POLLUTION UNCHECKED

A Case Study of Greene County, Pennsylvania

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Monongahela Riverkeeper is sponsored by the Monongahela River Society, a small nonprofit organization focused on issues related to the quality of public drinking source water and the impact of pollution on public health. For additional information, please contact the Monongahela River Society at 28 Church Street, Waynesburg, PA 15370.

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EXECUTIVE SUMMARY

Greene County, a predominantly low-income Appalachian community in the southwestern corner of Pennsylvania, suffers from serious air and water pollution. A variety of sources, including abandoned mining sites and two major Allegheny Energy power plants, release large quantities of pollutants into the environment. The U.S. Environmental Protection Agency (EPA) has already designated Greene County as an unhealthy air area (non-attainment area) due to ozone pollution and has also proposed designating Greene County as a non-attainment area for particulate matter pollution. Cancer rates in Greene County are substantially higher than state and national averages. Despite the obvious health risks county residents face, state and federal officials have repeatedly allowed inadequate monitoring of air and water pollution and have made no significant effort to collect data on possible health effects linked to pollution in Greene County. The problems NRDC uncovered in Greene County, while perhaps extreme, are not unique; residents in other parts of Pennsylvania and the Appalachian region face similar issues. The county's problems illustrate substantial shortcomings in state and federal regulatory programs and enforcement, some of which may plague many other communities in the nation.

Working in cooperation with, and at the request of, the Pennsylvania Environmental Council (PEC) and local citizens, NRDC launched an investigation to determine the extent of pollution problems in Greene County. This report details the results of NRDC's extensive examination of government documents and computer databases.

HEALTH EFFECTS OF POLLUTION

Many of the air and water contaminants to which Greene County residents are exposed pose known health threats. For example:

- Arsenic, found in much county tap water, causes bladder, lung, and other cancers.[1]

- Ozone in the county's air makes it hard for some people to breathe. Children, the elderly, people with asthma or other lung ailments, and those who work or exercise regularly outdoors are most susceptible to ozone. It can permanently harm the lungs,[2] and recently has been linked to certain birth defects.[3]

- Particulate matter (PM) in polluted county air can aggravate asthma, increase respiratory symptoms like coughing and painful breathing, cause chronic bronchitis and decreased lung function, and can trigger premature death.[4]

- Sulfur dioxide (SO_2), one of the principal pollutants released by power plants, is associated with low birth weight and the onset of asthma attacks.[5]

- Bacteria and parasites in drinking water or recreational water can cause gastrointestinal disease, vomiting, diarrhea, and in vulnerable people, serious infections and even death.[6]

- Manganese, found in much county tap water, has been linked with neurological and cognitive impairments.[7]

▸ Beryllium, pumped into the county air in large quantities by local power plants, can cause lung damage and is a "probable human carcinogen," according to the EPA.

Based upon the limited available data, it has been projected that nearly all 40,000 county residents face a pollution-related cancer risk greater than 100 times the goal set by federal policy (one in 1 million lifetime cancer risk).[8] In fact, Greene County was ranked as one of the "dirtiest/worst counties in the United States" (worst 10 percent) based on total environmental releases, cancer risk, and non-cancer risk.[9] The extent of the pollution also raises concerns about children's health and development in the county and surrounding areas. As noted above, prenatal exposures to pollutants such as ozone are suspected of causing birth defects, while others, such as manganese, are associated with delayed psychomotor development in children.[10]

AIR POLLUTION

Hatfield's Ferry and Fort Martin power plants are the most significant local sources of air pollution in Greene County—Hatfield's Ferry is the second largest air polluter in Pennsylvania.[11] Both plants have a history of regulatory compliance problems stretching back over 30 years.

Greene County was ranked as one of the "dirtiest/worst counties in the United States."

Annually, the two plants release approximately 99 million pounds of nitrogen oxides and 511 million pounds of sulfur oxides into the air. In 2001, Hatfield's Ferry was the largest source of SO_2 in the United States.[12]

In addition, both plants emit millions of pounds of heavy metals and other toxins into the air. In 2002, Hatfield's Ferry was responsible for more than half of the entire state's air emissions of the dangerous metal beryllium. The plant pumped more than 3,900 pounds of arsenic into the air in 2002—21 percent of the state's air emissions of arsenic. The Fort Martin plant self-reported 210 pounds of arsenic emissions to the air in 2002.[13]

Other significant toxic releases included barium, chromium, cobalt, copper, dioxin, hydrochloric acid, hydrogen fluoride, lead, manganese, mercury, nickel, selenium, sulfuric acid, vanadium, and zinc. However, the county's only ambient air quality monitoring station does not test for any of these hazardous air pollutants, so actual exposure data for residents are nonexistent. NRDC discovered that both power plants also have violated opacity standards on numerous occasions—an indication of PM pollution.

DRINKING WATER RISKS AND WATER POLLUTION

Spotty compliance records and detections of contaminants in public drinking water supplies also pose health concerns.[14] Two local water supplies have been found to contain arsenic, a potent cancer-causing agent, at levels up to three times higher than the EPA's new 10 parts per billion (ppb) standard (which becomes enforceable in 2006).[15] The risk of dying from cancer from drinking water containing this level of arsenic for a lifetime, according to National Academy of Sciences estimates, is about 1 in 100.[16] Some local water systems also have failed bacteria, filtration, or other drinking water requirements. In one instance, water authority employees found rat remains clogging a customer's water meter and tap.

It is not possible to pinpoint with certainty the source of the arsenic in local water supplies, but it is a concern that in 2002 the Hatfield's Ferry power plant released or transferred 15,000 pounds of arsenic to land.[17] It also is a concern that high levels of arsenic and certain other heavy metals and other inorganic constituents that are fingerprints for coal waste or coal ash have been found in groundwater and surface water at or near the two big power plants, and that discharges from the two plants sometimes contain metals at elevated levels. Furthermore, certain abandoned mine discharges in Greene and neighboring Fayette counties have been found to contain elevated arsenic concentrations. Again, there are major gaps in the discharge monitoring, groundwater monitoring, and monitoring of the Monongahela and its tributaries in the Greene County area. Even so, NRDC has uncovered numerous violations of water permits from power plants and other pollution sources.

