



# University of Pittsburgh

*Graduate School of Public Health  
Department of Environmental and Occupational Health*

Bridgeside Point  
100 Technology Drive, Suite 350  
Pittsburgh, PA 15219-3130  
412-383-7700  
Fax: 412-624-9361

## Testimony Regarding “Coal Combustion Waste Storage and Water Quality before the Subcommittee on Water Resources, Committee on Transportation and Infrastructure, U.S. House of Representatives

April 30, 2009  
Rayburn House Office Building

Given By:  
Conrad Daniel Volz, DrPH, MPH  
Bridgeside Point  
100 Technology Drive  
Suite 564, BRIDG  
Pittsburgh, PA 15219-3130  
office 412-648-8541: cell 724-316-5408: Fax 412-624-3040  
[cdv5@pitt.edu](mailto:cdv5@pitt.edu)

Assistant Professor, Environmental and Occupational Health, University of Pittsburgh, Graduate School of Public Health <http://www.pitt.edu/~cdv5/> ;  
Director-Center for Healthy Environments and Communities <http://www.chec.pitt.edu>;  
Director, Environmental Health Risk Assessment Certificate Program  
<http://www.publichealth.pitt.edu/interior.php?pageID=82>

My name is Dr. Conrad D. Volz, since 2004 I have been an Assistant Professor in the Department of Environmental and Occupational Health (EOH) at the Graduate School of Public Health (GSPH), University of Pittsburgh (UP) where I am also the Director of the Center for Healthy Environments and Communities (CHEC) and of the Environmental Health Risk Assessment Certificate Program. I also hold an appointment to the University of Pittsburgh, School of Law where I give technical and human and ecological toxicological guidance to the Environmental Law Clinic. I have over 30 years of experience in performing environmental health and human and aquatic risk assessment studies; working under contract or grants from the US Department of Defense and the Department of Energy, National Nuclear Security Agency (NNSA), in the USA and 24 countries, on 4 continents (See Attachment 1, Biography of Conrad Daniel Volz, DrPH, MPH and Attachment 2, CV of Conrad Daniel Volz, DrPH, MPH).

My current research is focused on using fish and other aquatic receptors as indicators of; industrial and municipal pollution sources; and as sentinels for human health effects from exposure to aquatic contaminants. This work is supported by the Centers for Disease Control and Prevention's (CDC), Environmental Public Health Tracking Network (EPHTN). At the GSPH I teach two (2) seminal courses related to; 1.) Transport processes of CCW and other toxic contaminants entry into surface water and groundwater and how these contaminants are cycled through other environmental media (air, soils and substrata, biota, sediments and foods); and 2.) The assessment and quantification of human and aquatic receptor exposure to environmental contaminants contained in these environmental media.

My testimony today before this Subcommittee on Water Resources and Environment concerns known and theoretical water quality impacts of coal combustion waste (CCW) storage including evidence; that CCW mixtures have direct ecotoxicological effects on aquatic animals and that these animals, once exposed to CCW can spread toxic trace elements to nearby uncontaminated terrestrial and aquatic environments; that trace toxic elements from CCW impoundments enter groundwater, especially during periods of low rainfall or draught, contaminating local drinking water wells, with a high probability of reentering surface water through freshwater seeps, springs, and movement of contaminated groundwater into surface water; that a toxic waste site with characteristics similar to unlined CCW impoundments, assessed by my group in June of 2008, is releasing significant levels of arsenic, lead and other metals and metalloids into groundwater and surface water and that this process is occurring under conditions of high alkalinity; that the predominant location of flyash piles and CCW surface impoundments near surface water-drinking water sources creates an unreasonable threat to public health and the environment because of rain water runoff and the demonstrated potential for catastrophic release of CCW into major river systems; and that placement of flyash piles and CCW impoundments constitutes a major environmental justice issue, in that these communities are generally located in areas with associated and other polluting sources, which are characterized by low socio-economic attainment, flight of residents that can afford to relocate, resulting in further erosion of municipal and school tax bases. Lastly, I will outline steps necessary to regulate and mitigate fly ash impoundments and storage facilities to protect human health and the environment.

Coal combustion waste (CCW) is a leachable mixture of carbon, sulfur compounds, nitrates/nitrites, toxic trace elements, radionuclides, and mutagenic polynuclear aromatic hydrocarbons. In 2005 coal-fired power plants (CFPP) produced 71.1 million tons of flyash, filling 44 million cubic yards of landfill space, in the forms of fly ash, bottom ash, boiler slag, and Flue Gas Desulfurization sludge. Studies show that masses 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; Cadmium in coal isn't over .6 ppm but can reach 250 ppm in flyash; and alarmingly Manganese levels don't exceed 15.0 ppm in coal but can be as high as 4,400 ppm in fly ash. The Law of Conservation of Mass 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 wastewater-stay in the fly ash. As air pollution control devices and wastewater treatment plant efficiency increases the amount of toxic elements in CCW. Overproduction of CCW has strained the holding capacity of many impoundment sites causing ecological and public health disasters, such as the recent Tennessee Valley Authority (TVA) spill, and the little known 2005 Forward

Township legacy flyash landslide. The staggering amounts of CCW sitting next to major source water bodies, dumped into landfills and pumped into impoundments creates a significant threat to environmental resources and a potential health hazard for communities, especially rural communities already impacted by coal mining and those already impacted by coal burning air pollution sources..

#### I. COAL COMBUSTION WASTE MIXTURES HAVE DIRECT ECOTOXICOLOGICAL EFFECTS ON AQUATIC ANIMALS AND THESE ANIMALS, ONCE EXPOSED TO CCW CAN SPREAD TOXIC TRACE ELEMENTS TO NEARBY UNCONTAMINATED TERRESTRIAL AND AQUATIC ENVIRONMENTS

Table 1, Studies Indicating Coal Combustion Waste (CCW) Effects on Animal Survival, Reproduction and Growth and Development (with an emphasis on aquatic organisms) lists 16 studies from the peer-reviewed academic literature that demonstrate that CCW has direct effects on aquatic animals and animals that spend part of their life-cycle in aquatic environments and species that feed on them. CCW effects in the southern toad (*Bufo terrestris*) have been extensively studied. CCW ash-exposed toads exhibited elevated levels of 11 of 18 metals measured. Increases ranged from 47.5% for lead to more than 5000% for arsenic (Ward et al., 2009). Toads exposed to CCW trace metal contamination gained significantly less mass (18.3 %) than control toads (31.3%) when food was limited and experienced significantly decreased Respiratory Quotient (RQ) after exercise (Ward et al., 2006). This study suggests that CCW trace metal exposure is associated with changes in the basal metabolic rate of these vertebrates and that decreased RQ after exercise suggests an inability to eliminate carbon dioxide and/or absorb oxygen due to trace metal exposure. Many of the metals in CCW are pulmonary toxicants even when the mode of exposure is through ingestion or skin absorption, just as in humans (Yoshida et al., 2004). In a study that assessed concentrations of As, Cd, Cu, Ni, Pb, Se, Sr, and Zn in whole bodies of larval, recently metamorphosed, and adult life stages in *Bufo terrestris*, after exposure to CCW, it was found that the elements As, Cd, Cu, Ni, Pb, Zn, concentrations were highest in larvae, but that Se and Sr concentrations remained elevated in later life stages (Roe et al, 2005). This study demonstrates that toads and frogs exposed to metals in CCW can transport trace elements from aquatic disposal basins to nearby uncontaminated terrestrial and aquatic habitats and additionally that, anurans utilizing naturally revegetated sites up to 30 years after CCW disposal ceases are exposed to elevated trace elements. A 1999 study of toads showed that initial circulating levels of corticosterone in toads captured at the CCW area were significantly higher than levels in toads from the reference site. Corticosterone levels in toads from the CCW site remained high even after 2 weeks of laboratory acclimation and injection with saline (Hopkins et al., 1999). This study demonstrates that CCW constituents display endocrine system disrupting effects that may be mediated through disruption of hepatic enzymes responsible for the metabolic clearance of steroid hormones.

Other studies using a fish- Lake chubsuckers, again fellow vertebrates with hormonal systems much the same as humans, found that chubsuckers grazing CCW sediments had significantly elevated body burdens of Se, Sr, and V. Selenium levels were particularly elevated, reaching mean whole body concentrations of 5.6 micrograms/gram dry mass by the end of experimental manipulations. Twenty-five percent of fish exposed to pollutants died during the study. All surviving fish exposed to ash exhibited substantial decreases in growth and severe fin erosion

(Hopkins et al., 2000). This study indicates that fish exposed to ash utilized more energy for daily activities and/or were less efficient at converting available energy to tissues for growth and storage.

In a study of the bird-common grackle feeding in CCW basins, selenium was found in significantly higher concentrations in ash basin eggs ( $x = 5.88 \pm 0.44$  microg/g DW) than in reference eggs ( $x = 2.69 \pm 0.13$  microg/g DW). Selenium concentrations in eggs from the ash basins were above background levels (Bryan et al., 2003). This study shows maternal transfer of selenium to eggs in birds living near CCW settling ponds. Se was also found to be transferred maternally to turtle hatchlings at relatively high levels after exposure to CCW. Hatchlings from polluted-site females exhibited reduced O<sub>2</sub> consumption rates compared to hatchlings from reference sites. Since Se was transferred to hatchlings at high levels it may be responsible for the observed physiological impairments.

There are several concepts concerning the ecotoxicology of Se that must be stated.

Selenium contamination represents one of the few clear cases where environmental pollution has led to devastation of wildlife populations, most notably in agricultural drainage evaporation and power plant coal-fly ash receiving ponds (Fan et al, 2002). Elevated concentrations have degraded many freshwater ecosystems throughout the United States, and additional systems are expected to be affected as anthropogenic activities, including runoff and leaching of selenium from CCW deposits and impoundments, increasingly mobilize Se into aquatic systems. Se is a very toxic essential trace element. Toxic threshold concentrations in water, dietary items, and tissues, for aquatic organisms are only 2-5 times normal background concentrations. Selenium toxicity in freshwater ecosystems is the result of a complex series of bioaccumulation and biotransformation mechanisms, and cycling of Se in aquatic food chains (Maier and Knight, 1994). Organic selenium bioaccumulation and toxicity patterns in the freshwater bivalve sentinel species *Corbicula fluminea* have recently been demonstrated. Waterborne selenomethionine (SeMet) exposure was used to mimic dietary organo-Se uptake. Results of this study demonstrate that SeMet is accumulated to a relatively high extent with a concentration factor of 770 (wet weight basis). The higher uptake than depuration rates suggest that bivalves deal with high Se amounts using a strategy of detoxification based on Se sequestration that could involve granules, as shown by a strong increase of Se in the particulate subcellular fraction. Selenium is persistent in the cytosol of bivalves exposed to SeMet where it is found in proteins of a wide range of molecular mass, indicating a possible replacement of methionine by selenomethionine. A subsequent alteration of protein function might be one of the mechanisms of Se toxicity that could explain the histopathological damage observed in gills by using transmission electronic microscopy. Those analyses showed changes in gill filament ultrastructure and suggested mitochondria as the first target for SeMet cytotoxicity, with alterations of the outer membrane and of cristae morphology. Organo-Se would thus not only be toxic via indirect mechanisms of maternal transfer as it is suggested for fish and turtles but also directly (Adam-Guillermin et al., 2009).

Table 1 describes CCW effects on shrimp, salamanders, water snakes, green frogs and leopard frogs. Many of these effects are related to perceived problems in hormonal regulatory processes. Larval leopard frogs exposed to CCW have high corticosterone levels that may be associated with jaw abnormalities and decreased survival rates. And the high mortality of green frog larvae exposed to CCW with raised concentrations of As, Se, Sr, and V occurred when control larvae were entering metamorphosis.

## II. TRACE TOXIC ELEMENTS FROM CCW IMPOUNDMENTS ENTER GROUNDWATER, ESPECIALLY DURING PERIODS OF LOW RAINFALL OR DRAUGHT, CONTAMINATING LOCAL DRINKING WATER WELLS, WITH A HIGH PROBABILITY OF REENTERING SURFACE WATER THROUGH FRESHWATER SEEPS, SPRINGS, AND MOVEMENT OF CONTAMINATED GROUNDWATER INTO SURFACE WATER

Waste products from coal combustion have the highest potential human risk among the fossil fuel alternatives, even higher than wastes from the nuclear energy process. The highest risk is caused by metals, and the fly ash represents the effluent stream giving the largest contribution to the potential human health risk from trace metal exposure (Christensen et al, 1992). It has been observed that as much as 8% (approximately 10 microg g<sup>-1</sup>) in fly ash) of total chromium is converted to the Cr(VI) species during oxidative combustion of coal and remains in the resulting ash as a stable species, however, it is significantly mobile in water based leaching (Kingston et al, 2005). Approximately 1.23 +/- 0.01 microg g<sup>-1</sup> of Cr(VI) was found in the landfill leachate from permanent deposits of aged fly ash. Thus Cr (VI), a known human carcinogen can enter groundwater and can runoff of CCW sites in tributary streams. Additionally it has been observed that fly ash and sludge mixing and transport to waste lagoons releases significant portions of zinc, nickel and chromium and that arsenic and manganese are released continuously during this transport process. Adsorbed portions of calcium, magnesium and potassium are also leached during coal ash transport (Popovic et al., 2001). These elements are then available to interact with unconfined aquifer water that is in hydrological connection with water in lagoon basins and can contaminate local well water and runoff through groundwater seeps and overflows to surface water. There is no known safe level of exposure to Cr (VI) any increase in its concentration in water carries with it an increased risk of the development of cancer.

A laboratory leaching test was employed to predict the potential mobility of As, and Se in landfilled fly ash produced by coal combustion. These waste residues also formed the basis of a speciation study in which the valency states of As and Se were determined. Selenium displayed the greatest leachability in CCW, despite being present at relatively low concentrations in CCW. A substantial amount As was also leached from coal ash. Water-soluble extracts of coal fly ash contained As exclusively as As(V). Selenium was present largely as Se(IV) in aqueous extracts of fly ash (Wadge et al., 1987). This is direct evidence that both As and Se are present in the water soluble fractions of CCW lagoons and can enter groundwater as well as surface waters. Distance of CCW particles from their injection points has also been shown to affect the metal characteristics of CCW impoundments. It has been found that the presence of fine particles (< 50 microns) increased with increasing distance from the ash slurry inlet zone in the ash pond. Wide variations in the bulk density (800-980 kg m<sup>-3</sup>), porosity (45-57%) and water-holding capacity (57.5-75.7%) of CCRs were recorded. With increasing distance the pH of the CCRs decreased (from 9.0 to 8.2) and electrical conductivity increased (from 0.25 to 0.65 dS m<sup>-3</sup>). The presence of almost all the heavy metals in CCRs exhibited an increase with distance from the ash slurry discharge zone due to the increase in surface area (from 0.1038 to 2.3076 m<sup>2</sup> g<sup>-1</sup>) of CCRs particles (Askosan et al., 2004). These results suggest that CCW impoundments do not have monolithic physical-chemical properties and that the further away from the slurry inlet that CCW moves the greater its ability to become water soluble and move into groundwater and

surface waters. The increase in conductance indicates that species of chemicals are going into solution as they move from injection sites.

Finally, the coal fired power plant institutional control technique of purchasing residential and institutional properties as the levels of CCW raise in impoundments and surface water backs up into hollows indicates that environmental control personnel are aware of the intimate connection between standing water in settling CCW ponds and its connection to contamination of unconfined aquifers. At Little Blue CCW impoundment in Shippingsport PA the responsible company has purchased many properties bordering the impoundment and capped their wells (Site Survey, 2009). My group is in possession of 2 reports, one from the PA DEP of well water from a property in hydrogeological connection with this CCW lagoon that has arsenic levels above the drinking water standard for arsenic of 10 ppb. We would not expect such high background levels in groundwater in this area because it was not glaciated in the last ice age nor are their granite or other rock formations present that might leach arsenic into groundwater.

