptive, unproven and unrealistic fears.