Other environmental pollution sources in Greene County include:

- contamination from abandoned and active coal mines;
- "wildcat sewers" that discharge untreated sewage into the Monongahela and its tributaries immediately upstream of Greene County water supply intakes;
- hazardous waste disposal areas;
- other upstream or upwind pollution sources.

Despite the numerous violations NRDC uncovered in state records, enforcement has been weak to nonexistent.

INADEQUATE MONITORING AND ENFORCEMENT

Our detailed review has shown that despite the potential health risks due to pollution, state and federal officials have repeatedly allowed monitoring waivers or insufficient testing for air and water pollution in Greene County. County air pollution is monitored at only one site and only for three pollutants, and monitoring for many air and water pollutants at the big power plants is infrequent or nonexistent. Moreover, water quality testing of the Monongahela River, its tributaries, and recharging groundwater is rare and generally ignores key contaminants. In addition, Pennsylvania Department of Environmental Protection (PA DEP) officials have waived many drinking water safety monitoring requirements for Greene County water utilities, such as tests for arsenic, pesticides, and many industrial chemicals, in a manner that NRDC believes is unlawful—using a statewide blanket waiver that allows most utilities to test for many contaminants only once every nine years. This virtually guarantees that the extent of local tap water contamination is poorly understood, and that local citizens are not informed of potentially risky contaminants in their water. And despite the numerous violations NRDC uncovered in state records, enforcement has been weak to nonexistent.

In addition, NRDC found no substantial effort by government officials to collect direct data on possible health effects linked to pollution in the county. The overall cancer rate, and the rate of certain cancers such as lung cancer, are higher in Greene County than statewide or nationally, though making any link to environmental causes would require further study. Better data will be crucial in order to identify possible disease clusters and to track the progress of environmental and health protection efforts.

Recommendations

The problems identified in this report are not exclusive to Greene County. Contaminated mine drainage from both active and abandoned coal mines, air emissions from highly polluting power plants, hazardous waste sites, wildcat sewers, and other pollution sources found in Greene County are also present in many other areas of Pennsylvania and the region. So are many of the deficiencies in state activities identified in this report: inadequate monitoring of air and water quality, poor enforcement of clean air and clean water laws, and insufficient collection of data on the health effects of environmental contamination. Therefore, the recommendations outlined here are applicable to other areas of the state.

Monitoring and Health Tracking

▶ State DEP officials and local water utilities should assure that there is routine monitoring of microbial contaminants, arsenic, and other heavy metals indicative of mine discharge or power plant waste in ambient water in the Monongahela and at drinking water intakes.

▶ Monitoring for arsenic and other toxic metals is needed in the tributaries and groundwater that drain coal ash dumps, coal ash minefills, and mine drainage areas.

▶ The PA DEP should revoke the nine-year monitoring waivers for Greene County and other water systems, particularly for contaminants often found in mine discharges, as well as discharges and runoff from coal ash ponds, landfills, and minefills.

▶ The Pennsylvania and West Virginia DEPs should strengthen the National Pollution Discharge Elimination System (NPDES) permits and the ash disposal landfill permits for power plants by requiring comprehensive, at least monthly monitoring of arsenic, heavy metals, and other hazardous constituents of coal ash at all outfalls and in nearby streams and groundwater.

▶ The existing ambient air quality monitoring station in Holbrook should be improved to test for a wider array of air pollutants, including PM and high-volume power plant pollutants like arsenic.

▶ At least one additional ambient air quality monitoring station should be established near the Hatfield plant in the prevailing downwind direction. It should monitor for all criteria pollutants and for key hazardous pollutants emitted by the power plant.

▶ The EPA should review the adequacy and legality of state monitoring and permit requirements, such as Pennsylvania's widespread use of nine-year monitoring wavers and extremely limited NPDES and air monitoring.

▶ A citizen monitoring campaign for the Monongahela should be developed. NRDC is prepared to work with PEC and others to pinpoint monitoring locations and parameters.

▶ Local and state officials should develop a significantly improved public health tracking system (including asthma, birth defects, and other health data) to evaluate the health status of Greene County and other state residents who may be affected by pollution and other health threats.

Stronger Permits

▶ The Pennsylvania and West Virginia DEPs should establish strict permit limits for arsenic and heavy metal air emissions and water discharges at the Hatfield and Fort Martin plants.

▶ The PA DEP should impose strict, enforceable limits on groundwater contamination and surface water runoff from the residual waste landfill at Hatfield for heavy metals, including arsenic and other hazardous contaminants like boron, manganese, and molybdenum.

▶ A comprehensive state review of the adequacy of the ash disposal permits is needed at both the Fort Martin and Hatfield's Ferry plants to ensure that groundwater and surface water contamination with heavy metals and other contaminants, as well as fugitive emissions, is fully controlled.

▶ The PA DEP should conduct a system-wide review of the residual waste permits at coal-fired power plants to ensure that similar deficiencies are not threatening other drinking water sources with contamination from coal ash.

▶ The EPA should review the adequacy of state NPDES permits and residual waste handling requirements.

Enforcement

▶ Pennsylvania officials should follow through on the threatened air pollution lawsuits against the Fort Martin and Hatfield's Ferry power plants.

▶ Pennsylvania and West Virginia DEP officials should swiftly punish all permit and clean air and water rule violations by Allegheny Energy power plants.

▶ Pennsylvania and West Virginia officials should conduct a comprehensive compliance audit of the two big Allegheny Energy power plants, release the results, and bring enforcement action to address additional discovered violations.

