



September 25, 2008

Remarks of Conrad (Dan) Volz, DrPH, MPH, Air and Water Science Panelist

**“Science that Bridges the False Divide Between Ecological and Human Health-  
Ecological and Human Health Risks from Coal Combustion Products”**

**(Talk Title, Slide-1)**

I see many familiar faces in the audience probably anticipating a talk about the effects of Estrogens in fish. In fact studies from around the world clearly show that fish are sentinels for estrogen exposure. When I gave my topic to the conference organizers I had this very issue in mind.

**(Stack Plume, Slide-2)**

But I've decided to focus my remarks today on the immense quantities of toxic heavy metals released from the coal combustion process. And, why declines in ecological health indicators- like frogs and toads- should be a public health warning, a wake up call, another “canary in the coal mine” regarding our public health.

I believe this is a priority public health issue, of particular interest to women and children, for a number of reasons.

First, studies mount worldwide indicating fish are bioaccumulating mercury and selenium, including fish in the Allegheny River. Both mercury and selenium are highly associated with power plant pollution. Mercury is a neurotoxin, particularly affecting developing fetuses and children.

**(Forward Township Flyash Spill, Slide-3)**

Second, In collaborative work with the Environmental Integrity Project, particularly Lisa Graves-Marcucci and the Children's Institute we are finding many, permitted and legacy coal combustion waste sites--commonly called fly ash piles-- throughout the Tri-State area ---

I'm sure most of you passed close by a fly ash pile or over a fly ash filled mine on your way here today----and, legacy is a word used to describe wastes that were historically dumped, often forgotten about and behind me you see the results of this neglect in a southwestern Pennsylvania community.

#### **(Clean Coal as oxymoron, Slide-4)**

And than the clincher- Said perfectly in a recent Washington Post column

“Clean coal: Never was there an oxymoron more insidious or more dangerous to our public health

There needs to be reasoned, vocal public health opposition to the “Clean Coal” campaign. This slogan actually encourages increased coal usage and coal-fired plant production, when no such “Clean Coal” technology exists — no one who has ever seen the extraction or burning of coal can honestly say it is clean.

Some documents arising from the Department of Energy (DOE) and state regulatory agencies under-estimate the life-cycle health risks of coal-fired energy production. They often don't include peer-reviewed publications concerning significant concentrations of toxic elements released during this production cycle and their health effects and risks.

#### **(Little Blue Flyash Disposal Site, Slide-5)**

I want to impress upon you the substantial evidence that emissions of toxic heavy metals and elements from coal burning plants has and continues to;

- Cause widespread health effects in aquatic animals.

- Adds significant masses of these contaminants to our air, land surfaces, watersheds and groundwater.

-And increases the risk of development of health problems in humans, especially our most vulnerable population our children.

Our ecosystems are being overwhelmed by coal combustion contaminants. Elements such as arsenic, cadmium – a metalloestrogen, chromium, mercury, and selenium are; released into the air through stack emissions; pumped into our water from plant wastewater and most insidiously leach into the water and soil from flyash piles-the end product after the coal is burned.

In 2005, Coal-fired power plants produced 71.1 million tons of flyash, filling 44 million cubic yards of landfill space. Studies show that the amounts of elements left in fly ash are much higher than in coal; Arsenic can have up to 100 ppm in coal but 1,700 ppm in fly ash; and alarmingly Manganese levels don't exceed 15.0 ppm in coal but can be as high as 4,400 ppm in fly ash.

Additionally, flyash has had its radioactivity technologically enhanced because of the concentration of radioisotopes especially Uranium.

The Law of Conservation of Mass-we all learned this in high school science class-states that “matter cannot be created nor can it be destroyed.” The burning of vast amounts of coal opens Pandora's Box and releases almost every element in the periodic table into the environment. This law also tells us that elements that don't go up the stack or into water-**stay in the fly ash.**

### **(National Academies Statement, Slide-6)**

Fly ash that is not considered a toxic waste but deemed a beneficial use material; it is often kept in unlined dumps without adequate protection from the elements; and is being disposed of now in abandoned underground coal mines-with a high probability that it will eventually add heavy metals to our groundwater.

The National Academies of Science has concluded that “the presence of high contaminant levels in many coal combustion residue leachates may create human health and ecological concerns at or near some mine sites over the long term.”

### **(Trace Metals in Southern Toads, Slide-7)**

So what is the ecological evidence supporting fly ash exposure and declines in ecological health that should cause us to be concerned.

Recently, researchers collected toads from fly ash sites and from uncontaminated sites. They found that ash-exposed toads had elevated levels of 11 of the 18 metals measured including a 5000% increase for arsenic. When the toads were removed from the ash piles, 10 of 18 metals decreased, up to a 96% decrease for Thallium.

### **(Overwintering green frog (*Rana clamitans*) larvae, Slide-8)**

In a study of green frogs it was found that larvae exposed to fly ash-contaminated sediment suffered greatly reduced survival--only 13% survived-- compared to control treated animals. Most larvae mortality in the fly ash treatment corresponded to the onset of metamorphosis. This implicates fly ash in endocrine function disruption.

### **(Southern Leopard Frogs and corticosterone content, Slide-9)**

A study, done on leopard frogs, supports this hypothesis. Both frog larvae administered Corticosterone, a glucocorticoid hormone and larvae exposed to fly ash had oral malformations and growth, and development deficits.

### **(Grass shrimp (*Palaemonetes pugio* Holthius), Slide-10)**

Additionally, exposure to fly ash sediment reduced the survival of grass shrimp larvae from 70 to 17 % and induced genotoxic DNA damage in hepatopancreas cells.

This is just a small sampling of the literature pointing to fly ash, trace metal contamination and wildlife effects— failure to fully appreciate these findings in the light of comparative biology puts us at risk.

### **( Slurry of Fly Ash, Slide-11)**

Now to human health, it is clear that power plant particulate has the potential to cause or exacerbate lung diseases, particularly asthma.

Increasing evidence suggests that transition metals contained in fly ash are an important toxic component helping to promote airway reactivity and lung fibrosis.

And finally the EPA estimates that the cancer risk for adults and children drinking groundwater contaminated with arsenic from fly ash impoundments could be very high, at least hundreds of times above regulatory guidelines.

**(CHEC Center, Please Call for Appointment, Slide-12)**

“Clean coal”---no thanks – I prefer to call it what it is-“dirty”- a public health problem that extends far beyond the well publicized issues of climate change, to potentially affect the health of you and your children today.

Thank you for your kind attention and please put the Center for Healthy Environments and Communities to work for your community.