### III. ASSESSMENTS OF A TOXIC WASTE SITE WITH CHARACTERISTICS SIMILAR TO UNLINED CCW IMPOUNDMENTS, SAMPLED BY THE CENTER FOR HEALTHY ENVIRONMENTS AND COMMUNITIES (CHEC) IN JUNE OF 2008, IS RELEASING SIGNIFICANT LEVELS OF ARSENIC, LEAD AND OTHER METALS AND METALLOIDS INTO GROUNDWATER AND SURFACE WATER AND THAT THIS PROCESS IS OCCURRING UNDER CONDITIONS OF HIGH ALKALINITY

It is commonly assumed that trace element migration from CCW lagoons into groundwater is minimal because the pH of the lagoon waste is extremely alkaline. It is believed that that high pH hinders the mobility of toxic elements through the CCW matrix itself and also through underlying soils. In the summer of 2008 the CHEC performed a site assessment of a highly alkaline waste glass dump with characteristics very similar to CCW ponds. Our results indicate that contrary to prevailing engineering opinions we found greatly increased levels of the following elements in different environmental media:

- Arsenic (As) concentrations in all waterfall effluents and 3 of 4 hole water samples exceed the US EPA Drinking Water Standard.; As in hole sediments range from .6-1X and 1.6 to 2.9X the Canadian PEL and ISQW respectively.
- Mercury (Hg) in all waterfall effluents exceeds the US EPA Drinking Water Standard (range 1.4-4.9X). Hg in waterfall effluent is approximately 7X the CMC.
- Cadmium (Cd) in hole sediments ranges from 1.6 to 2.8 times the Canadian ISQG.
- Lead (Pb) in waterfall effluent exceeds the EPA Drinking Water Standard in all samples (range 2.0 to 8.8X) and the CMC in one sample by a factor of 2. Pb in hole sediment exceeds the ISQG in 3 of 4 samples.
- Copper (Cu) exceeds the Freshwater CMC in all samples, in one by a factor of 8. Cu in hole water exceeds the CMC in 2 of 4 holes.
- Manganese (Mn) exceeds the NSDWR secondary water standards in 2 of 3 waterfall effluent samples and in all hole water samples. The Mn level in hole sediments exceeds the Missouri PEL in all samples (range, 1.9-2.7X).

This finding is important to this discussion because the prevailing pH was between 10.9 and 12.0. We propose as a result of this work that the environmental impact of metals is directly related to its bioavailability and that increasing pH can actually help mobilize and increase transport of toxic elements such as arsenic. This is because arsenic predominately exists as an oxyanion species in soils and freshwater. Arsenite [As(III)] species predominate in anoxic and reducing conditions while arsenate [As(V)] species are more so found in oxidizing solutions (T. W. Frankenberger, 2002). Sorption of arsenate/arsenite is highly dependent on pH and decreases greatly with increasing pH, as hydroxide competition is significant. High silica (SiO<sub>2</sub>) levels have shown to interfere with arsenic sorption onto iron oxides and hydroxides (Cullen & Reimer, 1989; Ferguson & Gavis, 1972). High silica (SiO<sub>2</sub>) levels, as seen in flyash, have been shown to interfere with arsenic sorption onto iron oxides and have been a concern of utilities striving to improve arsenic removal. It is suggested by Korte, Fernando and Moore that higher concentrations of silica in solution, coupled with higher pH, could cause mobilization of arsenic from sediments and soil (Korte & Fernando, 1991; Moore, 1991) into groundwater and breakout into surface water. Result of our survey of this site seems to confirm these observations.

**IV. THE PREDOMINANT LOCATION OF FLYASH PILES AND CCW SURFACE IMPOUNDMENTS NEAR SURFACE WATER-DRINKING WATER SOURCES CREATES AN UNREASONABLE THREAT TO PUBLIC HEALTH AND THE ENVIRONMENT; AND PLACEMENT OF FLYASH PILES AND CCW IMPOUNDMENTS CONSTITUTES A MAJOR ENVIRONMENTAL JUSTICE ISSUE, IN THAT THESE COMMUNITIES ARE GENERALLY LOCATED IN AREAS WITH ASSOCIATED AND OTHER POLLUTING SOURCES, WHICH ARE CHARACTERIZED BY LOW SOCIO-ECONOMIC ATTAINMENT, FLIGHT OF RESIDENTS THAT CAN AFFORD TO RELOCATE, RESULTING IN FURTHER EROSION OF MUNICIPAL AND SCHOOL TAX BASES.**

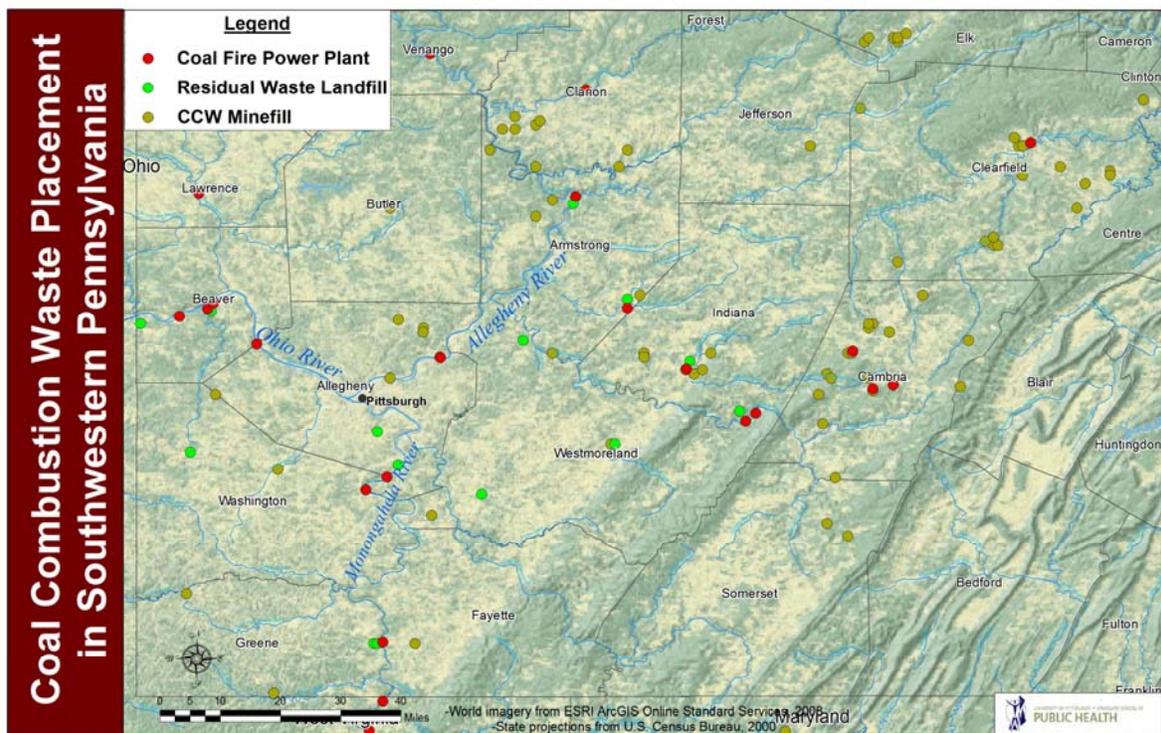
The CHEC used ArcView 9.3.1 to create interpolative geographical representations of CCW storage areas in Southwestern Pennsylvania. Coal fired power plants (CFPP), landfills, ash piles and impoundments were added as point sources by latitude and longitude or geocoding of addresses. Figure 1, Locations of Coal Powered Electrical Generation Stations in Southwestern PA and Associated Residual Waste Landfills presents the location of CCW sites in the region. While this map is representative only of the Southwestern PA region, CFPP locations across the country are located similarly because of their need for freshwater sources for proper operations, cooling and wastewater discharge.

This map reveals that CCW sites are located principally along major river systems, which also serve as the source water for downstream communities. Leaching of toxic elements and potential catastrophic release of CCW impoundments are a direct threat to environmental resources and to public health. It is estimated by the PA DEP that failure of the Little Blue CCW impoundment would directly impact the lives of over 50,000 residents of the Upper Ohio Valley.

Additionally the communities that are affected by CCW impoundments and waste piles tend to be in areas already severely degraded environmentally from legacy industries (iron and steel, zinc smelting, foundry operations and coal mining) and active industries, including air and wastewater pollution from CFPP in close proximity to CCW storage areas. This constitutes a

major environmental justice issue because residents of these already environmentally degraded communities with sufficient economic resources simply move to areas more favorable to a healthy lifestyle and with better aesthetic value. As a result these communities have shown a shrinking municipal and school tax base, with resultant losses of municipal, educational, and social services. Federal and state tax dollars must therefore be directed to help stabilize these environmental justice areas; this necessary practice is an unrecognized subsidy to the coal fired electrical generation industry.

**Figure 1, Locations of Coal Powered Electrical Generation Stations in Southwestern PA and Associated Residual Waste Landfills<sup>1</sup>**



<sup>1</sup> Coal Fire Power Plants (CFPPs) are included in the list of impoundments because CFPPs have on-site temporary and permanent storage impoundments. This figure shows all forms of CCW at sites in the southwestern Pennsylvania region.

## V. Problem Solutions

The Resource Conservation and Recovery Act (RCRA) of 1976, along with the Hazardous and Solid Wastes Amendments of 1984 are the principal Federal laws in the United States governing the disposal of solid waste and hazardous waste. These laws were intended to provide cradle to grave tracking of these wastes for the protection of public health and environmental resources. RCRA's intent was to maintain a system whereby legacy toxic waste dumps, covered under CERCLA (Superfund), would never occur again. CCW impoundments, flyash settling ponds,

flyash storage piles and flyash waste pits represent a clear hazard to humans and to the environment and should thus be covered under RCRA as hazardous waste. It is actually beyond my comprehension to think that the framers of this legislation did not have CCW in mind as a hazardous waste when this legislation was enacted. The US EPA should be tasked with the immediate review of all administrative decisions regarding the classification of the myriad forms of CCW and how to insure that disposal practices can insure proper protection of both human and ecological health. As a result of the failure of RCRA to stop CCW from being deposited into unlined pits and impoundments we are again confronted with massive potential Superfund sites that must be stabilized.

At minimum actions should be immediately taken to stop the flow of CCW into unlined impoundments. CCW should be stored only in areas of low hydrogeological significance-away from source drinking water supplies. These disposal pits should be lined with clay and appropriate liners that can withstand the harsh physical-chemical demands of these mixtures and geologic weathering. All CCW disposal areas should be ringed with monitoring wells that are at a depth well below the level of the waste so that monitoring can be done at various intervals between the surface and any confining unit; monitoring wells should be monitored in perpetuity, at least once monthly and after significant rain/wet weather events or during low flow periods such as droughts. CCW disposal areas should also be covered with structurally sound materials so that wind erosion cannot aerosolize dried materials, especially those that can be inhaled and retained in the deep lung.

Unlined CCW impoundments should slowly be drained, especially if they are in critical watersheds and moved to less hydrogeologically sensitive areas. This will not be easy and it will be expensive. There may be technologies that can be used to encapsulate these existing lagoons in place using newly discovered flexible pipes used in the gas and oil shale industries. Focused research will be needed to find ways to stop groundwater intrusion by CCW if removal to proper storage areas proves to be cost ineffective. Minimally no fly ash pile temporary, semi-permanent or permanent should be placed on bare ground. All such piles should be within sealed brims preferably made of concrete and underlaid with both clay and a non-permeable fabric. All fly ash piles must be covered with durable fabric to stop entrainment of particles into the air from the ash pile surface.

### **Bibliography and Notes:**

Adam-Guillermin, et al., (2009). Biodynamics, subcellular partitioning, and ultrastructural effects of organic selenium in a freshwater bivalve. *Environ. Sci. Technol.*, Article ASAP DOI: 10.1021/es802891j Publication Date (Web): February 6, 2009 Copyright © 2009 American Chemical Society.

Asokan P, Saxena M, Aparna A, Asolekar SR. Characteristics variation of coal combustion residues in an Indian ash pond. *Waste Manag Res.* 2004 Dec;22(6):497. Asoletar, Shyam R [corrected to Asolekar, Shyam R].

Bryan AL Jr, Hopkins WA, Baionno JA, and Jackson BP. (2003) Maternal transfer of contaminants to eggs in common grackles (*Quiscalus quiscula*) nesting on coal fly ash basins. *Arch Environ Contam Toxicol.*;45(2):273-7.

- Christensen T, Fuglestedt J, Benestad C, Ehdwall H, Hansen H, Mustnen R, Stranden E. Chemical and radiological risk factors associated with waste from energy production. *Sci Total Environ.* 1992 Apr;114:87-97.
- Cullen, W., & Reimer, K. (1989). Arsenic speciation in the environment. *Chem Rev*, 89, 713-764.
- ERSI. (2008). ArcGIS Desktop Help (Version ArcMap 9.3): ERSI ArcMap Inc.
- ERSI. (2009). ArcGIS Online Standard Services. Retrieved February 18, 2009, 2009, from <http://www.esri.com/software/arcgis/arcgisonline-services/agol-standard/index.html>
- ESRI. (2009). Census 2000 TIGER/Line Data. *Free Data* Retrieved February 18, 2009, 2009, from [http://www.esri.com/data/download/census2000\\_tigerline/index.html](http://www.esri.com/data/download/census2000_tigerline/index.html)
- Fan TW, Teh SJ, Hinton DE, Higashi RM. Selenium biotransformations into proteinaceous forms by foodweb organisms of selenium-laden drainage waters in California. *Aquat Toxicol.* 2002 Apr;57(1-2):65-84.
- Ferguson, F. J., & Gavis, J. (1972). A review of the arsenic cycle in natural waters. *Water Res*, 6, 1259-1272.
- Frankenberger, T. W. J. (Ed.). (2002). *Environmental Chemistry of Arsenic* (1st ed.). New York, NY: Marcel Dekker, Inc.
- Hopkins WA, Mendonça MT, Congdon JD. (1997). Increased circulating levels of testosterone and corticosterone in southern toads, *Bufo terrestris*, exposed to coal combustion waste. *Gen Comp Endocrinol.*;108(2):237-46.
- Hopkins WA, Mendonça MT, Congdon JD (1999). Responsiveness of the hypothalamo-pituitary-interrenal axis in an amphibian (*Bufo terrestris*) exposed to coal combustion wastes. *Comp Biochem Physiol C Pharmacol Toxicol Endocrinol.*;122(2):191-6.
- Hopkins WA, Snodgrass JW, Roe JH, Jackson BP, Gariboldi JC, and Congdon JD. (2000). Detrimental effects associated with trace element uptake in lake chubsuckers (*Erimyzon sucetta*) exposed to polluted sediments. *Arch Environ Contam Toxicol.* ;39(2):193-9.
- Hopkins WA, Snodgrass JW, Staub BP, Jackson BP, and Congdon JD (2003). Altered swimming performance of a benthic fish (*Erimyzon sucetta*) exposed to contaminated sediments. *Arch Environ Contam Toxicol.* ;44(3):383-9.
- Hopkins WA, Staub BP, Snodgrass JW, Taylor BE, DeBiase AE, Roe JH, Jackson BP, and Congdon JD. (2004). Responses of benthic fish exposed to contaminants in outdoor microcosms--examining the ecological relevance of previous laboratory toxicity tests. *Aquatic Toxicology* (Amsterdam, Netherlands);v. 68 no. 1, pp. 1-12.