▶ The EPA should implement a vigorous New Source Review rule and enforcement program to address power plant pollution.

Citizen Involvement

▶ Citizen groups at the local, state, and national level should cooperatively set up an extensive citizen monitoring effort for the Monongahela and key tributaries in Greene County.

▶ Citizen groups, such as the Monongahela Riverkeeper, PEC, and other local organizations, should be supported in efforts to aggressively oversee government and polluter monitoring of local air and water pollution, discover (and if necessary enforce against) violations, and conduct citizen monitoring.

▶ Citizen groups also should receive support to educate local and regional media, local, state, and federal officials, and Greene County and other citizens about the extent of the environmental health threats in the county, and what can be done about them.

▶ Local, statewide, and national citizen groups should develop an aggressive public education and advocacy campaign to assure that environmental rules are met and polluters clean up.

▶ Citizen groups should consider petitioning the DEP for stronger permit requirements for Fort Martin and Hatfield, including more comprehensive monitoring and strict discharge limits, and for an examination of other coal-fired power plants to uncover similar permitting problems.

▶ Citizen groups should consider initiating citizen suits against the Fort Martin and Hatfield's Ferry plants for air, water, and solid waste rule and permit violations if the states fail to do so or do not aggressively prosecute enforcement cases.

CHAPTER 1

Overview of Greene County

Nestled in the heart of Appalachia, in the southwestern corner of Pennsylvania bordering West Virginia, Greene County is a predominantly low-income rural county with about 40,000 residents and 16,600 housing units. According to the 2000 Census, the per capita income in the county, $14,959, is far below the state average of $21,000; the poverty rate (16 percent) is substantially higher than the state average (11 percent); and the median county home is worth $59,600, about half the state median.[18]

Greene County stands out among other counties in the United States for the amount of toxic pollution threatening the health of county residents. Greene County figured in the top 2 percent of counties in the United States for total air emissions of toxic contaminants in 2002, with 7.2 million pounds, ranking 38th among the 2,260 counties where air emissions were reported.[19] As one of the country's top coal producers, Greene County also suffers from water quality problems caused by over a century of surface and deep coal mining, with contaminated drainage from active and abandoned mines causing widespread pollution of groundwater and surface water. In addition, millions of tons of coal ash from two power plants (Hatfield's Ferry in Greene County and Fort Martin in Maidsville, West Virginia) have been dumped in landfills and surface mines in Greene County and its vicinity over nearly four decades, becoming a major source of contamination with heavy metals and other toxic substances. Much of this pollution eventually enters the Monongahela River, which supplies most of the drinking water for county residents.

Cancer statistics show a marked difference between Greene County and the rest of the country. Cancer incidence and mortality rates are 8.8 and 8.1 percent higher, respectively, than U.S. rates. Although differences in cancer rates between Greene County and the state of Pennsylvania are not as striking, they still compare unfavorably to state rates. Cancer incidence in the county is 2.7 percent higher, and cancer mortality is 4.3 percent higher than in the state at large.[20] So far, there has been no significant effort by health authorities to determine how environmental factors may be influencing cancer rates, or to track the incidence of other diseases that may be caused or aggravated by exposure to environmental pollutants. The current shortage of primary care physicians in Greene County also raises concerns that residents may not be able to obtain good quality health care in a timely manner.[21]

ENVIRONMENTAL FACTORS AFFECTING GREENE COUNTY

Greene County residents are exposed to air and water pollutants that have been scientifically linked to known health threats, including cancer, asthma and other respiratory diseases, heart attacks, and a variety of other health consequences. The arsenic found in much county tap water, for example, is known to cause bladder and lung cancer,[22] and ozone causes respiratory problems, especially in children, the elderly, people with asthma or other lung ailments, and people who spend a lot of time outdoors.[23] Particulate matter aggravates asthma, causes coughing and breathing difficulty, chronic bronchitis, and can cause premature death.[24] Parasites in tap water or recreational water can cause vomiting, diarrhea, and in people with compromised immune systems, serious infections and even death.[25]

NRDC has been unable to discover any serious effort by local, state, or federal government officials to collect data on the possible health effects linked to pollution in the county. However, there are reasons for concern. For example, according to National Cancer Institute data, the annual cancer death rate in Greene County from 1998 to 2001 was 216 deaths per 100,000 people and has been rising in recent years.[26] Greene County's cancer death rate is higher than the state average (207.1), and significantly above the national average (199.9), placing it in the worst 10 of Pennsylvania's 67 counties. Similarly, the cancer incidence rate in Greene County in the period from 1998 to 2000 was 505.1 cases per 100,000 people, also significantly higher than the U.S. rate of 464.2 and the state rate of 491.7. Additional study would be needed to establish whether environmental factors are contributing to this higher cancer rate.

Greene County has a lung cancer incidence and death rate that is much higher than average Pennsylvania or U.S. rates (Table 1). In fact, Greene County ranks third among Pennsylvania's 67 counties for lung cancer incidence, and fourth for lung

TABLE 1
Comparison of Cancer Rates

	INCIDENCE (PER 100,000 PEOPLE) 1998–2000			DEATHS (PER 100,000 PEOPLE) 1997–2001		
Cancer site	**Greene County**	**Pennsylvania**	**United States**	**Greene County**	**Pennsylvania**	**United States**
Bladder	23.1	24.8	21.5	3 or fewer	4.7	4.4
Breast	118.3	132.4	128.9	26.0	28.8	27.0
Cervix	5 or fewer	9.3	9.2	3 or fewer	2.9	2.9
Colon and rectum	**69.1**	62.4	54.6	20.0	23.4	20.8
Kidney and renal pelvis	Not available	13.3	12.0	3 or fewer	4.3	4.2
Lung and bronchus	**86.0***	69.2	67.4	**66.2****	56.2	55.7
Non-Hodgkin's lymphoma	Not available	19.9	18.1	6.4	8.9	8.4
Prostate	**216.4**	166.8	160.4	19.4	31.8	31.5
Stomach	5 or fewer	7.9	7.3	3 or fewer	4.6	4.7
All cancers	**505.1**	491.7	464.2	**216.0**	207.1	199.8

Source: National Cancer Institute, *State Cancer Profiles*

Bold indicates rates higher than state and national averages.

