

Underground Injection of Coal Slurry

A fact sheet prepared by the Sludge Safety Project

Overview

- The practice of injecting coal slurry into abandoned underground mines has increased significantly since the 1980s.
- Recently, coalfield residents in areas near coal slurry injection points have reported that their water wells have become contaminated as a result of the injection of coal slurry.
- Coalfield residents believe the contaminated well water has created health problems, including cancer, skin rashes, and kidney and liver ailments.
- A preliminary study by Wheeling Jesuit University researchers indicates significant metals contamination in areas near coal slurry injection points, specifically in the area of Sprigg, Merrimac, Rawl, and Lick Creek near Williamson, West Virginia. These levels are at concentrations well beyond what is safe in a water supply source.
- A vast array of chemicals, including known carcinogens, is used in the coal prep process. Yet there are no adequate studies documenting the contents of coal slurry.
- The National Academy of Sciences has recommended that research be performed to identify the chemical constituents contained in the liquid and solid fractions of coal waste, and to characterize the hydrogeologic conditions around impoundments.
- Dry alternatives to liquid coal prep processing do exist and are in use by the industry elsewhere.
- Given all the information above, we ask that the Legislature help fund and oversee a three-part independent scientific study to determine: 1) The extent of ground water contamination caused by the underground injection of coal slurry in West Virginia; 2) A comprehensive delineation of the contents of the slurry material being injected; and 3) An analysis of impacts from the underground injection of coal slurry to human health and safety.
- Further, we recommend that until such time as the above studies are complete, the Legislature impose a moratorium on any new coal slurry injections permits and promptly begin to phase out all existing permits.

What is Coal Slurry?

To prepare (prep) coal for market, some companies wash the coal with chemicals and water. The prep plants use some of 60 different additives for washing coal, such as flocculants and surfactants. However, little is known about many of the chemicals used.

The coal prep process separates non-combustible materials from the coal. The non-combustible material or refuse is stored either in impoundments or injected underground. Larger, coarse refuse often is used to build dams for coal waste. And finer refuse, called slurry, is stored behind the dams, or is injected into underground mined-out coal seams.

Slurry contains the prep plant chemicals, heavy metals, and other chemicals naturally present in coal, such as arsenic, mercury, chromium, cadmium, boron, selenium, and nickel.

Note that dry methods of processing coal for market do exist—methods that do not use chemicals and water. Dry prep processes do not produce slurry.

(See www.sludgesafety.org/what_me_worry/coal_slurry_chemicals.html for a listing of *some* of the chemicals prep plants use.)

Underground Injection of Coal Slurry

Underground injections of coal slurry into old mines have been recorded since the 1980s. The West Virginia Department of Environmental Protection's (DEP) Division of Water and Waste Management, through its groundwater unit, funds and oversees the Underground Injection Control (UIC) office. Just one employee oversees all coal-waste-injection permitting for the state. The Division of Water and Waste Management will run out of funding by 2010.

Since 2000, DEP has documented more than 400 injections into underground mines. We have no idea how many injection points there were prior to that date. In the coalfields, coalfield residents believe illegal, non-permitted injection sites have existed as far back as the 1960s. Injection wells can be constructed within a matter of hours and are easy to cover up in less time. They can exist anywhere on a mine site.

DEP's UIC office is understaffed and under-funded. Enforcement of UIC regulations relies on coal companies to monitor their own impact and to report to the UIC program what they are pumping underground. There is no independent verification of the data or conditions around injection sites.

Why is a Coal Slurry Underground Injection Study Needed?

DEP complaint logs show residents in coal mining areas across the state have called in concerns about their well water. For instance, more than 200 families living near Williamson in Mingo County believe the injected slurry has made its way into their well water. One prep plant in the area has injected billions of gallons of coal slurry over the years. These families believe the contaminated well water has created health problems, including cancer, skin rashes, and kidney and liver ailments. People often report blackened or orange water coming from wells that used to be clean. Their water stinks and feels greasy. High levels of arsenic, lead, and manganese are just a few of the heavy metals that researchers have found in the wells.

In 2004, researchers from Wheeling Jesuit University sampled 15 area wells for assorted heavy metals. A paper, titled "Well water quality in the vicinity of a coal slurry impoundment near Williamson, West Virginia," by Dr. Ben M. Stout III, Ph.D. and research assistant Jomana Papillo, explains:

Wells in the area of Sprigg, Merrimac, Rawl, and Lick Creek near Williamson, West Virginia, reportedly had good quality water approximately 10-15 years prior to this study. More recently, households consistently reported periodic "blackwater" events in their well water, fixtures that corroded within 2 years, red and black stains on their porcelain, walls, clothing and dishes, and health problems including cancer and kidney stones. This study focused on 7 heavy metals regulated by Environmental Protection Agency primary drinking water standards, and 5 metals regulated by secondary standards...