- Kingston HM, Cain R, Huo D, Rahman GM. Determination and evaluation of hexavalent chromium in power plant coal combustion by-products and cost-effective environmental remediation solutions using acid mine drainage. *J Environ. Monit.* 2005 Sep;7(9):899-905. Epub 2005 Jul 13.
- Korte, N., & Fernando, Q. (1991). A review of arsenic (III) in groundwater. *Crit Rev Environ Control*, 21, 1-39.
- Kuzmick DM, Mitchelmore CL, Hopkins WA, and, Rowe CL. (2007). Effects of coal combustion residues on survival, antioxidant potential, and genotoxicity resulting from full-lifecycle exposure of grass shrimp (*Palaemonetes pugio* Holthius). *Sci Total Environ.* ;373(1):420-30. Epub 2006 Dec 19.
- Maier, KJ., Knight, AW.(1994).Ecotoxicology of selenium in freshwater systems. *Rev. Environ. Contam. Toxicol.*; 134: 31-48.
- Nagle RD, Rowe CL, and Congdon JD. (2001). Accumulation and selective maternal transfer of contaminants in the turtle *Trachemys scripta* associated with coal ash deposition. *Arch Environ Contam Toxicol.*;40(4):531-6.
- Peterson JD, Peterson VA, and Mendonça MT. (2009). Exposure to coal combustion residues during metamorphosis elevates corticosterone content and adversely affects oral morphology, growth, and development in *Rana sphenocephala*. *Comp Biochem Physiol C Toxicol Pharmacol.*;149(1):36-9. Epub 2008 Jun 25.
- Popovic A, Djordjevic D, Polic P. Trace and major element pollution originating from coal ash suspension and transport processes. *Environ Int.* 2001 Apr;26(4):251-5.
- Roe JH, Hopkins WA, Durant SE, and, Unrine JM. (2006). Effects of competition and coal-combustion wastes on recruitment and life history characteristics of salamanders in temporary wetlands. *Aquat Toxicol.*;79(2):176-84. Epub 2006 Jul 13.
- Roe JH, Hopkins WA, Jackson BP. (2005). Species- and stage-specific differences in trace element tissue concentrations in amphibians: implications for the disposal of coal-combustion wastes. *Environ Pollut.*;136(2):353-63.
- Site survey of Little Blue CCW Impoundment with community representative Ralph Hysong, Conrad Volz DrPH and Charles Christen DrPH cand. , March 2009.
- Smith-Sonneborn J, Fisher GL, Palizzi RA, and Herr C. (1981). Mutagenicity of coal fly ash: a new bioassay for mutagenic potential in a particle feeding ciliate. *Environ Mutagen.*;3(3):239-52.
- Snodgrass JW, Hopkins WA, Jackson BP, Baionno JA, and Broughton J. (2005). Influence of larval period on responses of overwintering green frog (*Rana clamitans*) larvae exposed to contaminated sediments. *Environ Toxicol Chem.* ;24(6):1508-14.

- Wadge A, Hutton M. The leachability and chemical speciation of selected trace elements in fly ash from coal combustion and refuse incineration. *Environ Pollut.* 1987;48(2):85-99.
- Ward C, Hassan S, Mendonca M., (2009). Accumulation and depuration of trace metals in southern toads, *Bufo terrestris*, exposed to coal combustion waste. *Archives of Environmental Contamination and Toxicology* 56:268–275.
- Ward CK, Appel AG, and Mendonca MT (2006). Metabolic measures of male southern toads (*Bufo terrestris*) exposed to coal combustion waste. *Comp Biochem Physiol A Mol Integr Physiol.* ;143(3):353-60. Epub 2006 Jan 31.
- William A. Hopkins, Christopher L. Rowe, and Justin D. Congdon (1999). Elevated trace element concentrations and standard metabolic rate in banded water snakes (*nerodia fasciata*) exposed to coal combustion wastes. *Environmental Toxicology and Chemistry*. Volume 18, Issue 6 Article: pp. 1258–1263.
- Yoshida T, Yamauchi H, Fan Sun G.(2004). Chronic health effects in people exposed to arsenic via the drinking water: dose-response relationships in review. *Toxicol Appl Pharmacol.*;198(3):243-52.



**Table 1, Studies Indicating Coal Combustion Waste (CCW) Effects on Animal Survival, Reproduction and Growth and Development (Emphasis on Aquatic Organisms)**

Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
i	Southern toads ( <i>Bufo terrestris</i> )	In situ exposure of toads to ash containing wastes over a 5 month period with sacrifice of animals throughout the study period.	Ash-exposed toads exhibited elevated levels of 11 of 18 metals measured. Increases ranged from 47.5% for lead to more than 5000% for arsenic. Ten of eighteen metals decreased in toads removed from ash, ranging from -25% for cobalt to -96% for thallium.	First report of field studies that examine the uptake of metals over time from vertebrates exposed to CCW. Additionally, this study showed the extent of recovery from long term exposure and excretion of trace metals.	C. Ward and M. Mendonca, at Department of Biological Sciences, Auburn University, Auburn, AL 36866, USA S. Hassan at Forest Utilization Laboratory, University of Georgia, Athens, GA 30602, USA	Ward C, Hassan S, Mendonca M., (2009). Accumulation and depuration of trace metals in southern toads, <i>Bufo terrestris</i> , exposed to coal combustion waste. Archives of Environmental Contamination and Toxicology 56:268–275.
ii	Southern toads ( <i>Bufo terrestris</i> )	Experimental exposure of southern toads to metal-contaminated sediment and food; measured changes in standard and exercise metabolic rates as well as changes in body, liver and muscle mass, blood glucose, and corticosterone.	Toads exposed to trace metal contamination gained significantly less mass (18.3 %) than control toads (31.3%) when food was limited and experienced significantly decreased Respiratory Quotient after exercise.	Trace metal exposure is associated with changes in the basal metabolic rate of these vertebrates. Decreased RQ after exercise suggests an inability to eliminate carbon dioxide and/or absorb oxygen due to trace metal exposure.	Department of Biology, Auburn University, Montgomery, P.O. Box 244023, Montgomery, AL 36124-4023, USA. cward3@mail.a	Ward CK, Appel AG, and Mendonca MT (2006). Metabolic measures of male southern toads ( <i>Bufo terrestris</i> ) exposed to coal combustion waste. Comp Biochem Physiol A Mol Integr Physiol. ;143(3):353-



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
					um.edu	60. Epub 2006 Jan 31.
iii	Southern toads ( <i>Bufo terrestris</i> ) and southern leopard frogs ( <i>Rana sphenoccephala</i> )	Assessed concentrations of As, Cd, Cu, Ni, Pb, Se, Sr, and Zn in whole bodies of larval, recently metamorphosed, and adult life stages in <i>Bufo terrestris</i> and <i>Rana sphenoccephala</i> from a site that currently receives coal combustion waste (CCW) discharge, a site where CCW was formerly discharged that has undergone natural attenuation for 30 years, and a nearby reference site.	For elements As, Cd, Cu, Ni, Pb, Zn, concentrations were highest in larvae, but Se and Sr concentrations remained elevated in later life stages. Element concentrations were generally higher in <i>B. terrestris</i> than in <i>R. sphenoccephala</i> . Concentrations of As, Se, and Sr were up to 11-35 times higher in metamorphs emigrating from CCW-polluted wetlands compared to unpolluted wetlands	The study suggests that toads and frogs exposed to metals in CCW can transport trace elements from aquatic disposal basins to nearby uncontaminated terrestrial and aquatic habitats. In addition, anurans utilizing naturally revegetated sites up to 30 years after CCW disposal ceases are exposed to elevated trace elements.	University of Georgia, Savannah River Ecology Laboratory, P.O. Drawer E, Aiken, SC 29802, USA.	Roe JH, Hopkins WA, Jackson BP. (2005). Species- and stage-specific differences in trace element tissue concentrations in amphibians: implications for the disposal of coal-combustion wastes. Environ Pollut.;136(2):353-63.
iv	Southern toads ( <i>Bufo terrestris</i> )	In vivo study to assess the responsiveness of the interrenal axis to stress from adrenocorticotrophic hormone (ACTH), as well as the vehicle alone (saline) in CCW exposed toads against those from control sites.	Initial circulating levels of corticosterone in toads captured at the CCW area were significantly higher than levels in toads from the reference site. Corticosterone levels in toads from the CCW site remained high even after 2 weeks of laboratory acclimation and injection with saline. Injection of toads from the	CCW constituents display endocrine system disrupting effects. This may be through disruption of hepatic enzymes responsible for the metabolic clearance of steroid hormones. Toads exposed to CCW wastes may be less efficient at responding to additional environmental stressors.	Hopkins WA, Mendonça MT, Congdon JD. Department of Zoology and Wildlife, Auburn University, AL 36849, USA. hopkins@srel.edu	Hopkins WA, Mendonça MT, Congdon JD (1999). Responsiveness of the hypothalamo-pituitary-interrenal axis in an amphibian ( <i>Bufo terrestris</i> ) exposed to coal combustion wastes. Comp Biochem Physiol C Pharmacol Toxicol



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
			CCW site with ACTH had no effect on plasma corticosterone levels, whereas a similar treatment of toads from the reference site stimulated a marked increase in corticosterone.			Endocrinol.;122(2):191-6.
v	Southern toads ( <i>Bufo terrestris</i> )	In situ experiment, which compared in phase 1, the circulating levels of corticosterone (B) and testosterone in male toads captured at CCW sites versus reference sites. In phase 2 of this study, male toads from reference sites were transplanted to enclosures at the polluted site or an uncontaminated site and B levels were checked up to 12 weeks following exposure in each group.	Free-ranging male toads captured at the CCW site exhibited significantly higher circulating levels of corticosterone (B) in both June/July and August than conspecifics captured at uncontaminated sites. Additionally, both calling and noncalling males from the polluted site had higher B levels than conspecifics engaged in the same behaviors at reference sites. Testosterone levels were elevated in toads from the polluted site, regardless of capture month or behavioral state. In phase 2 of this study toads held at the polluted site exhibited significant increases in B after 10 days of exposure compared to toads held at the reference site. B levels remained significantly elevated in	This study describes an interrenal stress response in adult toads after exposure to coal combustion waste (CCW). CCW exhibited endocrine-disrupting capabilities by increasing testosterone levels, which suggests altered androgen production, utilization, and/or clearance. CCW exposure also increased circulating levels of corticosterone.	Department of Zoology and Wildlife Science, Auburn University, 331 Funchess Hall, Auburn, Alabama, 36849, USA.	Hopkins WA, Mendonça MT, Congdon JD. (1997). Increased circulating levels of testosterone and corticosterone in southern toads, <i>Bufo terrestris</i> , exposed to coal combustion waste. Gen Comp Endocrinol.;108(2):237-46.



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
			toads transplanted to the polluted site after 12 weeks.			
vi	Larval southern leopard frogs, ( <i>Rana sphenocephala</i> )	CCW are documented to negatively impact oral morphology, growth, and development in larval amphibians. It is currently unclear what physiological mechanisms may mediate these effects. Corticosterone, a glucocorticoid hormone, is a likely mediator because when administered exogenously it, like CCRs, also negatively influences oral morphology, growth, and development in larval amphibians. In an attempt to identify if corticosterone mediates these effects, the authors raised larval Southern Leopard Frogs, <i>Rana sphenocephala</i> , on either sand or CCR substrate and documented effects of sediment type on whole body corticosterone,	CCW treated tadpoles contained significantly more corticosterone than controls throughout metamorphosis. However, significantly more oral abnormalities occurred early in metamorphosis when differences in corticosterone levels between treatments were minimal. Overall, CCR-treated tadpoles took significantly more time to transition between key stages and gained less mass between stages than controls, but these differences between treatments decreased during later stages when corticosterone differences between treatments were greatest.	CCW treatment has effects on corticosterone levels in tadpoles and exposed tadpoles took significantly more time between stages than controls and gained less mass between stages than controls. The mechanism for these effects may be more complex than once thought.	Department of Biological Sciences, Auburn University, Auburn, AL 36849, USA. peterj1@auburn.edu	Peterson JD, Peterson VA, and Mendonça MT. (2009). Exposure to coal combustion residues during metamorphosis elevates corticosterone content and adversely affects oral morphology, growth, and development in <i>Rana sphenocephala</i> . Comp Biochem Physiol C Toxicol Pharmacol.;149(1):36-9. Epub 2008 Jun 25.



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
		oral morphology, and time to and mass at key metamorphic stages.				
vii	Green frogs ( <i>Rana clamitans</i> )	In contaminated aquatic environments, a prolonged larval phase means prolonged exposure to pollutants and, potentially, more severe toxic effects. In the laboratory, the authors tested this hypothesis by exposing green frog larvae ( <i>Rana clamitans</i> ) to commercial clean sand (control), sediment from an abandoned surface mine (mine), or sediment contaminated with coal combustion waste (CCW). By collecting eggs late in the breeding season, they obligated larvae to overwinter and spend a protracted amount of time exposed to contaminated sediments. The experiment was continued until all larvae either successfully	Larvae exposed to CCW-contaminated sediment accumulated significant levels of As, Se, Sr, and V. Larvae exposed to CCW-contaminated sediment suffered greatly reduced survival (13%) compared to both control and mine treatments. Moreover, among larvae in the CCW treatment, the majority of mortality occurred during the latter part the overwintering period (after day 205), corresponding to the onset of metamorphosis in the controls.	Mortality in CCW exposed larvae corresponding with metamorphosis in control larvae suggests possible disruption of hormone signaling from exposure to CCW and/or constituent elements and/or chemicals.	Department of Biological Sciences, Towson University, Towson, Maryland 21252, USA. <a href="mailto:jsnodgrass@towson.edu">jsnodgrass@towson.edu</a>	Snodgrass JW, Hopkins WA, Jackson BP, Baionno JA, and Broughton J. (2005). Influence of larval period on responses of overwintering green frog ( <i>Rana clamitans</i> ) larvae exposed to contaminated sediments. <i>Environ Toxicol Chem.</i> ;24(6):1508-14.



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
		completed metamorphosis or died (301 d).				
viii	Lake chubsuckers ( <i>Erimyzon sucetta</i> ) FISH	Lake chubsuckers ( <i>Erimyzon sucetta</i> ) were exposed to coal ash-polluted sediments under conservative experimental conditions (filtered artificial soft water and abundant uncontaminated food). Four months after exposure fish were analyzed for incorporation of toxic elements, growth-survival and physical deformities, and total non-polar lipids.	Fish grazing the CCW sediments had significantly elevated body burdens of Se, Sr, and V. Selenium levels were particularly elevated, reaching mean whole body concentrations of 5.6 microg/g dry mass by the end of experimental manipulations. Twenty-five percent of fish exposed to pollutants died during the study. All surviving fish exposed to ash exhibited substantial decreases in growth and severe fin erosion. Total nonpolar lipids were two times higher in fish from the control treatment.	Fish exposed to ash utilized more energy for daily activities and/or were less efficient at converting available energy to tissues for growth and storage. Study implicates CCW and/or constituents as possible endocrine-disrupting agents.	Savannah River Ecology Laboratory, Aiken, South Carolina 29802, USA.	Hopkins WA, Snodgrass JW, Roe JH, Jackson BP, Gariboldi JC, and Congdon JD. (2000). Detrimental effects associated with trace element uptake in lake chubsuckers ( <i>Erimyzon sucetta</i> ) exposed to polluted sediments. Arch Environ Contam Toxicol. ;39(2):193-9.
ix	Juvenile lake chubsuckers ( <i>Erimyzon sucetta</i> )	A controlled laboratory study evaluating the responses of individual fish to ash exposure and its effect on swimming performance. To test this hypothesis, the authors measured sprint speed and critical swimming speed (U(crit)) of juvenile lake	Fish exposed to ash for 90-100 days accumulated significant concentrations of As, Se, Sr, and V; exhibited severe fin erosion; and had reduced sprint speed and U(crit). Compared to controls, sprint speed of ash-exposed fish was reduced by 30% at 5 cm and the percent reduction was further	Ash exposed fish have changes in their ability to move effectively in their environment, making them less able to avoid predators and procure foods.	Savannah River Ecology Laboratory, Aiken, South Carolina 29802, USA.	Hopkins WA, Snodgrass JW, Staub BP, Jackson BP, and Congdon JD (2003). Altered swimming performance of a benthic fish ( <i>Erimyzon sucetta</i> ) exposed to contaminated sediments. Arch



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
		chubsuckers ( <i>Erimyzon sucetta</i> ) exposed to ash in the laboratory versus control fish.	reduced to 104% at 20 cm. Critical swimming speed was approximately 50% lower in fish exposed to ash compared to controls. Additionally, the typical positive relationship between standard length and U(crit) was absent in fish exposed to ash.			Environ Contam Toxicol. ;44(3):383-9.
x	Lake chubsuckers ( <i>Erimyzon sucetta</i> ) FISH and benthic invertebrates	Because aquatic disposal of ash can also adversely affect food resources for benthic fish, the authors hypothesized that changes in resources might exacerbate the effects of ash on fish observed in laboratory studies. They exposed juvenile <i>E. sucetta</i> in outdoor microcosms to water, sediment, and benthic resources from an ash-contaminated site or a reference site for 45 days and compared findings to previous laboratory studies.	Benthic invertebrate biomass was nearly three times greater in controls compared to ash microcosms. Total organic content of control sediment (41%) was also greater than in ash sediments (17%), suggesting that additional benthic resources may have also been limited in ash microcosms. Benthic invertebrates isolated from the ash microcosms had trace element concentrations (As, Cd, Co, Cr, Cs, Se, Sr, and V) up to 18 times higher than in weathered ash used in laboratory studies. The concentrations of trace elements accumulated by fish reflected the high	This study combined with the results of the previous study suggest that ash discharge into aquatic systems is a more serious threat to the health of benthic fish than previously predicted based upon laboratory toxicity tests.	Savannah River Ecology Laboratory, University of Georgia, Drawer E, Aiken, SC 29802, USA. hopkins@srel.edu	Hopkins WA, Staub BP, Snodgrass JW, Taylor BE, DeBiase AE, Roe JH, Jackson BP, and Congdon JD. (2004). Responses of benthic fish exposed to contaminants in outdoor microcosms-- examining the ecological relevance of previous laboratory toxicity tests. Aquatic Toxicology (Amsterdam, Netherlands),;v. 68 no. 1, pp. 1-12.