*The lung cancer incidence rate places Greene County in 3rd place among the 67 PA counties.
**The lung cancer death rate places Greene County in 4th place among the 67 PA counties.

cancer deaths. Again, additional study is needed to determine what, if any, environmental contribution there is to the county's lung cancer rate. Other potential confounders, such as smoking rates, must be assessed, but the Pennsylvania Department of Health has reported that the percentage of smokers in this area is not significantly different from the rest of the state.[27]

Greene County also has a much higher rate of prostate cancer than the United States or the state of Pennsylvania, although the death rate from this type of cancer is lower. The incidence of cancer of the colon and rectum is also higher in Greene County. Lung, prostate, and colorectal cancer appear to be the main contributors to the higher overall cancer rate. Although the county tends to have lower rates of several other types of cancer than the rest of the state or the United States as a whole, it is still falling far short of the goal of the U.S. Department of Health's *Healthy People 2010* program to reduce the overall cancer death rate to 159.9 by the year 2010.[28]

Greene County residents are exposed to a wide variety of air and water pollutants, and the overall county cancer rate is substantially higher than state and national averages. Therefore, there is a need for serious study and tracking of the possible adverse health problems that may be associated with the county's environmental pollution.

While Pennsylvania tracks cancer information well, receiving an "A" from the Trust for America's Health (a national public health group) for its cancer tracking system, the state does not track disease rates for many other illnesses that have been linked to environmental causes or are suspected of having environmental components, including asthma, cerebral palsy, autism, mental retardation, and autoimmune disease. [29] The state also recently received a "D" grade for its health tracking of birth defects from the Trust for America's Health.[30] In addition, Pennsylvania has just 37 health workers per 100,000 residents, which is the lowest number of health workers per capita of any state in the country—less than one-fourth the national average of 158 per 100,000.[31]

Most of the county is considered a Health Professional Shortage Area—an area with a critical shortage of primary care physicians.

Greene County residents face elevated environmental health risks, yet have more limited health care options than Pennsylvania residents in general. There is no county health department, and although the percentage of adults lacking health insurance in Greene County is not significantly different from the state average (12.2 percent versus 11.9 percent, respectively), most of the county is considered a Health Professional Shortage Area—an area with a critical shortage of primary care physicians.[32] With a higher poverty rate and lower per capita income than the rest of the state, people living in these underserved areas may find it difficult to obtain proper health care. Meanwhile, the Greene-Fayette-Washington County area has a significantly higher percentage of the population reporting fair or poor health (17.5 percent) than the state average (14.0 percent).[33]

HOW NRDC CONDUCTED THIS STUDY

The PEC and others raised substantial questions about the possible adverse health impacts of major pollution sources in the area, including the two large coal-fired power plants.[34] At the request of the PEC and local citizens, NRDC launched an investigation to determine the extent of pollution problems in the county. With help and advice from the PEC and local experts, NRDC conducted an extensive investigation of paper files and computer databases. NRDC submitted open records and freedom of information requests for data to Pennsylvania and West Virginia officials, and reviewed tens of thousands of pages of files in DEP offices in Pittsburgh and California, Pennsylvania and Charleston, West Virginia.

NRDC evaluated information contained in permit files, records of violations, correspondence, notices, inspection reports, citizen complaints, and other information available in state files. We also reviewed data available in electronic databases housed at EPA, including the Toxics Release Inventory (TRI), Envirofacts, Superfund/hazardous waste (e.g., CERCLIS), drinking water (SDWIS), surface water discharge, permit compliance (PCS), groundwater/surface water storage and retrieval (STORET), Enviromapper; Environmental Compliance History Online (ECHO) and other databases; U.S. Geological Survey databases (e.g., NWIS and NAWQA); the U.S. Department of Interior database on abandoned mines (AMLIS); and Pennsylvania DEP databases (e.g., EFACTS, eMap PA, and DWRS).

CHAPTER 2

SOURCES OF WATER POLLUTION

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The Monongahela River, which separates Greene and Fayette counties, flows north from West Virginia into Pennsylvania and is the main drinking water source for Greene County residents. The Upper and Lower Monongahela River watersheds, which drain into the segment of the river running through Greene and Fayette counties, cover a total area of 1,913 square miles in the states of Pennsylvania and West Virginia.[35] Extensive coal mining in the area has long been a major source of water pollutants, which are discharged from active and abandoned mines. Disposal of coal ash from the Hatfield's Ferry and Fort Martin power stations is another significant source of contaminants. Other factors that degrade water quality in the Monongahela include untreated sewage, industrial discharges, agricultural runoff, oil and gas wells, toxic waste sites, and urban stormwater runoff.

MONONGAHELA WATER QUALITY

The most recent PA DEP stream assessment report classified the Monongahela River watershed as highly degraded by point and nonpoint pollutants ranging from acid mine drainage to sewage. Water quality problems in the watershed include elevated temperatures, reduced dissolved oxygen, increased iron and sulfate levels, and high turbidity and suspended solids. Forty-seven water bodies in the Upper and Lower Monongahela River watersheds have been classified as "impaired" for their designated uses by the states of Pennsylvania and West Virginia. Causes of impairment include metals, PCBs, inorganic chemicals, suspended solids, pH, salinity, and siltation. Only two impairments are listed for the Monongahela River itself: the pesticide chlordane and PCBs. This is not necessarily indicative of water quality in the river because of the low monitoring frequency and the small number of locations sampled.