...The information presented here indicates significant metals contamination at concentrations well beyond what should be used as a water supply source. Additional studies are required to determine the exact source of contamination.

Based on the results of this study a thorough and comprehensive assessment of the relationship between well water quality and human health is warranted in the area of Sprigg, Merrimac, Rawl, and Lick Creek near Williamson, West Virginia.

Underground slurry injections are not only a concern in Mingo County, as coal slurry has been injected underground in coal-mining counties across the state. Natural fractures in rock formations could provide pathways for slurry to move between rock strata and into drinking water aquifers. Blasting associated with

surface mining activity, and longwall and other deep mining activity could also alter rock strata so that slurry could move from its injection points into underground aquifers.

The reality is that no one knows how much of West Virginia's priceless groundwater has already been contaminated by the toxins in coal slurry. To continue such a practice without all the facts threatens the health and safety of people living near these injections. There are an estimated half million people in the state (28%) relying exclusively on groundwater.* In Mingo county 61% of the population relies on private wells for their domestic water supply. (*USGS. Estimated Use of Water in the United States in 2000. Table 6--Self-supplied domestic water withdrawals, 2000. (10/9/05) <http://pubs.usgs.gov/circ/2004/circ1268/htdocs/table06.html>)

Enforcing 40 CFR 144.12(a) is difficult without knowing what slurry contains, and how it might be potentially interacting with aquifers, rock minerals and rock strata. You can't enforce drinking water standards if you have no data.

Furthermore, while reserves of clean freshwater are shrinking globally, the water market is growing. Sludge injections may literally be contaminating a future economic opportunity for West Virginia.

Right now, we do not know what is in the coal slurry injected underground. Sampling and analysis of slurry would help citizens know just what is in the slurry that is apparently making its way into drinking water.

Our Request

Given the evidence already collected regarding coal slurry injection, groundwater contamination and subsequent negative human health effects, members of the Sludge Safety Project urge the Legislature to help fund and oversee a three-part independent scientific study to determine: 1) The extent of ground water contamination caused by the underground injection of coal slurry in West Virginia; 2) A comprehensive delineation of the contents of the slurry material being injected; and 3) An analysis of impacts from the underground injection of coal slurry to human health and safety. Further, members of the Sludge Safety Project request that members of the Legislature act with the Precautionary Principle in mind: Until such time as studies on underground coal slurry injection are completed and analyzed for human health and safety effects, the Legislature should place a moratorium on any new coal slurry injection permits and promptly begin to phase out all existing permits.

The West Virginia Environmental Council assisted in the preparation of this presentation.

More...

Chemicals Found in Coal Sludge

Chemicals Found in Coal.

Aluminum; Antimony; Arsenic; Barium; Beryllium; Cadmium; Calcium; Chromium; Cobalt; Copper; Iron; Lead; Magnesium; Manganese; Mercury; Molybdenum; Nickel; Potassium; Selenium; Silver; Sodium; Strontium; Tin; Vanadium; Zinc.

Chemicals Used to Wash Coal.

Aniline; Acenaphthene; Aenaphthylene; Anthracene; Benzidine; Benzo(a)anthracene; Benzo(a)pyrene; Benzo(b)fluoranthene; Benzo(ghi)perylene; Benzo(k)fluoroanthene; Benzyl alcohol; bis(2-ethylhexyl)phthalate; bis(2-chloroethoxy)-methane; bis(2-hloroethyl)ether; bis(2-chloroisopropyl)ether; Butyl benzyl phthalate; Chrysene; Dibenzo(a,h)anthracene; Dibenzofuran; Dibutyl phtalate; Diethyl phthalate; Dimethyl phthalate; Dioctylphthalate; Fluoranthene; Fluorene; Hexachlorobenzene; Hexachloroethane; Indeno(1,2,3-c,d)pyrene; Isophorone; N-Nitrosodi-n-propylamine; N-Nitrosodiphenylamine; Naphthalene; Nitrobenzene; Phenanthrene; Pyrene; Suspended Solids; Acrilamide; Hexachloro-1,3-Butadiene; Hexa-Cl-1,3-Cyclopentadiene; 1,2,4-trichlorobenzene; 1,2-Dichlorobenzene; 1,3-Dichlorobenzene; 1,4-Dichlorobenzene; 2,4-Dinitrotoluene; 2,6-Dinitrotoluene; 2-Chloronaphtalene; 2-Methylnaphtalene; 2-Nitroaniline; 3-3'-Dichlorobenzidine; 3-Nitroaniline; 4-Bromophenyl phenyl ether; 4-Chloroaniline; 4-Chhlorophenyl phenyl ether; 4-Nitroaniline;

Specific Elements and Compounds

Source: Kentucky Division of Water. DOW-DES Analytical Data File.

Electronic File: [Martin Co.Coal.Co.Slurry Release Data.xls](#)

Also see http://www.sludgesafety.org/what_me_worry.html.