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
			dietary concentrations encountered in the ash microcosms and were associated with reduced growth (final mass = 0.07 g) and survival (25%) compared to controls (0.37 g and 67%, respectively).			
xi	Common grackles ( <i>Quiscalus quiscula</i> ) BIRD	Tested hypothesis concerning aquatic disposal of CCW and effects in avian fauna. Individual eggs were collected from common grackles ( <i>Quiscalus quiscula</i> ) nesting in association with coal fly ash settling basins and a reference site to determine if females from the contaminated site transferred trace elements to their eggs. Whole clutches were also collected from both sites to examine inter- and intra-clutch variability of maternally transferred contaminants.	Selenium was found in significantly higher concentrations in ash basin eggs (x = 5.88 +/- 0.44 microg/g DW) than in reference eggs (x = 2.69 +/- 0.13 microg/g DW). Selenium concentrations in eggs from the ash basins were above background levels. Inter- and intra-clutch variation was higher for ash basin clutches than reference clutches.	This study shows maternal transfer of selenium to eggs in birds living near CCW settling ponds.	Savannah River Ecology Laboratory, University of Georgia, P. O. Drawer E, Aiken, South Carolina 29802, USA. bryan@srel.edu	Bryan AL Jr, Hopkins WA, Baionno JA, and Jackson BP. (2003) Maternal transfer of contaminants to eggs in common grackles ( <i>Quiscalus quiscula</i> ) nesting on coal fly ash basins. Arch Environ Contam Toxicol.;45(2):273-7.
xii	Slider turtles ( <i>Trachemys scripta</i> )	The authors examined two potential pathways by which female T.	Incubation in contaminated soil was associated with reduced embryo	CCW contaminant constituents accumulated in female turtles. Se was	University of Georgia, Savannah River	Nagle RD, Rowe CL, and Congdon JD. (2001).



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
		<i>scripta</i> may influence the survivorship and quality of their offspring in a contaminated habitat: (1) nesting in contaminated soil and (2) maternal transfer of pollutants. Eggs were collected from turtles captured in coal ash-polluted or unpolluted sites; individual clutches were incubated in both ash-contaminated and uncontaminated soil in outdoor, artificial nests.	survivorship. Adult females from the polluted site accumulated high levels of As, Cd, Cr, and Se in their tissues, yet Se was the only element transferred maternally to hatchlings at relatively high levels. Hatchlings from polluted-site females exhibited reduced O <sub>2</sub> consumption rates compared to hatchlings from reference sites.	transferred to hatchlings at high levels and may be responsible for observed physiological impairments.	Ecology Laboratory, Aiken, South Carolina 29802, USA	Accumulation and selective maternal transfer of contaminants in the turtle <i>Trachemys scripta</i> associated with coal ash deposition. Arch Environ Contam Toxicol.;40(4):531-6.
xiii	Banded water snakes, ( <i>Nerodia fasciata</i> ) and prey	Trace element concentrations in banded water snakes, <i>Nerodia fasciata</i> , and representative prey items from a site polluted by coal combustion wastes were compared with concentrations in conspecifics from a nearby reference site.	Water snakes accumulated high concentrations of trace elements, especially arsenic (As) and selenium (Se), in the polluted habitat. In addition to being exposed to contaminants in water and sediments, snakes in the polluted site are exposed to contaminants by ingesting prey items that have elevated whole-body concentrations of trace elements, including As, cadmium (Cd), and Se. Snakes from the polluted site exhibited mean standard	CCW exposed snakes appear to have elevated allocation of energy to maintenance and theoretically should have less energy available for growth, reproduction, and storage. These findings are consistent with physiological responses recently documented in other organisms from the polluted site. The authors hypothesize that long-term exposure to coal ash-derived trace elements and the resultant	William A. Hopkins <sup>1,2</sup> , Christopher L. Rowe <sup>1,3</sup> , and Justin D. Congdon <sup>1</sup> 1. Savannah River Ecology Laboratory, Aiken, South Carolina 29802, USA, 2. Department of Zoology and Wildlife, Auburn University,	William A. Hopkins, Christopher L. Rowe, and Justin D. Congdon (1999). Elevated trace element concentrations and standard metabolic rate in banded water snakes ( <i>nerodia fasciata</i> ) exposed to coal combustion wastes. Environmental Toxicology and Chemistry . Volume 18, Issue 6



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
			metabolic rates (SMR) 32% higher than snakes from the reference site.	accumulation of some elements are responsible for observed increases in SMR.	Auburn, Alabama 36849, USA, 3. Department of Biology, University of Puerto Rico, PO Box 23360, San Juan, Puerto Rico, 00931	Article: pp. 1258–1263.
xiv	Salamander ( <i>Ambystoma talpoideum</i> )	The authors exposed the salamander <i>Ambystoma talpoideum</i> to coal-combustion wastes at low and high larval density throughout aquatic development in mesocosms simulating temporary wetlands.	CCW and high density reduced survival to metamorphosis by 57-77% and 85-92%, respectively, and the effects of these two factors together were additive. Reduced metamorphosis was due in part to larval mortality prior to initiation of pond drying, but CCW and high density also extended the larval period, causing mortality of larvae that were not ready to metamorphose before the pond dried. <i>A. talpoideum</i> metamorphs accumulated high concentrations of a suite of trace elements (As, Se, Sr, and V).	This was the first demonstration of a CCW pollutant-induced extension of larval period leading to reduction in amphibian recruitment.	Savannah River Ecology Laboratory, University of Georgia, Aiken, SC 29802, USA. roe@aerg.canberra.edu.au	Roe JH, Hopkins WA, Durant SE, and, Unrine JM. (2006). Effects of competition and coal-combustion wastes on recruitment and life history characteristics of salamanders in temporary wetlands. <i>Aquat Toxicol.</i> ;79(2):176-84. Epub 2006 Jul 13.
xv	Grass shrimp	Grass shrimp were	Survival to metamorphosis	These findings suggest that	University of	Kuzmick DM,



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
	<i>(Palaemonetes pugio Holthius)</i>	exposed in the laboratory to CCW-enriched sediments and food over a full life cycle. Survival to metamorphosis was monitored. The COMET assay, a general but sensitive assay for genotoxicity, was used to quantify DNA single strand breaks (SSB) in adults. Total antioxidant potential was examined to assess the overall antioxidant scavenging capacity of CCW-exposed and non-exposed adult grass shrimp.	was significantly reduced in CCR-exposed larvae (17+/-4 versus 70+/-13% in the controls) but not in the juveniles or adults. Grass shrimp exposed to CCR significantly accumulated selenium and cadmium compared to unexposed shrimp. Chronic CCR exposure caused DNA SSB in hepatopancreas cells, as evidenced by the significantly increased percent tail DNA, tail moment, and tail length as compared to reference shrimp.	genotoxicity may be an important mode of toxicity of CCR, and that DNA SSB may serve as a useful biomarker of exposure and effect of this very common, complex waste stream. This study also suggests that CCW exposure during a critical window of development may predispose larvae to not survive to metamorphosis.	Maryland Center for Environmental Science, Chesapeake Biological Laboratory, 1, Williams Street, PO Box 38, Solomons, MD 20688, USA.	Mitchelmore CL, Hopkins WA, and, Rowe CL. (2007). Effects of coal combustion residues on survival, antioxidant potential, and genotoxicity resulting from full-lifecycle exposure of grass shrimp ( <i>Palaemonetes pugio Holthius</i> ). Sci Total Environ. ;373(1):420-30. Epub 2006 Dec 19.
xvi	Paramecium protozoan (Mutagenic Assay)	The use of the established mutagenesis assay in Paramecium as a prescreen for hazardous environmental particles is described. Since these protozoans ingest particles of the size respired by animals and man, the biological effects of the respirable fraction of fly ash	Fly ash from coal combustion was utilized for these studies and was found to be mutagenic. The effects of physical and chemical treatment of the particle mutagenicity provided evidence for heat-stable, heat-labile and acid extractable mutagenic agents.	Flyash and/or specific constituents of fly ash are mutagenic in the Paramecium-protozoan assay. This finding implies genotoxic effects to both humans and animals from inhalation of repairable flyash particles. Genotoxic effects are associated with increased risk of cancer development and	Department of Biological and Exercise Sciences, Northeastern Illinois University, Chicago 60625-4699, USA.	Smith-Sonneborn J, Fisher GL, Palizzi RA, and Herr C. (1981). Mutagenicity of coal fly ash: a new bioassay for mutagenic potential in a particle feeding ciliate. Environ Mutagen.;3(3):239-52.



Study Number	Species Name	Study Type	Results	Significance	Authors Affiliations	Citation
		particles were monitored in particle-feeding eukaryotic cells. Fly ash from coal combustion was utilized for these studies.		teratogenic effects.		

Table compiled by Conrad Daniel Volz, DrPH, MPH Assistant Professor <http://www.pitt.edu/~cdv5/>  
Director, [Center for Healthy Environments and Communities](#)  
Director, [Environmental Health Risk Assessment Certificate Program](#)  
Bridgeside Point, 100 Technology Drive  
Room 553, BRIDG  
Pittsburgh, PA 15219-3130  
Cell: 724-316-5408  
Email: [cdv5@pitt.edu](mailto:cdv5@pitt.edu)

## Appendix 1, Biography-Testimony of Conrad Daniel Volz, DrPH, MPH

Dr. Volz is an Assistant Professor of Environmental and Occupational Health (EOH) at the Graduate School of Public Health (GSPH), University of Pittsburgh; he is also the Director for the Center for Healthy Environments and Communities at the Graduate School of Public Health (GSPH), University of Pittsburgh; and Director of the Environmental Health Risk Assessment Certificate Program. Dr. Volz's research interests are primarily focused on how industrial and municipal toxins and carcinogens move through the air, water, soil and groundwater to reach people and how to block this movement. He teaches both Exposure Assessment and Fate and Transport of Environmental Contaminants in the EOH, GSPH. Dr. Volz is the Principal Investigator for the Three Rivers Fish Consumption Project, which has found significant levels of estrogen-mimicking chemicals in area channel catfish, related to bioaccumulation of pharmaceutical estrogens and xenoestrogens principally from sewer overflows. This project has also discovered dangerous and elevated levels of heavy metals, including selenium and mercury, in fish in the Allegheny River and even Store-Bought Fish. He was Director of the 2004 Amchitka Expedition to determine radionuclide concentrations in marine biota from underground nuclear test shots fired in the Aleutian Islands. Dr. Volz is the PI for the Allegheny River Stewardship Project of 2008, a Heinz and Highmark (through UPCI-CEO) funded, community based participatory environmental research and outreach program that will test several hypothesis concerning identification of sources of pollution by sampling of fish, sediment and water in different locations of the Allegheny River. Dr. Volz is also the Co-Principal Investigator for a project with the Children's Institute of Pittsburgh to explore associations between Autism and Autism Exacerbations with exposure to coal fired plant emissions and wastes.

Dr. Volz has over 30 years experience in occupational-environmental health, he received his initial training in Public and Occupational Health in the Department of Occupational Health at the University of Pittsburgh's, Graduate School of Public Health (GSPH) on a fellowship from the U.S. National Institute for Occupational Safety and Health (NIOSH). Dr. Volz holds an MPH and Doctor of Public Health degree from GSPH. After holding progressively responsible posts in private industry (National Steel Corporation), government (California OSHA Consultation Service) and non-governmental agencies (Western Institute for Occupational and Environmental Health Sciences, Berkeley California), Dr. Volz started Volz Environmental Services, an environmental health consulting company in 1984. He has worked in 24 different countries on 5 continents performing radionuclide transport studies, occupational/environmental contaminant/toxin exposure pathway analysis, exposure assessments, environmental risk assessments and engineer and policymaker training for private industry, municipal, state and the federal governments and foreign manufacturers and governmental agencies. He joined the faculty of EOH-GSPH in May of 2004. Dr. Volz was elected to the Omicron Chapter, Delta Omega Honor Society, National Public Health Honor Society in 2006. Dr Volz is the recipient of the endowed Dr. James Craig Award for Teaching Excellence for GSPH faculty received at 2009 convocation ceremonies.



**UNIVERSITY OF PITTSBURGH**  
**GRADUATE SCHOOL OF PUBLIC HEALTH**

**CURRICULUM VITAE**

**Name:** Conrad Daniel Volz, DrPH, MPH

**Business Address:** University of Pittsburgh  
Graduate School of Public Health  
Department of Environmental and Occupational Health  
Bridgeside Point Building  
100 Technology Drive  
Suite 564  
Pittsburgh, PA 15219

Office Phone: 412-648-8541  
Cell Phone: 724-316-5408  
Email: [cdv5@pitt.edu](mailto:cdv5@pitt.edu);

**Websites:** **Departmental Website:** <http://www.pitt.edu/~cdv5/>

**Center for Healthy Environments and Communities:**  
<http://www.chec.pitt.edu>

---

**EDUCATION AND TRAINING**

1975	University of Pittsburgh Pittsburgh, PA College of Arts and Sciences	B.S. Biochemistry and Biophysics
1976	University of Pittsburgh Pittsburgh, PA Faculty of Arts and Sciences	Life Science Studies, Neurosciences- Graduate Research Assistant
1977	University of Pittsburgh Pittsburgh, PA Graduate School of Public Health	M.S. Hyg. Industrial Hygiene Program, National Institute for Occupational Safety and Health Fellowship

- |      |  |                              |
|------|--|------------------------------|
| 1997 | University of Pittsburgh<br>Pittsburgh, PA<br>Graduate School of Public Health | MPH Master of Public Health  |
| 2002 | University of Pittsburgh<br>Pittsburgh, PA<br>Graduate School of Public Health | DrPH Doctor of Public Health |

**ADDITIONAL ENVIRONMENTAL / OCCUPATIONAL HEALTH  
PUBLIC HEALTH TRAINING**

- |            |   |
|------------|---|
| 1977       | Industrial Health Foundation, “New Concepts in Occupational Health under OSHA”, Chicago, IL.  |
| 1979       | American Welding Society, “The Welding Environment”, Milwaukee, WI.   |
| 1979       | “Social Issues in Industrial Hygiene”, Chicago, American Industrial Hygiene Association.  |
| 1979       | “NIOSH Respiratory Protection Course”, Darryl Bevis and Associates, Berkeley, CA.   |
| Sept. 1979 | “New Concepts in Toxicology”, Monterey, CA., Western Occupational Health Conference.  |
| Oct. 1979  | :Cal/OSHA, Industrial Relations Survey Course”, San Francisco, CA.  |
| Oct. 1979  | “Cal/OSHA, Industrial Toxicology”, San Francisco, CA.   |
| Oct. 1979  | “Cal/OSHA, Occupational Carcinogens”, San Francisco, CA.  |
| Mar. 1980  | Berkeley, CA., University of California Labor Occupational Health Program, “Industrial Noise Control”.  |
| Jan. 1987  | National Asbestos Council, National Convention, Chicago, IL.  |
| Nov. 1989  | Asbestos Abatement Design, Supervision, and Management program participant and attendee at a six (6) day course devised as complete design and supervision course for A/E firms involved in U.S. Army Corp of Engineer Projects. Course is approved for AHERA Project Designer and Supervisor Certifications. |
| May 1990   | Indoor Air Quality, University of Pittsburgh, School of Medicine Pittsburgh, PA, Certificate 5.5 Continuing Education Units.  |