According to a Source Water Assessment prepared for Southwestern Pennsylvania Water Authority, the largest of the public water systems serving Greene County, there are 1,078 potential sources of water contamination that may affect the system's intake water, including point sources such as industrial wastewater discharges, and non-point sources such as contaminated mine drainage, barge traffic, and toxic waste sites. When these were ranked according to their potential threat, with "A" representing the greatest threat and "F" the lowest, over 90 percent of those potential sources were ranked as "A" or "B."

TABLE 2
Source Water Analysis (Monongahela River), Average Concentrations

Chemical	Maximum Contaminant Level (ppm)	1998 Concentration (ppm)	1999 Concentration (ppm)	2000 Concentration (ppm)	2001 Concentration (ppm)
Aluminum	0.2	**0.21**	0.035	0.101	**0.829**
Arsenic	0.050	0.0015	Not detected	Not detected	Not detected
Barium	2	0.043	0.043	0.043	0.049
Cadmium	0.005	Not detected	Not detected	Not detected	Not detected
Copper	1.3	0.012	0.058	0.068	0.063
Fluoride	4.0	Not detected	0.115	Not detected	0.08
Iron	0.3	**0.39**	0.23	0.250	**1.505**
Lead	0.015	Not detected	Not detected	Not detected	0.0023
Manganese	0.05	**0.141**	**0.091**	**0.061**	**0.099**
Selenium	0.05	Not detected	Not detected	Not detected	Not detected
Sodium	—	21.2	32.5	21.6	14.87
Sulfate	250	101	Not detected	110.6	78.4
Total Phosphorus	—	0.015	Not detected	Not detected	Not detected
Zinc	5	0.017	0.009	0.051	0.020

Source: Morgantown Utility Board, as reported in Annual Drinking Water Quality Reports of Brave Water Authority and Mt. Morris Water and Sewage Authority.

Concentrations exceeding drinking water quality standards (Maximum Contaminant Levels, or MCLs) are shown in **bold.** MCLs for aluminum, fluoride, iron, manganese, sulfate, and zinc are non-enforceable secondary standards.

TABLE 3
Monongahela River Water Quality in Greene/Fayette County Area, PA, 1995–2004

Parameter	Monongahela River Sampling Location	Average (ppm)	Range (ppm)	MCL or SMCL (ppm)	Number of Samples
Aluminum, Total	At Lock & Dam #8-Point Marion Point Marion	**0.951** 0.491	0.135–**4.140** 0.200–**2.100**	0.5	46 31
Copper, Total	At Lock & Dam #8-Point Marion Point Marion	0.00126 0.01039	Not detected–0.016 0.0100–0.016	1.3	46 31
Iron, Total	At Lock & Dam #8-Point Marion Point Marion	**1.5169** **0.8422**	0.0810–**7.600** 0.1440–**2.525**	0.3	46 31
Lead, Total	At Lock & Dam #8-Point Marion Point Marion	0.0008 0.0015	Not detected–0.0051 0.0010–0.0079	0.015	46 31
Manganese, Total	At Lock & Dam #8-Point Marion Point Marion	**0.1846** **0.1444**	**0.0530–0.3890** **0.0710–0.2220**	0.05	46 31
Nickel, Total	At Lock & Dam #8-Point Marion Point Marion	Not detected 0.0500	Not detected 0.0500–0.0500	—	36 31
Sulfate, Total	At Lock & Dam #8-Point Marion Point Marion	104.57 97.64	Not detected–**258.0** 32.0–242.0	250.0	46 33
Zinc, Total	At Lock & Dam #8-Point Marion Point Marion	0.0416 0.0332	Not detected–0.1670 0.0100–0.1640	1.3	46 31

Source: EPA Storage and Retrieval (STORET) database; data collected by Pennsylvania Department of Environmental Protection.

***Bolded** results exceeded the Maximum Contaminant Level (MCL) or Secondary MCL (SMCL).

HOW EPA REGULATES WATER POLLUTION

Maximum Contaminant Level (MCL): These primary standards set maximum limits on levels of contaminants in drinking water based on health concerns, costs, and available treatment. MCLs are legally enforceable, and EPA has set MCLs for 87 chemical and biological contaminants.

Secondary MCL (SMCL): These secondary standards regulate contaminants that may cause cosmetic (skin or tooth discoloration) or aesthetic (taste, odor, color) effects in drinking water. EPA does not require compliance with secondary standards, but some states may adopt them as enforceable standards.

Removal Action Levels (RALs): EPA looks at these contaminant levels to decide whether to provide alternate sources of drinking water under Superfund removal authority to people affected by contaminated drinking water sites.

National Pollutant Discharge Elimination System (NPDES): This permit program established under the Clean Water Act controls water pollution by regulating discharges of pollutants by point sources, such as pipes or ditches.

Sources: EPA, *List of Drinking Water Contaminants and MCLs*, 2004, www.epa.gov/safewater/mcl.html#mcls; EPA, *National Pollutant Discharge Elimination System* (NPDES), 2003, http://cfpub.epa.gov/npdes/index.cfm; EPA, *Numeric Removal Action Levels for Contaminated Drinking Water Sites*, 1998, OSWER Memorandum No. 9360.1-028-P, EPA-540-F99-044.

Source water analyses of the Monongahela River completed occasionally for the Morgantown Water Utility Board (which supplies water to Brave Water Authority and Mt. Morris Water and Sewage Authority) show that aluminum, iron, and manganese exceeded non-enforceable secondary drinking water standards (Table 2). While these inorganics have no enforceable health standards, they often are an indication that mine drainage, coal mining, and coal ash have polluted the water. Often, these pollution sources also are associated with other heavy metals of substantial health concern, such as arsenic, cadmium, and mercury. No information was provided as to how many samples or sampling locations were included in the analysis.

