

## **Introduction**

“Requests for a moratorium on the use of fly ash for reclamation, in effect, seek protection from a danger that does not exist.”

Pennsylvania Joint Legislative Air and Water Pollution Control and Conservation Committee in its Report on the Use of Fly Ash in Mine Reclamation Projects, February 5, 2004

The goal of this report is to assess the monitoring data of groundwater and surface waters downgradient of coal combustion waste (CCW) mine placement sites in Pennsylvania to determine whether increases in contaminant concentrations may be attributed to CCW placement. The CCW involved is composed of fly ash and bottom ash generated by conventional pulverized coal power plants and fluidized bed combustion power plants.

To understand the potential for CCW to degrade groundwater and surface waters in Pennsylvania coal mines, this report reviews research documenting environmental harm and the potential for harm from CCW (Chapter 1). Also included in Chapter 1 is a discussion of the geology and hydrology of coal mines where the CCW is being placed and the chemical makeup of the CCW minefilled in Pennsylvania. Chapter 2 describes the methodology used to examine minefill permits, explains the presentation of the data in this report and summarizes the results of site examinations. The backbone of the report, Chapters 3, 4, and 5, examines groundwater and surface water monitoring data collected at 15 CCW minefills to discern trends in concentrations of contaminants and thereby measure the effects of ash on water quality.

Chapters 3 through 5 address 12 CCW minefill permits in the bituminous coalfield of western Pennsylvania and three in the anthracite coalfield of eastern Pennsylvania. The manner of placement, geology and water movement at each site is discussed. A map depicts the ash placement area, direction of relevant water flow and locations of ash monitoring points for which data are examined. Concentrations of major elements, including iron, manganese and sulfates, and trace metals, primarily arsenic, selenium, cadmium, and lead, are graphed as a function of time at upgradient and downgradient ash monitoring points. Additional “ash parameters” such as calcium, magnesium, chloride, sodium and others are also assessed and graphed as well as major parameters such as Total Dissolved Solids, specific conductance, acidity, alkalinity and pH. Trend lines in these graphs depict increases or decreases in average concentrations of contaminants. Loading data were also analyzed and plotted at seven sites.

Monitoring data for nearly all (14 of the 15) permits reviewed indicate sustained increases in contaminant concentrations downgradient of ash placement areas after that placement began. Chapter 3 describes 10 mine sites where the data indicate that degradation occurred partially if not primarily as a result of ash placement. Chapter 4 describes three sites where degradation occurred but available data were not sufficient to

draw conclusions regarding the impact of ash on water quality. Chapter 5 describes two CCW minefills where water quality improved, at least in part, after ash placement.

Deficiencies of the Pennsylvania CCW beneficial use program became evident through the research and analysis of these mine sites. Many of these deficiencies are systemic and result from failures of the Pennsylvania regulatory program. Chapter 6 of this report discusses these deficiencies, including the failure of the Pennsylvania program to require (1) adequate waste and site characterization; (2) isolation of the waste to avoid contamination ; (3) long term, effective groundwater monitoring; (4) corrective action when degradation is discovered; and (5) sufficient financial assurance to address contamination of water resources. The researchers also discovered serious administrative deficiencies. In several cases significant data gaps in state permit files made it difficult or impossible to determine trends for ash contaminants at ash placement sites.

Lastly, Chapter 7 summarizes the results and conclusions of this report and presents recommendations for improvement of the Pennsylvania coal ash minefill program. Following Chapter 7, the reader will find three useful appendices: Appendix 1, which describes the Pennsylvania regulatory scheme governing beneficial use of coal ash in mines, Appendix 2 which includes the monitoring data graphed in the figures in the site examinations in Chapters 3, 4, and 5, and Appendix 3 which includes the tabulations of monitoring points and data from the each site that are summarized in Tables 2, 3 and 4 in Chapter 2.

In sum, this report presents valuable data and important recommendations concerning the placement of coal ash in mines. Yet this inquiry into the impact of CCW minefilling on Pennsylvania waters has only scratched the surface. It is the intention of the authors that this report be a beginning and not an end. It is our goal that the findings of this report launch a larger and more thorough investigation into the science, law, and policy governing this potentially damaging practice. The health of coalfield communities and their water resources depend on the open and honest assessment of the environmental impact of placing coal combustion waste in mines.