- Sept. 1990 National Asbestos Council (NAC) National Conference, Update Asbestos Regulation (NESHAP), Operations and Maintenance Plans (O&M) Workshops, Phoenix, Arizona.
- Oct. 1990 Asbestos Regulations Update, Pennsylvania Chamber of Business and Industry, Harrisburg, PA.
- Nov. 1990 OSHA Laboratory Standards, Pennsylvania Chamber of Business and Industry, Harrisburg, PA.
- Nov. 1990 Pennsylvania Planning Association Meeting, Harrisburg, PA. Environmental Planning Issues.
- Feb. 1999 The Future of Public Health, 50<sup>th</sup> Anniversary of the University of Pittsburgh, Graduate School of Public Health, Pittsburgh, PA.
- May 1999 Environmental Public Health Forum, Center for Public Health Practice, Allegheny County Health Department, Pittsburgh, PA.
- Aug., 2008 Use of Laboratory Animals in Research and Education, University of Pittsburgh, Center for Continuing Education in the Health Sciences, Certificate ID; 89747
- Nov. 2007 American Public Health Association, Training Program, Use of Geographic Information Programs in Public Health, 6 credit hours, APHA Learning Institute, Washington, D.C.
- Nov. 2007 American Public Health Association, Training Program, Use of NHANES and other NIH/NIEHS Databases, 6 credit hours, APHA Learning Institute, Washington, D.C.
- May, 2008 National Institutes of Health Web-based training course “Protecting Human Research Participants”. NIH Office of Human Subjects Research, Certification Number: 31150

### **APPOINTMENTS AND POSITIONS**

- |           |  |  |
|-----------|--|--|
| 1975-1976 | Life Sciences Program, Neurosciences<br>Faculty of Arts and Sciences<br>University of Pittsburgh<br>Pittsburgh, PA | Teaching Assistant,<br>Graduate Student Researcher |
| 1976-1978 | Industrial Health Foundation   | Industrial Hygiene                                 |

	Pittsburgh, PA	Researcher
1977-1978	National Institute for Occupational Safety and Health Graduate School of Public Health Department of Occupational Health Sciences, University of Pittsburgh Pittsburgh, PA	Fellow
1978-1979	National Steel Corporation Pittsburgh, PA	Corporate Industrial Hygienist
1979-1980	California Occupational Safety and Health Administration San Francisco, CA.	Consultant
1980-1982	Western Institute for Occupational/ Environmental Health Berkeley, CA. (Carcinogen/Mutagen/Teratogen Demonstration Project Grantee, National Cancer Institute; EPA; United States Department of Labor, Occupational Safety and Health Administration (New Directions Grantee).	Technical Consultant

W.I.O.E.S. Occupational/Environmental Cancer Resource Center.  
Served as technical expert on industrial hygiene, and carcinogen and toxic substance control procedures for project serving industry, unions, citizens and government. Supported by the Department of Health and Human Services, National Institutes of Health, National Cancer Institute. Work involved all facets of toxic substance control. Work also included consultations regarding atomic veterans march to ground zero in the 1950's.

Shipyards Health Education Programs (SHEP)  
Responsible for giving technical assistance to shipyard unions and management on occupational/environmental health evaluation and control for general shipbuilding, including nuclear operations. Developed a slide show on occupational health engineering control techniques for shipyards. Work sites included all in-country U.S. Navy shipbuilding and maintenance sites with significant time spent at Pearl Harbor, Authored "Radiation and Health, A Guide for Radiation Workers".

1982-1992	Volz Environmental Services, Inc. (Volz)	President
-----------	--	-----------

Conrad Daniel Volz was Founder, President, and C.E.O. of Volz Environmental Services, Inc. (Volz), Occupational and Environmental Health Consulting and Risk Management Corporation located at the University of Pittsburgh Applied Research Center (UPARC), Pittsburgh, PA. Volz Environmental provided Environmental Health, Occupational Health and Safety, Asbestos, Indoor Air Quality, Hazardous Waste Management, and Environmental Assessment/Impact and Risk consulting services to State, County, and Municipal governments: worldwide.

Environmental Health and Safety Consultant  
 Bruin Lagoon Superfund Clean-up Site  
 Provided all occupational safety and health and environmental health services on clean-up of the EPA's 3<sup>rd</sup> most hazardous superfund site. Work included general environmental monitoring for benzene, toluene, xylene, chlorinated hydrocarbons and particulate sampling as well as specialty occupational and environmental real time sampling using portable OVM and gas chromatographs. Work also included interface with U.S. Army Corps of Engineers, U.S. Coast Guard and Environmental Protection Agency and state and county officials regarding emergency procedures for gas, vapor and/or particulate releases and explosives and fire protection. Interface with county officials included emergency drills and actual evacuation due to vapor release.

The Worldwide Asbestos Survey of the Department of Defense. Principal  
 Dependent Schools and Selected Base.  
 Responsibilities included development and delivery of professional training courses for foreign architects and engineers (Frankfurt, Germany and Seoul, South Korea) and a general informational program for administrators and maintenance workers, surveying all DOD bases for asbestos, laboratory analysis of all bulk and air samples, preparation of omnibus abatement specifications and oversight and air monitoring of all asbestos abatement. Services were delivered simultaneously on four continents and included 24 countries; work supervised by U.S. Army Corps of Engineers, Middle East, Africa Operations Group.

1992-1997 Volz Environmental Services, Inc. Board of Directors, Consultant

1997-2004 International Public Health and Environmental Health Consultant.

**Investigator for a Structural, Implementation and Intermediate and Ultimate Outcome Evaluation of the American Cancer Society's, Teen Fresh Start Tobacco Cessation Program.** Principle

Work included development of research questions and questionnaire pilot testing, sampling design, data analysis, report preparation and recommendations regarding program nationalization.

**Community Collaboration in Public Health, A Workshop to Improve Health Promotion and Disease Prevention in Sakhalin-Sakhalin Island, The Russian Federation, 9/03-2/04, Sponsored by the U.S. Cultural Affairs, Office of Citizen Exchanges and Magee Department of State, Bureau of Educational and Womancare International. Principle**

Work included development of environmental health priority setting models, community environmental health assessments and the development of curriculum focused on implementing environmental health programs with measurable outcomes.

**Consortium for Risk Assessment with Stakeholder Participation (CRESP) Amchitka Science Plan Project Manager**

Initial responsibilities included all logistical preparations, including general and radiation safety and health issues for a project to determine if there is radionuclide leakage from Amchitka Island in the Aleutian Chain into the marine environment. Amchitka is the site of three underground nuclear tests.

Summer 2004 on-island work included biota sampling, water and sediment sampling, oceanography, salinity gradient measurement, island movement studies and magnetotellurics. On-going work includes development of laboratory OA/OC procedures for Actinide and Gamma Emitter Analysis, statistical analysis and final report. Work done via a grant from the Department of Energy, National Nuclear Security Agency (NNSA), Stakeholders include DOE, NNSA, the US Fish and Wildlife Service, the Aleut/Pribiloff Island Association (APIA) and the Alaska Department of Environmental Protection.

2004 – 2007	Department of Environmental and Occupational Health University of Pittsburgh Graduate School of Public Health Pittsburgh, PA	Visiting Assistant Professor of Public Health Practice in Environmental and Occupational Health
2005 – 2007	Center for Healthy Environments and Communities University of Pittsburgh Graduate School of Public Health Pittsburgh, PA	Scientific Director

2005 –2008	University of Pittsburgh Cancer Institute Center for Environmental Oncology Pittsburgh, PA	Co-Director, Environmental Assessment and Control
2007–Present	Department of Environmental and Occupational Health University of Pittsburgh Graduate School of Public Health Pittsburgh, PA	Assistant Professor of Public Health Practice in Environmental and Occupational Health
2008 –Present	Center for Healthy Environments and Communities University of Pittsburgh Graduate School of Public Health Pittsburgh, PA	Director
2008-Present	Environmental Health Risk Assessment Department of Environmental and Occupational Health Graduate School of Public Health Pittsburgh, PA	Director
2008-Present	University of Pittsburgh, School of Law	Assistant Professor of Law (Secondary Appointment)

### **MEMBERSHIP IN PROFESSIONAL AND SCIENTIFIC SOCIETIES**

1978-1982 and 2007-present	American Public Health Association
1978-1982	American Industrial Hygiene Association
1988-1992	National Asbestos Council Marketing Board Member
1988-1992	Pennsylvania Chapter, National Asbestos Council State Board Member
2004- Present	Community Campus Partnerships for Health

### **COMMITTEE AND PUBLIC APPOINTMENTS**

Pennsylvania Chamber of Business and Industry  
Past Environmental Committee Member

American Society for Testing and Materials (ASTM)  
Committee. E06.24, Building Renovation, Visual  
Inspection of Asbestos Abatement Programs

Pennsylvania Chapter, National Asbestos Council  
Past Program and Membership Chairman  
Past Member, Board of Directors

Stevens Publishing, Asbestos News  
Past Editorial Board

Allegheny County Health Department  
Original Asbestos Advisory Committee

Environmental Information Association  
Past Marketing Committee

May 2008, The Heinz Awards  
Environmental Juror

September 2008-present, Board of Directors, Adults and  
Children with Learning Disabilities, Tillotsen School

### **Honors**

2006 Omicron Chapter, Delta Omega Honor Society, National Public Health Honor Society

2009 Dr. James L. Craig Award for Teaching Excellence, Awarded 59<sup>th</sup> Graduate School of Public Health Convocation

### **PUBLICATIONS**

#### **Refereed Articles**

1. Volz., C.D. OSHA Carcinogen Regulations. 1979. Science12; 203(4376):124.
2. Powers, C.W., Burger, J., Kosson, D., Gochfeld, M., Barnes, D., Bliss, L., Friedlander, B., Jewett, S., Johnson, M., Stabin, M., Unsworth, M., Volz, C., Vyas, V. and Weston, J. AMCHITKA INDEPENDENT SCIENCE ASSESSMENT: Biological and Geophysical Aspects of Potential Exposure in the Amchitka Marine Environment, CRESP, Department of Energy AI#DE\_FCO1-95EW55084, August 1, 2005.
3. Burger, J., Gochfeld, M., Burke, S., Jeitner, C.W., Jewett, S., Snigaroff, D., Snigaroff, R., Stamm, T., Harper, S., Hoberg, M., Chenelot, H., Patrick, R., Volz, C.D., and Weston, J. Do Scientists and fishermen collect the same size fish? Possible implications for exposure assessment. Environ. Research. Sep. 17, 2005. PMID: 16174519.

4. Burger, J., Gochfeld, M., Kosson, D.S., Powers, C.W., Friedlander, B., Eichelberger, J., Barnes, D., Duffy, L.K., Jewett, S.C., Volz, C.D. Science, Policy, and stakeholders: developing a consensus science plan for Amchitka Island, Aleutians, Alaska. *Environ Manage* May:35(5):557-68, 2005. PMID: 15886955.
5. Greenberg, M., Burger, J., Gochfeld, M., Kosson, D., Lowrie, K., Mayer, H., Powers, C., Volz, D., and Vyas, V. End State Land Uses, Sustainable Protective Systems, and Risk Management:: A Challenge for Multi-Generational Stewards. *Remediation Journal* 16(1), 2005.
6. Volz, C., Powers, C., Burger, J., Kosson, D., Gochfeld, M., Friedlander, B., Barnes, D., Bliss, L., Jewett, S., Johnson, M., Stabin, M., Unsworth, M., Vyas, V., and Horsch, J. The CRESP Amchitka expedition: a model for multi-and interdisciplinary research into radionuclide contamination of the marine environment. In F. Linkov and R. LaPorte (Eds.), *Scientific networking and the global health supercourse. NATO Security through Science Series D: Information and Communication Security-Vol. 5, Amsterdam, Netherlands: IOS Press, 2006.*
7. Talshinsky, R., Azwebajan, R., Egypt: Adlas, R., Keders, U., Estonia: Bakanidze, L., Georgia: Linn, S., Israel: Rossodivita, A., Italy: Shishani, K., Jordan: Busmane M., Latvia: Grabauskas, V., Jankauskas, D., Mireckas, R., Obrikis, R., Sliupa, S., Starkuviene, D., Vaitkaitis, D., Zukauskus, G., Lithuania: Galatchi, L., Romania: Puchkina, N., Shubnikov, E., Trufanov, A., Russia: Ghannem, H., Tunisia: Ozden, YI., Onale, AE., Turkey: Gudzenko, N., Ledoshchuk, B., Vynograd, N., Ukraine: Dorman, J., LaPorte, R., Linkov, F., Noji, E., Powell, J., Rumm, P., Volz, C.D., USA. Constructing a NATO Supercourse. In: F. Linkov and R. LaPorte (Eds.). *Scientific networking and the global health supercourse. NATO Security through Science Series D: Information and Communication Security-Vol. 5, Amsterdam, Netherlands: IOS Press.*
8. Burger, J., Mayer, H., Greenburg, M., Powers, C., Volz, C., and Gochfeld, M. Ecological risk and conceptual site models where critical risk is offsite for ecological receptors: The case of the Department of Energy's Amchitka Island Nuclear Test Site. *Journal of Toxicology and Environmental Health, Part A*, 69:1217-1238, 2006.
9. Burger, J., Gochfeld, M., Kosson, D., Jewett, S., Friedlander, B., Chenelelot, H., Volz, C.D., and Jeitner, C. Radionuclides in marine macroalgae from Amchitka and Kiska Islands in the Aleutians: establishing a baseline for future biomonitoring.. *Journal of Environmental Radioactivity*, 91:1-2, 27-40, 2006.
10. Burger, J., Gochfeld, M., Jeitner, C., Stamm, T., Burke, S., Donio, M., Snigeroff, D., Snigeroff, R., and Volz, C.D. Heavy metal levels in Pacific cod (*Gadus*

- macrocephalus) from the Aleutians: location, age, size and risk effects. *Journal of Toxicology and Environmental Health, A*; 2007 Nov; 70(22):1897-911.
11. Burger, J., Gochfeld, M., Kosson, D., Powers, C., Friedlander, B., Stabin, M., Favret, D., Jewett, S., Snigaroff, D., Snigaroff, R., Stamm, T., Weston, J., Volz, C.D., and Jeitner, C. Radionuclides in marine fishes and birds from Amchitka and Kiska Islands in the Aleutians: Establishing a baseline. *Accepted Health Physics*, December 2006.
  12. Gochfeld, M., Volz, C., Jewett, S., Powers, C., Friedlander, B. Developing a Health and Safety Plan for Hazardous Field Work in Remote Areas. *Journal of Occupational and Environmental Hygiene*, 3(12):671-83, Dec. 2006.
  13. Burger, J., Gochfeld, M., Burke, S., Jeitner, C.W., Jewett, Snigaroff, D., Stamm, T., Volz, C., and James Weston. Do scientists and fishermen catch the same size fish: Implications for risk assessment. *Environmental Research* 101(1):34-41, 2006.
  14. Burger, J., Mayer, H., Greenburg, M., Powers, C., Volz, C. and Gochfeld, M. Ecological risk and conceptual site models where critical risk is offsite for ecological receptors: The case of the Department of Energy's Amchitka Island nuclear test site. *Journal of Toxicology and Environmental Health, Part A*, 69:10-22, 2006.
  15. Volz, C.D., and Christen, C. Why are river Recreationalists most at risk for development of waterborne infectious diseases; how can clinicians improve surveillance? *Journal of Occupational and Environmental Medicine*: 49(1): 104-105, January 2007. PMID: 17215719.
  16. Volz, C.D. How do water, land management, ecological and contamination issues interact to produce tertiary public health, medical, social and economic problems? -*Journal of Occupational and Environmental Medicine*, 2007 Mar; 49(3):349-52.
  17. Volz, C.D. A framework to understand the centrality of protection and restoration of ecosystem services to water management and preparedness: An all-hazards approach with implications for NATO plans and operations. In Maria Calpinskiene, MD, PhD, Curtis Cummings, MD, MPH, Nataliya Gudzenko, MD, PhD, Elin Gursky, ScD, Faina Linkov, PhD, Alessandra Rossodivita, MD, Eugene Shubnikov, MD, Elisaveta Stikova, MD, PhD, Andrey Trufanov, PhD, Conrad Volz, DrPH, MPH. Editors, *Strengthening national public health preparedness and response for chemical, biological, and radiological agent threats: Springer-NATO Advanced Science Institute Series*. IOS Press – Nieuwe 6B, 1013 BG Amsterdam, Netherlands, June 2007.
  18. Tomljanovic, C. and Volz, C.D. Modeling munitions and explosives of concern (MEC) CBRN Hazards: Novel tools and approaches for strengthening the