PA DEP water quality monitoring of the Monongahela River also has shown high levels of aluminum, iron, and manganese at the two sampling stations in Point Marion (Table 3). The stations are located downstream of Fort Martin, but upstream of the Hatfield's Ferry power plant. These metals can leach out of coal ash, but they are also found in mine drainage, which is a significant source of water pollution for the Monongahela. Aluminum concentrations averaged 0.951 and 0.491 parts per million (ppm) at these locations, which is significantly above the secondary drinking water quality standard of 0.2 ppm. The average iron concentrations (1.5169 and 0.8422 ppm) also exceeded the corresponding secondary standard of 0.3 ppm. Manganese averaged 0.1846 and 0.1444 ppm, also above its secondary standard of 0.05 ppm.

COAL MINING AND CONTAMINATED MINE DRAINAGE

According to the PA DEP, mining accounts for more than 70 percent of the watershed's degradation.[36] Approximately 75 percent of the point sources in the watershed

HEALTH EFFECTS OF SOME POLLUTANTS FOUND IN THE MONONGAHELA RIVER AND TRIBUTARIES

Aluminum: May cause bone or brain disorders, particularly in people with kidney disease and especially in children.

Arsenic: Causes cancer of the bladder, kidneys, liver, lungs, prostate, and skin.

Boron: High concentrations may affect the male reproductive organs. In animal studies, boron has caused developmental and structural defects in the offspring of animals exposed during pregnancy.

***Cryptosporidium*:** This parasite causes gastrointestinal disease. People with weakened immune systems may be susceptible to serious symptoms or even death.

***Escherichia coli (E. coli)*:** *E.coli,* found in animal and human feces, may cause diarrhea, cramps, nausea, and headaches. Some strains may cause serious illness in sensitive individuals, such as children and the elderly.

***Giardia lamblia*:** This parasite causes gastrointestinal illness, such as diarrhea, vomiting, and cramps.

Manganese: High levels may cause changes in the brain and nervous system, and learning problems and decreased coordination in children.

Molybdenum: High levels of molybdenum may cause gout-like symptoms, with pain and inflammation of the joints.

Sulfate: May have a temporary laxative effect at high concentrations. Because infants are more susceptible to diarrheal water loss, water with high concentrations of sulfate should not be used to prepare infant formula.

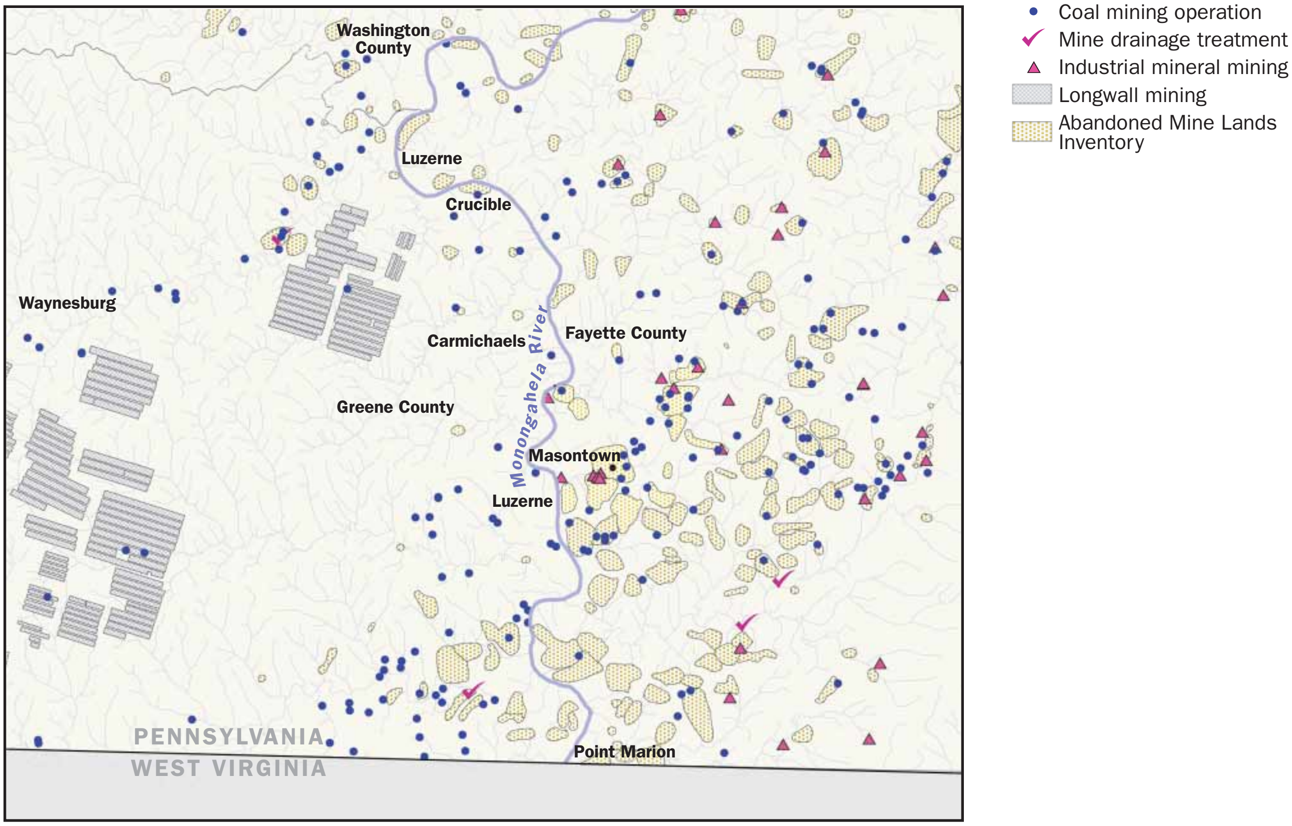
Total coliform bacteria: Although not necessarily a health threat themselves, coliform bacteria indicate the possible presence of harmful bacteria.

Sources: Agency for Toxic Substances and Disease Registry, *Public Health Statements* (PHSs), www.atsdr.cdc.gov/phshome.html; EPA, *Drinking Water Contaminants,* 2002, www.epa.gov/safewater/hfacts.html; EPA, *Drinking Water Advisory: Consumer Acceptability Advice and Health Effects Analysis on Sulfate*, 2003, www.epa.gov/safewater/ccl/pdf/hedoc-sulfate-final.pdf; EPA, *Integrated Risk Information System*, www.epa.gov/iris.

are related to surface and deep coal mining activities.[37] The Monongahela River, Whiteley Creek, and Little Whiteley Creek all receive contaminated mine drainage (CMD). Figure 1 shows active and abandoned mining sites in areas of Greene and Fayette counties that drain into the stretch of the Monongahela River separating the two counties.

United States Geological Survey (USGS) and other monitoring along several stretches of the Monongahela in coal country has found elevated levels of many heavy metals, including arsenic, resulting from coal mining activity and acid mine drainage.[38] In addition to runoff or groundwater discharge from the ash disposal at power plants, coal mines are likely sources of the arsenic found in some of Greene County's drinking water supplies (see Figures 2 and 3). Testing of mine discharges in Greene and Fayette counties has found arsenic concentrations up to 59.5 ppb (nearly six times the EPA's new drinking water standard of 10 ppb), demonstrating that these sites are a source of toxic discharges (see Table 4, page 11).

FIGURE 1
Mining Sites Near the Monongahela River, Greene and Fayette Counties, PA



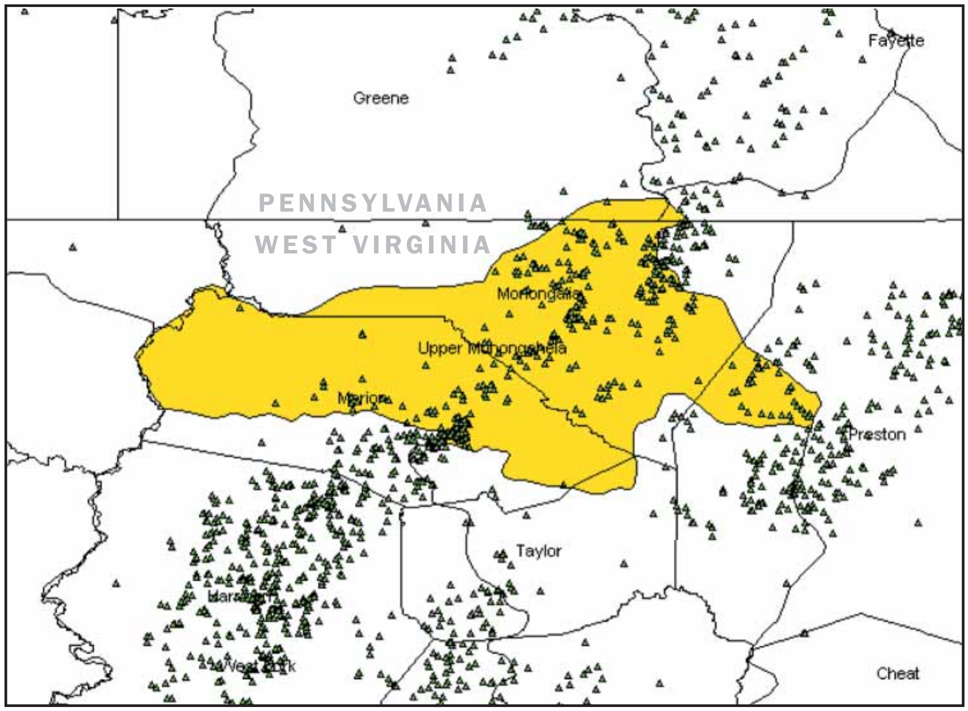
Pennsylvania DEP

Active Coal Mines

PA DEP data identify the locations of nine active surface coal mines and one active underground mine within the drainage area of the segment of the Monongahela River that separates Greene and Fayette counties.[39] Many of these mines pollute surface and groundwater with CMD. One of the main processes that produces CMD is the oxidation of iron disulfide (pyrite), which produces sulfuric acid that lowers the pH of water in the mined areas. This acidic water then dissolves metals such as iron, aluminum, and manganese, as well as more toxic elements such as arsenic and chromium. The result is the degradation of aquatic habitats and drinking water supplies.

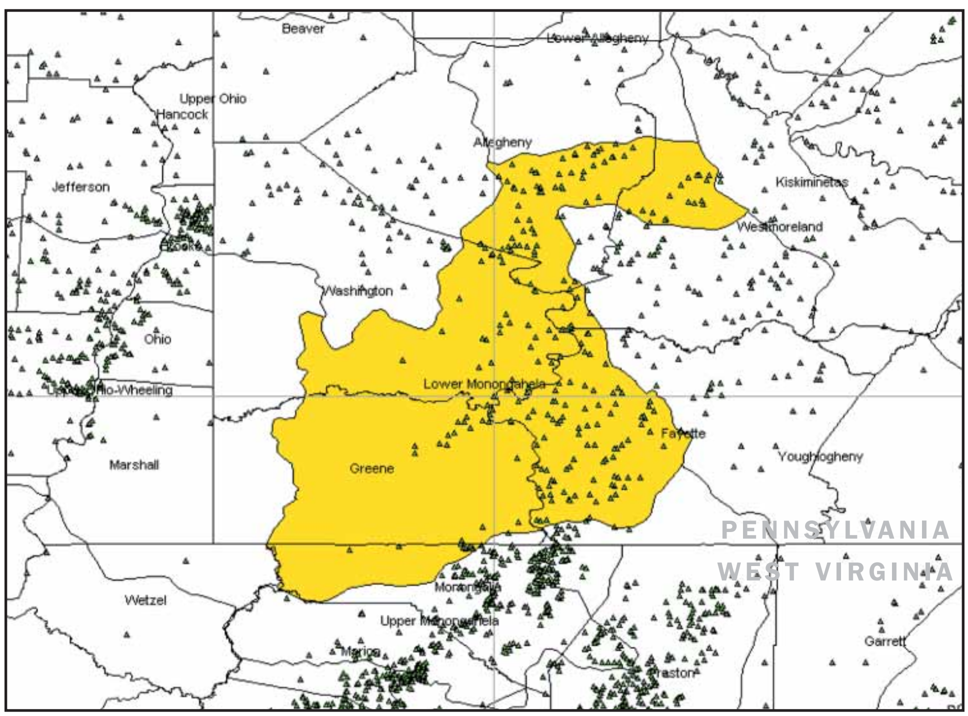
The EPA's Toxics Release Inventory for 2002 (the most recent year for which data are available) lists reported chemical releases for only two mining operations in Greene County. None are listed for Fayette County. The two Greene County mines reported the release of hydrochloric acid, lead and mercury compounds, sulfuric acid, and chlorine, in the total amount of 53,507 pounds. Ninety-five percent of the reported amount was released into the air, 3.2 percent was released directly into surface waters, and 1.3 percent went to land disposal. However, these amounts are just estimates of reportable chemicals released during mining operations and in no