- conceptual site model for public health preparedness. In Maria Calpinskiene, MD, PhD, Curtis Cummings, MD, MPH, Nataliya Gudzenko, MD, PhD, Elin Gursky, ScD, Faina Linkov, PhD, Alessandra Rossodivita, MD, Eugene Shubnikov, MD, Elisaveta Stikova, MD, PhD, Andrey Trufanov, PhD, Conrad Volz, DrPH, MPH Editors, Strengthening national public health preparedness and response for chemical, biological, and radiological agent threats: Springer-NATO Advanced Science Institute Series, IOS Press – Nieuwe 6B, 1013 BG Amsterdam, Netherlands, June, 2007.
19. Volz, C.D. Water management in Southwestern Pennsylvania based on a social-economic-ecological model for the University of Pittsburgh, Institute of Politics, Regional Water Management Task Force Board, July 2007.
  20. Burger, J., Gochfeld, M., Shukla, S., Stamm, T., Snigaroff, D., Snigaroff, R., and Volz, C.D. Heavy metals in Pacific Cod (*Gadus macrocephalus*) from the Aleutians: Location, age, size, and risk. 2007. *Journal of Toxicology and Environmental Health, Part A*, 70: 1-15.
  21. Walters, M. and Volz, C.D. Municipal wastewater concentrations of pharmaceutical and xeno-estrogens: wildlife and human health implications. Proceedings of the 3<sup>rd</sup> National Conference on Environmental Science and Technology, Springer in press.
  22. Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., Davis, D., Donovan, M., Hefnawy, T., and Eagon, P. Channel catfish estrogenicity and sewer overflows; Implications for xenoestrogen exposure. Proceedings of the 3<sup>rd</sup> National Conference on Environmental Science and Technology, Springer in Press.
  23. Volz, C.D. Assessment of metals in down feathers of female common eiders and their eggs from the Aleutians: arsenic, cadmium, chromium, lead, manganese, mercury, and selenium. *Environmental Monitoring and Assessment*: 2008 Aug; 143(1-3):247-56.
  24. Editors, Miller, T., Gorley, T., and Barron, B.; Author Volz, Conrad, D. Southwestern Pennsylvania's Water Quality Problems and How to Address Them Regionally, Issues, University of Pittsburgh, Institute of Politics, 60 pages, 2007.
  25. Burger, J., Gochfeld, M., Jeitner, C., Burke, S., Volz, C.D., Snigaroff, D., Snigaroff, Ronald, Shukla, T., Shukla, S., 2008. Mercury and other metals in eggs and feathers of glaucous-winged gulls (*Larus glaucescens*) in the Aleutians. *Environmental Monitoring and Assessment*: 143: 247-256.

**Whitepapers** (Since Academic Appointment)

1. Vyas, V. and Powers, C. with Volz, C., Liroy, P., and Gochfeld, M. The role of exposure assessment in the design of sustainable protective systems for Department of Energy Legacy Waste Sites, White Paper for the Department of Energy under a grant to the Consortium for Risk Evaluation with Stakeholder Participation (CRESP), January, 2006.
2. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Health Homes Initiative, January, 2006, 4<sup>th</sup> Quarter 2005 Evaluation.
3. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project, US Department of Housing and Urban Development, Healthy Homes Initiative, May, 2006, 1<sup>st</sup> Quarter 2006 Evaluation.
4. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project, US Department of Housing and Urban Development, Healthy Homes Initiative, July, 2006, 2<sup>nd</sup> Quarter 2006 Evaluation.
5. Volz, C.D. Water quality problems in Southwestern Pennsylvania in Miller, T., Editor, Regional water management in Southwestern Pennsylvania: Moving toward a solution, University of Pittsburgh, Institute of Politics, July, 2006.
6. Conrad Daniel Volz, DrPH, MPH, and Charles Christen, Graduate Student Researcher. Pathogen contamination and waterborne disease as a result of wet weather releases from combined and sanitary sewer overflows and stormwater runoff: The significance of continued high fecal coliform bacteria in Pittsburgh main stem rivers and tributaries as a public health problem for water recreationalists and municipal treatment facilities, for the University of Pittsburgh, Institute of Politic, Regional Water Management Task Force Board. Work also supported by the Heinz Endowment, September 8, 2006.
7. Volz, C.D. Regional water management in Southwestern Pennsylvania, Our environmental public health and economic challenge for the next 20 years; Definitions, scope, and a causation framework, for Weathering the Storm/Ivan Flood Symposium – University of Pittsburgh, Graduate School of Public Health, Center for Public Health Preparedness, September 15, 2006.
8. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Healthy Homes Initiative, October, 2006, 3<sup>rd</sup> Quarter 2006 Evaluation.
9. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Healthy Homes Initiative. January, 2007, 4<sup>th</sup> Quarter 2006 Evaluation.

10. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Healthy Homes Initiative, 1<sup>st</sup> Quarter, May, 2007 Evaluation.
11. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Healthy Homes Initiative, 2<sup>nd</sup> Quarter, July, 2007.
12. Volz, C.D., Dabney, B., Cohen, P., Cude, C., Dooly, I, Kyprianou, R., Malecki, K., Richter, W., Schulman, A., Shaw, S., Vanderslice, J., Walters, M., and Vyas, V. Handling left censored water contaminant data for descriptive statistics and hypothesis tests. Submitted to the Centers for Disease Control and Prevention's (CDC), Environmental Public Health Tracking Network (EPHT) from the Water Working Group, Non-Detect Subgroup, September, 2007.
13. Volz, C.D., and Liu, Y. Healthy Homes Resources, Environmental Asthma Project. US Department of Housing and Urban Development, Healthy Homes Initiative, 3<sup>rd</sup> Quarter, October, 2007.
14. Volz, C.D. Final Quarterly Report, Healthy Home Resources-AT HOME Environmental Asthma Evaluation Report, Healthy Home Resources for the Department of Housing and Urban Development, 2007.

#### **Selected Publications Before Academic Appointment**

1. Known carcinogen regulations and industrial hygiene protection, American Cancer Society Training Book, 1980.
2. Carcinogen Testing, American Cancer Society Training Book, 1980.
3. Control of health hazards in the workplace, protective clothing, Western Institute for Occupational Environmental Services, Inc., Berkeley CA, 1980.
4. Work and health, here are some vital tips on handling the PCB problem, California AFL-CIO News, 1980.
5. Radiation and work, 25 page pamphlet, published by the Western Institute for Occupational and Environmental Health under EPA Carcinogen and OSHA New Directions Grant, Reviewed by Arthur Upton, M.D., Berkeley CA, 1982.
6. Managing asbestos makes public health and economic sense, Tri-State Real Estate Journal, Pittsburgh, PA, 1989.
7. Year End Outlook, Environmental Concerns, Tri-State Real Estate Journal, Pittsburgh, PA, 1989.

8. Asbestos floor tile/mastic removal methods, PACNAC Insider, Harrisburg PA, 1990.
9. Comparison of asbestos floor tile/mastic removal methods, Asbestos Abatement News, Stephens Publishing Company, Dallas , Texas, 1990.
10. Asbestos management, Buildings Magazine, Section sponsored by the National Asbestos Council, Chicago, Illinois, 1990.
11. Another call for Pennsylvania regulations concerning air monitoring technicians, PACNAC Insider, Harrisbur, PA 1990.
12. Recognition and management of occupational environmental health risks, Hospital News, Pittsburgh PA, 1990.
13. Occupational safety and health issues in hospitals, Hospital News, 1992.
14. Asbestos management, Bests Safety Directory, Pyramid Environmental Systems, 1992 Edition.

### **Professional Activities**

#### 1. Teaching

##### a) Courses Taught

- EOH 2112      Co-Instructor  
                   Fate and Transport of Environmental Contaminants  
                   Four Hours Per week, Three Credits, Six Students  
                   Winter; 2005 – 2006
- EOH 2111      Course Director  
                   Occupational Health Survey Course, Medical Residents  
                   Summer; 2006 – 2007
- EOH 2504      Course Director  
                   Principals of Environmental Exposure  
                   Three Hours Per Week, Three Credits, 15 Students  
                   Fall; 2007 – 2008 and 2008-2009
- EOH 2112      Course Director  
                   Fate and Transport of Environmental Contaminants  
                   Three Credits, 5 Students  
                   Winter; 2007 – 2008

EOH Environmental Law (Course to be taught in winter of 08-09) in conjunction with the School of Law-Environmental Law Clinic-Course Co-Director

Lectures Given For Courses in Graduate School of Public Health

- BCHS 3004 Getting started with your dissertation-document.  
Lecture: BCHS; Integrative Seminar.  
2004
- EOH 2013 Intro Course-Barchowsky: Lecture, Occupational Health and Industrial Hygiene.  
2005-2008
- EOH 2112 Fate and Transport-Keller: Lecture, Radionuclide movement through media.  
2005
- EOH 2504 Exposure Assessment-Keller: Lecture, Conceptual site models  
2005
- EOH 2515 Preparedness Course-Schwerha: Lecture, Radiological catastrophic event evaluation studies.  
2005
- EOH 2108 Risk Assessment-Sussman: Lecture, Exposure assessment-conceptual site modeling in a risk assessment framework.  
2005 – 2008.
- EOH 2108 Risk Assessment-Sussman: Lecture, Risk assessment and exposure for the special case of Amchitka Island.  
2005 – 2008
- EOH 2013 Lecturer: Occupational Health and Radiation Health Lectures.  
2006 – 2008
- EOH 2013 Lecturer: Water Management Lecture.  
2006 – 2008
- EOH 2175 Lecturer: Principals of Toxicology; Ecotoxicology  
2007-2008 and 2008-2009
- EOH 2304 Lecturer: Biomarkers and Molecular Epidemiology.  
2006 – 2007
- EOH 2022 Proctor: Special Topics Credits (6) – Yan Liu.

2006 – 2007.

- EOH 2022 Proctor: Special Topics Credits (6) – Maxine Walters.  
2007 – 2008 and 2008-2009.
- EOH 2022 Proctor: Special Topics Credits (3) – Drew Michanowicz  
2007-2008.
- EOH 2022 Proctor: Special Topics Credits (3) – Malcomb Murray  
2007-2008.
- EOH 2022 Proctor: Special Topics Credits (3) – Suzanne Mamrose  
2007-2008.
- EOH 2022 Proctor: Special Topics Credits (1) – Chuck Tomjanovic  
2007-2008.
- EOH 2022 Advisor: Special Studies Credits (3)- Christy Lawson (Epidemiology)  
Fall 2008-2009 (Exposure Assessment to coal Combustion Wastes in  
Southwestern Pennsylvania)
- EOH 2022 Proctor: Special Topics Credits (3) – Drew Michanowicz  
Fall 2008-2009. (PPG Waste Site Research and Transport of Metals)
- EOH 2022 Proctor: Special Topics Credits (3) – Malcomb Murray  
Fall 2008-2009. (River Mining Consequences in the Allegheny River)
- EOH 2022 Proctor: Special Topics Credits (1) – Chuck Tomjanovic  
2007-2008. (Underwater Hazards of Unexploded Ordinance in  
the Mid-Pacific Ocean)
- EOH 2022 Proctor: Special Topics Credits (5), Special Topics in Fate and Transport  
of Chemical Contaminants – Kiel Ferrar, 2007-2008 and Fall 2008-2009.
- Geology Biomonitoring Water Using Fishes-Lecture, Winter 2007-2008; Course  
Environmental Director-Don Hopey of the Pittsburgh Post Gazette  
Sciences Program

b) Supervision

i) Graduate Studies

Advisor: EOH 2108, Environmental and Occupational Health Practicum.

2005 – 2008.

MPH Committee Member:

Awarded:

Susan Bealko, MPH in Environmental and Occupational Health, Spring 2007.

Topic; Evaluation of Noise Levels in Mine Trucks.

Diana Lenzner, MS in Biostatistics, Summer 2007.

Topic: Estrogenicity of Channel Catfish Tissue from the Three Rivers Near Pittsburgh, PA.

Katie Philp, MPH in BCHS, Spring 2008

Topic: Point of use water quality interventions in developing countries

In Progress:

Suphagaphan Ratanamaneechat, MD, MPH in Occupational Medicine  
Topic: Advisor-Toxic metal, metalloid and element pollution associated with coal fired electrical generation: Analysis of waste streams from the Reliant Energy Plant in Springdale, PA (Summer, 2009 Graduation).

Lara Hyler, MPH in Environmental and Occupational Health

Topic: An assessment of the protectiveness of Occupational Health Radiation limits.

MPH Major Advisor/Committee Head

Awarded:

Christine Lewis, University of Pittsburgh, Graduate School of Public Health, MPH, Awarded December, 2005.

Topic: Implementation Evaluation of the Healthy Homes Resources Environmental Asthma-AT HOME Project

Yan Liu, MPH in Environmental and Occupational Health, Awarded, Summer, 2007.

Topic: Mercury, Arsenic and Selenium Levels in Channel Catfish From Southwestern Pennsylvania; Implications for Coal Fired Power Plants.

In Progress

Charles Tomjanovic, University of Pittsburgh, Graduate School of Public

Health, November, 2005 – Present.  
Topic: Conceptual site models of explosive ordinance.

Drew Michanowicz, MPH in Environmental and Occupational Health,  
Graduate School of Public Health.  
Topic: Metal contamination in the Allegheny river as a result of glass  
production.  
(Expected Graduation, April, 2009).

Malcomb Murray, MPH in Environmental and Occupational Health,  
Graduate School of Public Health.  
Topic: Metal contamination in the Monongahela River from iron and steel  
production.  
(Expected Graduation Date, April, 2009).

Suzanne Mamrose, MPH in Environmental and Occupational Health,  
Graduate School of Public Health.  
Topic: An outcome evaluation of the healthy home resources AT HOME  
Asthma trigger remediation program.

#### Doctoral Committees

Member, Awarded:

Xiaohui Xu, University of Pittsburgh, Graduate School of Public Health  
Epidemiology.  
Topic: Geographic information systems and environmental health  
and exposure mapping.  
Awarded Ph.D. June, 2007.

#### Doctoral Dissertation Advisor

Maxine Walters (Admitted to Candidacy April 2008)  
Topic: Xenoestrogens in water and bioaccumulation in fish:  
Implications for human health.  
(Expected Graduation, Fall 2008 – 2009).

#### Graduate Student Field Placement

Christine Lewis, MPH, Environmental and Occupational Health  
University of Pittsburgh, Graduate School of Public Health.  
Topic: Healthy Homes Resources.  
May 1, 2005 – June 30, 2005.

Yan Liu, MPH, Environmental and Occupational Health  
University of Pittsburgh, Graduate School of Public Health.

Topic: Healthy home resources, Asthma Study, Summer, 2006.

Suzanne Mamrose, MPH, Environmental and Occupational Health  
University of Pittsburgh, Graduate School of Public Health

Topic: Healthy Home Resources Asthma Study  
Fall – Summer, 2007- 2008.

Drew Michanowicz, MPH, Environmental and Occupational Health  
University of Pittsburgh, Graduate School of Public Health

Topic: PA Department of Environmental Protection  
Spring-Summer, 2007- 2008.

Malcomb Murray, MPH in Environmental and Occupational Health,  
Graduate School of Public Health.

Topic: Center for Healthy Environments and Communities  
, Allegheny River Stewardship Project  
Spring-Summer, 2007- 2008.

Suphagaphan Ratanamaneechat, MD, MPH in Occupational Medicine

Topic: Allegheny River Stewardship Project.  
(Summer, 2009 Graduation).

Batsirai T. Mutetwa

MPH Candidate in Epidemiology  
Global Health Certificate '08

Topic: Center for Healthy Environments and Communities  
, Allegheny River Stewardship Project  
Spring-Summer, 2007- 2008.

#### Undergraduate Internships-Allegheny River Stewardship Project

Andreal Bowser, Chatham University (4 Credits)

May Externship Semester Bio 498, May 2008 and  
Advisor-Senior Project Tutorial Bio 499, 2008-2009,  
Allegheny River Stewardship Project.

Sophia Good, University of Pittsburgh, Environmental Studies

, Department of Geology, Senior Internship, Allegheny River Stewardship  
Project, Summer 2008.

Benjamin Schultz, West Virginia University, Department of Forestry  
and Conservation, Environmental Studies Division, Allegheny River  
Stewardship Project, Summer 2008.

Andrea Glassmire, University of Pittsburgh, Department of Biology  
Senior Internship Requirement, Allegheny River Stewardship Project,  
Summer, 2008.

2. **Research**

A. **Grants Received**

1) Consortium for Risk Evaluation with Stakeholder Input (CRESP)-Department of Energy

Title: Amchitka Study and Analysis of DOE Legacy Waste

PI; Charles Powers, PhD, UMDNJ

Co-Investigator: Conrad D. Volz, DrPH, MPH

% of Effort: 90

Annual Direct Costs: \$8,000,000

Period of Support: May 1, 2004- October 2004

Amchitka Science Plan-Initial responsibilities included all logistical preparations, including general and radiation safety and health issues for a project to determine if there is radionuclide leakage from Amchitka Island in the Aleutian Chain into the marine environment. Amchitka is the site of three underground nuclear tests. Summer 2004 on-island work included biota sampling, water and sediment sampling, oceanography, salinity gradient measurement, island movement studies and magnetotellurics. On-going work includes development of laboratory QA/QC procedures for Actinide and Gamma Emitter Analysis, statistical and analysis and final report writing. Work done via a Grant from the Department of Energy, National Nuclear Security Agency (NNSA), Stakeholders include DOE NNSA, the US Fish and Wildlife Service, the Aleut/Pribiloff Island Association (APIA) and the Alaska Department of Environmental Protection.

2) Heinz Endowments

Title: Center for Healthy Environments and Communities

Principal Investigator: Rabi Ali, MD

Scientific Director; Conrad Daniel Volz, DrPH

% of Effort: 50

Annual Direct Costs: \$200,000

Period of Support: 2005 -2007

3) CRESP/DOE

Title: Sustainability of Radionuclide Closures, Department of Energy, National Nuclear Security Agency (NNSA)

Charles Powers, PhD, UMDNJ

- Co-Investigator: Conrad D. Volz, DrPH, MPH  
% of Effort: 90  
Annual Direct Costs: \$1,500,000  
Period of Support: October 2004-September 2005
- 4) UPCI, DSF Charitable Trust / UPCI CEO  
Title: Development of a Community Based Participatory Environmental Research Project: Focus Groups to Investigate Fish Consumption Patterns. A Screening Assessment for Metals and Estrogenicity in White Bass and Channel Catfish Caught in the Three Rivers Area of Pittsburgh, Pennsylvania  
Principal Investigator: Conrad D. Volz, DrPH, MPH  
% of Effort: Various-up to 30  
Annual Direct Costs: \$75,000  
Period of Support: July 2005 – June 2007
- 5) Housing and Urban Development and Heinz Endowments  
Title: Healthy Homes Resources Environmental Asthma Evaluation  
Principal Investigator: Conrad D. Volz, DrPH, MPH  
% of Effort: 10  
Annual Direct Costs: \$12,000  
Period of Support: December 2004 – December 2007
- 6) Centers for Disease Control and Prevention  
Title: Environmental Public Health Tracking  
PI: Evelyn Talbott, DrPH  
Co-Investigator: Conrad D. Volz, DrPH, MPH  
% of Effort: 10  
Annual Direct Costs: \$250,000  
Period of Support: January 2005 – Present
- 7) Allegheny River Stewardship Project  
\$150,000 from Heinz Endowments  
Highmark and Alle-Kiski Health Foundation  
Principal Investigator: Conrad D. Volz, DrPH, MPH  
% of Effort: 20 and Various  
Annual Direct Costs: \$150,000  
Period of Support: June 2007 – November 2008
8. Heinz Endowments, Center for Healthy Environments and Communities  
\$200,000  
Principle Investigator  
% of Effort; 60%  
Period of Support; July 1, 2008-June 30. 2009
9. Children's Institute  
Autism and Heavy Metals Study

Co-Principal Investigator  
% of Effort; 10%  
Period of Support; July 1, 2008-June 30. 2009

C. Seminars

Burger, J., Gochfeld, M., Powers, C., Friedlander, B., Eichelberger, J., Barnes, D., Duffy, L., Jewett, S., and Volz, C. Science, Policy, Regulators and Stakeholders Developing a Consensus Science Plan for Amchitka Island, Aleutians, Alaska: presented at the University of Medicine and Dentistry of New Environmental and Occupational Health Sciences Institute, Environmental Session. May 31, 2004.

Ecological Risk and Conceptual Site Models Where Critical Risk is Offsite for Ecological Receptors, especially birds: The Case of the Department of Energy's Amchitka Island Nuclear Test Site. American Ornithological Union Conference, Quebec City, Canada. August 15, 2004.

Volz, C.D. Story Session and Conference Paper – Community Collaborations in Public Health: The Pittsburgh PA and Sakhalin, The Russian Republic Experience. A Partnership of Magee Women's International and the University of Pittsburgh's Graduate School of Public Health. Demonstration of an Environmental public health prioritization process International Conference of Community Campus. Partnerships for Health and the Network: Towards Unity for Health (World Health Organization), Atlanta, Georgia. October 9, 2004,

Volz, C.D. The CRESP Amchitka Expedition: A Model for Multi- and Interdisciplinary Research into Radionuclide Contamination. NATO Conference on Containment of Natural and Manmade Disasters, Kaunas, Lithuania. August 8 – 12, 2005.

Volz, C.D. Transport and Fate of Mercury in the Environment. Sierra Club Mercury Meeting, Pittsburgh, PA. September 27, 2005.

Volz, C.D. Exposure Assessment of Pennsylvania Communities Contaminated by Legacy Iron and Steel (ISI) Waste. Collaborative on Health and the Environment for Pennsylvania and the Battle of Homestead Foundation, Homestead Pump House, Homestead, PA. October 8, 2005.

Volz, C.D. Exposure Assessment as the Basis for Evaluating Alternative Land Use End States in Pennsylvania Communities Contaminated by Legacy Iron and Steel Industry Waste. Pennsylvania Public Health Association's 2005 Annual Conference.  
October 24, 2005.

Volz, C.D., Lewis, C., Horsch, J.. An Implementation Analysis of a Pittsburgh Based Environmental Asthma Intervention. Pennsylvania Public Health Association's 2005 Annual Conference.  
October 26, 2005.

Volz, C.D., Davis, D., Horsch, J., Domike, S., Ali, R. Use of Conceptual Site Models to Understand Human and Ecological Risk from Legacy Iron and Steel Industry Wastes in the Three Rivers Area of Pittsburgh. Pennsylvania Public Health Association's 2005 Annual Conference.  
October 26, 2005.

Transport and Fate of Air Contaminants in the Monongahela Valley REACH Mon Valley and Clean Water Action.  
November 5, 2005.

T5.5 Balancing worker risk and expedition benefit in a remote environment with uncharacterized hazards: Keeping expedition personnel safe in a risky environment. Gochfeld, M., Volz, D., Jewett,S., Burger, J. T5.3 What geophysical data can tell us about potential exposure pathways. Kosson, D., Unsworth, M., Johnson, M., Barnes, D., Vyas, V., Volz, D. Society for Risk Analysis, Annual Conference, Orlando, Florida.  
December, 2005.

Burger, J., Gochfeld, M., Powers, C., Friedlander, B., Eichelberger, J., Barnes, D., Duffy, L., Jewett, S., and Volz, C. Science, policy, regulators and stakeholders developing a consensus science plan for Amchitka Island, Aleutians, Alaska. Presented at the University of Medicine and Dentistry of New Environmental and Occupational Health Sciences Institute, Environmental Session.  
May 25, 2004.

Burger, J., Meyer, H., Greenburg, M., Gochfeld, M., Powers, C. and Volz, C.D. Ecological risk and conceptual site models where critical risk is offsite for ecological receptors, especially birds: The case of the Department of Energy's Amchitka Island Nuclear Test Site. American Ornithological Union Conference, Quebec City, Canada.

August 15, 2004.

Volz, C.D. Story session and conference paper – Community collaborations in public health: The Pittsburgh PA and Sakhalin, The Russian Republic Experience. A partnership of Magee Women’s International and the University of Pittsburgh’s Graduate School of Public Health. Demonstration of an environmental public health prioritization process international conference of community campus partnerships for health and the network: Towards unity for health (World Health Organization) Atlanta, Georgia.

October 9, 2004.

Volz, C.D. The CRESA Amchitka expedition: A model for multi- and interdisciplinary research into radionuclide contamination interdisciplinary research into radionuclide contamination. NATIO conference on containment of natural and manmade disasters, Kaunas, Lithuania.

August 8-12, 2005.

Volz, C.D. Transport and fate of mercury in the environment. Sierra Club Mercury Meeting, Pittsburgh, PA.

September 27, 2005.

Volz, C.D. Exposure assessment of Pennsylvania communities contaminated by Legacy Iron and Steel (ISI) waste. Collaborative on health and the environment for Pennsylvania and the battle of Homestead Foundation, Homestead Pump House, Homestead, PA.

October 8, 2005.

Volz, C.D. Exposure assessment as the basis for evaluating alternative land use end states in Pennsylvania communities contaminated by Legacy Iron and Steel industry waste. Pennsylvania Public Health Association’s Annual Conference.

October 24, 2005.

Volz, C.D., Lewis, C., and Horsch, J. An implementation analysis of a Pittsburgh based environmental asthma intervention. Pennsylvania Public Health Association’s Annual Conference.

October 26, 2005.

Volz, C.D., Davis, D., Horsch, J., Domike, S., and Ali, R. Use of conceptual site models to understand human and ecological risk from Legacy Iron and Steel industry wastes in the Three Rivers area of Pittsburgh. Pennsylvania Public Health Association's Annual Conference.  
October 26, 2005.

Transport and fate of air contaminants in the Monongahela valley REACH Mon Valley and Clean Water Action.  
November 5, 2005.

Volz, D., Gochfeld, M., Jewett, S., and Burger, J. T5.5 Balancing worker risk and expedition benefit in a remote environment with uncharacterized hazards: Keeping expedition personnel safe in a risky environment.  
Kosson, D., Unsworth, M., Johnson, M., Barnes, D., Vyas, V., Volz, D. T5.3 What geophysical data can tell us about potential exposure pathways. Society for Risk Analysis, Annual Conference, Orlando, Florida.  
December, 2005.

Skopje, Macedonia, NATO Advanced Science Institute. Conceptual models to assist in radionuclide, and toxic and carcinogenic chemical and metal exposure assessment, also Course Co-Director.  
June, 2006.

Volz, C.D. The relationship of land and water management to flood risk and contaminant deposition for weathering the storm: Lessons from the floods, Wyndham Garden Hotel, Pittsburgh, PA.  
September 15, 2006.

Global problems, global solutions, LaRoche College and the Graduate School of Public Health-Environment Presenter-Water Management: The most important public health challenge of the 21<sup>st</sup> Century.  
October 7, 2006.

Volz, C.D. Results of the Pittsburgh fish consumption study of 2005, Water Quality Roundtable. Sponsored by the Heinz Endowments and the Pennsylvania Environmental Council, Pittsburgh, PA.  
March 14, 2007.

Volz, C.D. Liu, Y., and Sussman, N. Dean's Day Student Presentations, First Prize Winner, Dean's Day – Graduate School of Public Health, Pittsburgh, PA.  
March 16, 2007.

Houghton, F., Liu, Y., Price, C.J., Elm, M.S., Donovan, M., Davis, D., Volz, C.D., and Eagon, P. Estrogenicity of tissue extracts from white bass and channel catfish caught along the Three Rivers of Pittsburgh, Pennsylvania. American Association for Cancer Research (AACR), Los Angeles, California, full text. April 17, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., Liu, Y., Davis, D., Donovan, M. and Eagon, P. Pittsburgh Environmental Health Summit, Biomonitoring fishes for estrogenicity, and mercury levels in the Allegheny, Ohio and Monongahela Rivers. Sponsored by EPHT and GSPH, Holiday Inn, Campus, Pittsburgh, PA. April 18, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., El Hefnawy, T., Davis, D., Donovan, M., and Eagon, P. REACH: A new EU approach to chemical safety: Lessons for the United States? A conference on the European Union (EU) regulation providing for registration, evaluation, authorization and restriction of chemicals (REACH): The case of pharmaceutical estrogens and xenoestrogens in combined and sanitary sewer overflow waste streams and wastewater treatment effluent. Sponsored by the University of Pittsburgh European Studies Center and The University of Pittsburgh Graduate School of Public Health (GSPH). June 9, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., El Hefnawy, T., Davis, D., Donovan, M., and Eagon, P. University of Pittsburgh Cancer Institute, Center for Environmental Oncology, Research Meeting, Novel ways to assess estrogenicity in fish and the use of GIS methods to determine proximity to pollution sources. Hillman Cancer Center, Pittsburgh, PA. June 12, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., El Hefnawy, T., Davis, D., Donovan, M., and Eagon, P. University of Pittsburgh Cancer Institute (UPCI) Scientific Retreat, Estrogenicity of channel catfish fillet and dense concentrations of combined and sanitary sewer overflows. University of Pittsburgh, Greensburg. June 15, 2007.

Volz, C.D., Singleton, K. and Rucekova, A. CESRA and the Wolf Creek Water Group. Use of a community based participatory research program in the Grove City area to understand patterns of disease and cancer mortality. Grove City, PA. June 30, 2007.

Volz, C.D. Environmental Public Health Tracking Network, University of Pittsburgh Academic Center for Excellence (UPACE), Advisory Group Meeting. Biomonitoring fishes for exposure assessment and source location purposes:

Examples for mercury, arsenic, selenium and estrogenicity. Graduate School of Public Health, Pittsburgh, PA.

August 8, 2007.

Volz, C.D. Environmental Public Health Tracking Network, Water Committee Task Force. Method to assess left censored or non-detect data. Centers for Disease Control and Prevention, Washington, DC, EPA Headquarters.

August 23-24, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., Davis, D., Donovan, M., El Hafnawy, T., and Eagon, P. Third National Conference on Environmental Science and Technology, Catfish estrogenicity and its association with sewer overflows: Implications for human exposure. North Carolina A&T, Greensboro, NC.

September 13, 2007.

Walters, M., and Volz, C.D. Third National Conference on Environmental Science and Technology, Pharmaceutical estrogens and Xenoestrogens in wastewater treatment plant effluent: Implications for both human and wildlife effects. North Carolina A&T, Greensboro, NC.

September 14, 2007.

Volz, C.D. Lunch & Learn Series: Continuing Medical Education Program – Environmental links to cancer, University of Pittsburgh-Center for Environmental Oncology – Using area fish to aid in pollution source identification and assess human exposure to Xenoestrogens, Mercury and Arsenic. Herberman Auditorium, Hillman Cancer Center, Pittsburgh, PA.

September 17, 2007.

Volz, C.D. The Winchester Thurston School Honors Program, Combined sewer overflows in Pittsburgh, PA and associated water quality threats. The Winchester Thurston School, Pittsburgh, PA.

September 19, 2007.

Volz, C.D. Central Atlantic States Association, Food and Drug Officials: Toxic contaminants in commercial and river caught fish. Pittsburgh Conference, Pittsburgh, PA.

September 25, 2007.

Volz, C.D. Komen Foundation (Race for the Cure) and Heinz Endowments, Local and national water and the estrogenic properties affecting both men and women. Third Annual Health and the Environment Conference, Elk Regional Health System, Women's Health Initiative, St. Mary's, PA.

October 5, 2007.

Volz, C.D., Houghton, F., Sussman, N., Lenzner, D., Davis, D., Donovan, M., El Hafnawy, T., and Eagon, P. Estrogenicity of channel catfish tissue is associated with high densities of sewer overflows in Pittsburgh, PA; Implications for human population exposure to xenoestrogens from drinking water in the Greater Pittsburgh Metropolitan area, Alumni Hall, Pittsburgh, PA. Science 2007, University of Pittsburgh.

October 11, 2007.

Liu, Y., Volz, C.D., Sussman, N., and Sharma, R., Mercury, arsenic and selenium in channel catfish (*Ictalurus punctatus*): Implications for pollution source identification and food safety. Science 2007, University of Pittsburgh, Alumni Hall, Pittsburgh, PA.

October 11, 2007.

Volz, C.D. The Allegheny River Stewardship Project, Three Rivers Water Roundtable, Pennsylvania Environmental Council, Pittsburgh, PA.

October 24, 2007.

Volz, C.D. Community awareness presentation of the Allegheny River Stewardship Project, Alle-Kiski Health Foundation, Heinz Endowments and Highmark Foundation, Pittsburgh Mills Mall, Frazier Township, PA.

October 30, 2007.

Houghton, Frank, Ph.D., Volz, Conrad, DrPH, MPH, Liu, Yan BS Env. Eng., Price, Christopher, Elm, Mary, Davis, Devra Lee, PhD, MPH, Donovan, Maryann, MPH, PhD, and Eagon, Patricia, PhD. Accepted for oral presentation 5041.0: Use of a human breast cancer cell proliferation assay as an exposure assessment tool for total bioaccumulated xenoestrogens in channel catfish (*Ictalurus punctatus*) caught in various locations on the Allegheny, Monongahela and Ohio Rivers near Pittsburgh, PA: Implications for consumption of river-caught fish 2007. American Public Health Association Annual Meeting, Washington, DC. [Full Text](#).

November 7, 2007.

Volz, Conrad, DrPH, MPH, Sussman, Nancy, PhD, Davis, Devra Lee, PhD, MPH, Donovan, Maryann, MPH, PhD, Liu, Yan, BS Env Eng, Brady, Sean, BS, MA, Gainey, Karen, and Zborowski, Jeanne, PhD, MS. Accepted oral presentation 5041.0: Mercury, arsenic and selenium in white bass fillet caught in the Allegheny and Monongahela Rivers near Pittsburgh, PA; Comparisons with store-bought fish from Canadian Lake Erie. American Public Health Association Annual Meeting, Washington, DC. [Full Text](#).

November 7, 2007.

Volz, Conrad, DrPH, MPH, Liu, Yan, BS Env Eng, Sussman, Nancy, PhD, Brady, Sean, BS, MA, Caruso, Paul, Green, Tiffany, BS, Arnowitt, Myron, BA, Peterson, Jim, PhD, Christen, Charles, Med, LPC, Donovan, Maryann, MPH, PhD, Davis, Devra Lee, PhD, MPH, Eagon, Patricia, PhD, McMahon, Kelly, MD, and Sharma Ravi K., PhD, Accepted for oral presentation, 5041.0: Mercury, arsenic and selenium in channel catfish from the Allegheny, Monongahela and Ohio Rivers near Pittsburgh, PA: Implications for metallotoxin source identification and fish consumption by local anglers. American Public Health Association Annual Meeting, Washington, DC. [Full Text](#). November 7, 2007.

Christen, C., Volz, C.D., Caruso, P., Arnowitt, M., Brady, S., Liu, Y., Davis, D.L., and Talbott, E.O. Accepted 5041.0: Results of semi-subsistence and recreational angler focus groups: Reports of combined sewer overflows, chemical releases and associated water-related illnesses in the Three Rivers area of Pittsburgh. Additionally the focus group method shows merit in reporting, often under-reported, gastrointestinal illnesses associated with recreational river water contact. American Public Health Association Annual Meeting, Washington, DC. [Full Text](#). November 7, 2007.

Volz, C.D. Accepted-Session Moderator, Contaminants in Freshwater Fish: Toxicity, sources and risk communication, 5041.0: Chemical contaminants in freshwater fish present potential health risks for subsistence fishers and recreational anglers. Many questions remain, however, about the sources and associated human health risks of those contaminants, their policy implications, and how to communicate risk information to culturally diverse fish-consuming populations. The first presentation in this session reports on the development and evaluation of a fish consumption advisory program, designed to be culturally sensitive for a Native American population. The following four presentations all originate from the comprehensive study in one geographic region, the Pittsburgh Fish Consumption Study. One presentation describes community based participatory research techniques used to understand patterns of fish consumption by semi-subsistence fishers and recreational anglers, and the discovery of unexpected results about the extent of pollution sources and under-reported gastrointestinal illnesses. The findings of fish tissue analyses for metal and xenoestrogen content are reported in the following presentations, with consideration of their broader implications, particularly source identification and health risks. American Public Health Association Annual Meeting, Washington, DC. [Full Text](#). November 7, 2007.

Lenzner, D., Stone, R., Wilson, J., and Volz, C.D. Novel statistical methodologies to determine if channel catfish estrogenicity is higher in areas with dense concentrations of sewer overflows. University of Pittsburgh Cancer

Institute, Center for Environmental Oncology Scientific Research Group Meeting, Hillman Cancer Center.  
January 15, 2008.

Volz, C.D. The Allegheny River Stewardship Project Community Meeting, Crooked Creek Environmental Center, Ford City, PA.  
January 15, 2008.

Volz, C.D. Mercury concentrations in river and store-bought freshwater fish of the same species, Pennsylvania Fish and Boat Commission, Mount Pleasant, PA.  
January 17, 2008.

Volz, C.D. Estrogenicity levels in Three Rivers fish are correlated with high densities of sewer overflows, Pennsylvania Department of Environmental Protection-Emerging Contaminants Forum, Harrisburg, PA.  
January 24, 2008.

Volz, C.D. The tale of two area fish and what they tell us about water quality, Environmental and Occupational Health Departmental Presentation, GSPH-EOH.  
February 7, 2008.

Volz, C.D. The Allegheny River Stewardship Project: How community and non-profit organizations can help, Water Quality Roundtable, Millvale, PA.  
February 27, 2008.

Volz, C.D. Contamination in the Allegheny River Valley-What individuals can do to help, Café' Scientifique, Penn Brewery, Pittsburgh, PA.  
March 3, 2008.

Volz, C.D. Contaminants emitted from electrical generating facilities in Southwestern Pennsylvania, Group Against Smog and Pollution, Rodef Shalom Temple, Pittsburgh, PA.  
March 29, 2008.

Volz, C.D. Earth Day Celebrations, Slippery Rock University of Pennsylvania, Emerging Contaminants and Persistent Organic Pollutants in Southwestern, PA.  
April 26, 2008.

Volz, C.D., 2008 Heinz Women's Health and the Environment Conference Bridging the False Divide Between Ecological and Human Health", Pittsburgh Convention Center, Pittsburgh, PA  
September 25, 2008

### **Presentations Before Academic Appointment**

Health Hazards in the Foundry Industry, Labor Occupational Health Program,

Molders Union, University of California – Labor Occupational Health Program,  
Emeryville, CA.  
September, 1979.

Industrial Hygiene Fundamentals, State Fund Insurance Company  
San Francisco, CA.  
October, 1979.

Industrial Hygiene Community Insights, KRE-KBLX Radio  
Berkeley, CA.  
January, 1980.

Asbestos Health Hazards, East Bay Municipal Utilities District  
AFSCME AFL-CIO, Oakland, CA.  
January, 1980.

Expert Testimony to the California State Senate Education  
Committee, Hearing on 5B 1900 Asbestos Removal in School Buildings.  
April, 1980.

Shipyard Workers Health Education Program Series, Control of Health Hazards,  
East Coast Metal Trades Council, AFL-CIO, Langley Park, MD, Federal  
Employees Metal Trades Council of Long Beach and the Industrial Union of  
Marine and Shipbuilding Workers, Local 9, Wilmington, CA, Federal  
Employees Metal Trades Council of Pearl Harbor, Pearl Harbor, Hawaii.  
The Federal Employees Metal Trades Council of Mare Island, AFL-CIO,  
Valley, CA.  
April 1980 to November, 1980.

Fetal Toxins and Mutagens, National Safety Council, Claremont Hotel,  
Berkeley, CA.  
April, 1980.

Control of Asbestos Exposure, American Industrial Hygiene Association,  
Northern California Section, IH Forum, San Leandro, CA.  
October, 1980.

Hospital Health Hazards, AFSCME AFL-CIO, Honolulu, Hawaii.  
November, 1980.

Occupational Health Study Group, Advisory, Graduate School of Public Health,  
Berkeley, CA.  
Winter, 1980.  
Industrial Health Classes, Guest Lecturer, University of California,  
Berkeley, CA.  
Winter, 1980.

Oil Mist and PCB Exposure, IBEW and IAM, Mare Island Naval Shipyard,  
Metal Trades, Vallejo, CA.  
February, 1981.

Boilermakers Health Education Workshop, Industrial Hygiene and  
Environmental Health, Boilermakers and Blacksmiths Union,  
Oakland, CA.  
March, 1981.

Recognizing Occupational Hazards, Teamsters Work and Health  
Conference, Martinez, CA.  
May, 1981.

Asbestos Demolition Techniques, Engineering Control Procedures and  
Respiratory Protection; Asbestos Forum Basilone Theatre,  
San Francisco, CA. (Sponsored by the National Cancer Institute).  
May, 1981.

Asbestos Removal Techniques, Industrial Hygiene and Construction,  
Cal Safe 82, The Annual California Safety and Equipment Show,  
Marin Civic Center, San Rafael, CA.  
May, 1982.

Health Sciences Instructor, Industrial/Environmental Health Course,  
University of California, Berkeley, CA.  
June, 1982.

Chemical Health Hazards/Toxic Substance Control, Butler County  
Emergency Management Agency, Butler, PA.  
January, 1984.

Asbestos Management, American Institute of Architects (AIA) Annual  
Convention, Dallas, TX.  
March, 1985.

Facility Asbestos Management, Butler Memorial Hospital Employees  
(for emergency), Butler, PA.  
November, 1986.

An Industrial Hygiene Perspective, The Pennsylvania Worker and Community  
Right-To-Know Law, Pennsylvania School Business Officials.  
March, 1987.

The Pennsylvania Community Right-To-Know Law, Southwestern  
Pennsylvania School Business Officials, Washington, PA.

November, 1987.

The Asbestos Hazard Emergency Response Act and EPA Certification Training, Allegheny County Building and Grounds Administrators, Pittsburgh, PA. January, 1988.

The Asbestos Hazard Emergency Response Act (AHERA), Pennsylvania School Business Officials Convention, Seven Springs, PA. March, 1988.

The Asbestos Abatement Project. A Project Management Perspective, Pennsylvania School Business Officials Convention, Hershey, PA. March, 1989.

AHERA Asbestos Designer Certification course for overseas Architects and Engineers, Frankfurt, West Germany (Devised and presented new combination Supervisor/Designer/NIOSH 582 Training Course, sponsored by the U.S. Army Corps of Engineers, Middle East Africa Operations (MEAPO). October, 1989.

AHERA Asbestos Designers Certification Course for overseas Architects and Engineers, Seoul, South Korea, sponsored by the U.S. Army Corps of Engineers and the Department of Defense Dependents Schools (DODDS). February, 1990.

Facility Environmental Control for Architects. Burt Hill Kosar, Rittelmann Associates, Butler, PA; Williams Trebilcock Whitehead, Pittsburgh, PA. Spring, 1990.

The History and Sociology of the Environmental Movement, History and Sociology of Public Health, University of Pittsburgh Medical School, Pittsburgh, PA. April, 1999.

A Chain of Causation, Mexican Environmental Degradation to Mexican Social Problems to Social, Economic and Political Problems for the United States, GSPH, Dean's Day, Celebration of 50<sup>th</sup>. February, 1999.

D. Honors

Omicron Chapter, Delta Omega Honor Society, National Public Health Honor Society, 2006.

3. Service

## **a. University/Institute of Higher Learning**

### Committees Served Within The University of Pittsburgh

GSPH Representative, American Schools of Public Health-Environmental Section (June, September, 2004)

Conference Contributor, Community Campus Partnerships for Health (2004)

GSPH Representative, Pennsylvania Coalition for Interdisciplinary Environmental Policy (PCIEP) (2005)

Disaster Network of Networks, Graduate School of Public Health, University of Pittsburgh, WHO Collaboration Center, Supercourse, Committee Member (2005)

Graduate School of Public Health, University of Pittsburgh, Planning Committee, Member for the Ivan Flood Symposium (2005)

Conference Organizer and Participant, European Union and North American Conference on Indoor Air Quality, Graduate School of Public Health and Graduate School of Public and International Affairs, University of Pittsburgh (2005)

May-Advisory Board, University of Pittsburgh, School of Law, Journal of Environmental Law and Policy (2005 – 2007)

January – Dean’s Day Committee, Graduate School of Public Health, Committee Member (2005)

June – Institute of Politics, University of Pittsburgh, Environmental Committee, Committee Member (2005 – Present)

Institute of Politics, University of Pittsburgh, Sub-Committee on Water Quality in Southwestern Pennsylvania , Committee Member (2005 – Present)

Flood Symposium Planning, Primary Prevention Specialist – Development and Effect on Water Quality and Flood Risk, Center for Public Health Preparedness, Center for Public Health Practice, Graduate School of Public Health, University of Pittsburgh, Planning Committee, Member for the Ivan Flood Symposium (2006)

Conference Planning Committee/Organizer, Pennsylvania Asthma Summit CDC/PADOH, Graduate School of Public Health (August, 2004)

Graduate School of Public Health, New Students Plunge (August 2008)

Committees Served Outside The University of Pittsburgh

Advisory Board/Healthy Homes Resources, Asthma and Lead-Environmental Health Advisor (2004-Present)

May-Member and Environmental Sub-Section Member, Pennsylvania Public Health Association (2005)

Advisory Board Water Quality Management, Allegheny County Health Department, Environmental Capacity Building Workshop/CDC (May, 2005)

September-Chair, Nine Mile Run Watershed-Social/Ecological Evaluation Committee-Nine Mile Run Watershed Association, Supported by the Heinz Endowment (2005)

December-Scientific Advisory Chair, The Collaborative on Health and Environment Pennsylvania, CHE-Penn (2005)

February-May-Expert Review Panel, Heinz School-Department of Engineering and Public Policy, Capstone Project-Measurement of Environmental Justice Issues in Allegheny County (2006)

Conference Contributor, Community Campus, Partnerships for Health, Member (2004 – 2006)

Act 48 Planning Committee, Alle-Kiski Health Foundation, Natrona Heights, PA (2008-Present)

Other Services Outside the University of Pittsburgh

Testimony – Pennsylvania Scientists, Health Care Professionals Join Call for State Regulations on Toxic Mercury Pollution; for Penn Future in support of state-specific mercury pollution rule proposed by the State Department of Environmental Protection (DEP). Volz, C.D.  
June 6, 2006.

**b. Editorial Boards, Editorships**

<b>Journal Title</b>	<b>Position</b>	<b>Organization</b>
Strengthening national public health preparedness and response for chemical, biological, and radiological agent threats: Springer-NATO Advanced Science Institute Series, IOS Press – Nieuwe 6B, 1013 BG Amsterdam, Netherlands, July 2007.	Editorial Board	North Atlantic Treaty Organization, Security Through Science

**c. Manuscript and Other Document/Publication Review**

<b>Journal Title</b>	<b>Number of Manuscripts</b>
Environmental Research 2007-2008	3
GENDER IN TOXICOLOGY SPECIAL ISSUE of Environmental Research. Editor Michael Gochfeld, MD, PhD. 2007	3
Book Title-Springer Publications, Proceedings of the 3 <sup>rd</sup> Annual Conference on Environmental Science and Technology 2007-2008	3

**d. Study Sections, Review Panels, and Related Advisory Boards**

Environmental Public Health Tracking Network (EPHT) CDC, EPA-Water Working Group 2007-2008	Member
EPHT, CDC-EPA Water Group-Arsenic in Water Subgroup 2007-2008	Member
EPHT, CDC-EPA Water Group- Censored Data Analysis Group 2007-2008	Chair

**e. Service to Governmental and Other Public Organizations**

Testimony – Presented by Steffi Domike, Coordinator of the Collaborative on Health and the Environment in Pennsylvania (CHE-Penn) and Conrad D. Volz, DrPH, MPH, Testimony to EPA hearing on Particulate Pollution and Environmentally Induced Asthma. March 8, 2006.