FIGURE 2
Abandoned Mine Sites in the Upper Monongahela Watershed, WV



Source: DOI Office of Surface Mining Abandoned Mine Land Inventory System (AMLIS).

FIGURE 3
Abandoned Mine Sites in the Lower Monongahela Watershed, PA



Source: DOI Office of Surface Mining Abandoned Mine Land Inventory System (AMLIS).

TABLE 4
Arsenic in Mine Discharges, Monongahela River Watershed

County	Stream/river site	Sample date	Arsenic, dissolved (ppb)
Greene	Mine Discharge 50	7/28/1999	0.6
	#USGS 394425079584001	7/28/1999	1.1
		7/28/1999	1.7
	Mine Discharge 51	7/28/1999	3.4
	#USGS 394556079582201	7/28/1999	3.6
		7/28/1999	3.7
	Mine Discharge 52	7/16/1981	1.0
	#USGS 394556079582601	7/28/1999	2.8
		7/28/1999	2.9
		7/28/1999	3.0
Fayette*	Number 3 Mine Pool at Melcroft, PA	10/23/1985	**19.1**
	#USGS 03082122	2/26/1987	**19.0**
	Kalp Mine Discharge at Rumney, PA	10/23/1985	**40.7**
	#USGS 03082132	2/26/1987	**13.9**
		6/29/1987	**21.5**
	Mathews Mine Discharge at Davistown, PA	2/26/1987	**10.1**
	#USGS 03082142	6/29/1987	**21.5**
	Galentine Mine Discharge near Indian Head, PA	10/24/1985	**31.3**
	#USGS 03082168	2/26/1987	**12.9**
		6/29/1987	**15.8**
	Mine Discharge 39	7/28/1999	6.3
	#USGS 395637079434901	7/28/1999	7.0
		7/28/1999	7.6
	Mine Discharge 40	7/28/1999	9.5
	#USGS 395637079434601	7/28/1999	9.8
		7/28/1999	10.0
		9/4/2003	**59.5**
	Mine Discharge 41	7/29/1999	0.9
	#USGS 400250079362901	7/29/1999	0.9
		7/29/1999	0.9
	Mine Discharge 42	7/29/1999	7.2
	#USGS 400240079361801	7/29/1999	7.8
		7/29/1999	8.3
	Mine Discharge 43	7/30/1999	5.1
	#USGS 400234079362501	7/30/1999	5.2
		7/30/1999	5.3
	Mine Discharge 45	8/24/1999	2.2
	#USGS 400208079381401	8/24/1999	2.6
		8/24/1999	2.9
	Mine Discharge 46	8/24/1999	9.6
	#USGS 400215079374601	8/24/1999	9.7
		8/24/1999	9.8
	Mine Discharge 47	7/29/1999	0.03
	#USGS 400249079240701	7/29/1999	0.5
		7/29/1999	0.5
	Mine Discharge 48	7/29/1999	0.03
	#USGS 395922079271101	7/29/1999	0.2
		7/29/1999	0.2
	Mine Discharge 49	7/30/1999	5.4
	#USGS 400635079495101	7/30/1999	6.1
		7/30/1999	6.8

Source: USGS, National Water Information System (NWIS). Only sites and samples with detectable concentrations are included.

Bold denotes concentrations that exceed the EPA's new drinking water standard for arsenic of 10 parts per billion (ppb), effective in 2006.

*Sites in Fayette County are located in areas of the watershed that drain to the Monongahela directly across the river from Greene County.

way represent the actual amounts of chemicals released by mine drainage, runoff from mine spoils, and chemicals contained in coal mining waste, which include iron, aluminum, manganese, sulfate, and heavy metals. In fact, lack of regular monitoring for most contaminants makes it impossible to estimate the amounts of contaminants released into the water from these mines. The scarcity of data concerning pollutant releases caused by mining will be an obstacle in the design of any future water pollution prevention activities by the PA DEP not only in Greene County, but in the entire state of Pennsylvania.

Abandoned and Inactive Mines

Most of the coal mines along the river are abandoned, and CMD from these abandoned mines represents a significant source of contamination with manganese, aluminum, zinc, arsenic, barium, cadmium, cobalt, copper, silver, sulfate, iron, and other trace metals and inorganic constituents.[40]

The scarcity of data concerning pollutant releases caused by mining will be an obstacle in the design of any future water pollution prevention activities by the PA DEP not only in Greene County, but in the entire state of Pennsylvania.

The U.S. Department of Interior Office of Surface Mining lists 148 abandoned mine sites within Greene and Fayette counties, and the state of West Virginia has identified 200 abandoned mine sites in the Upper Monongahela watershed, upstream of Greene County (see Figures 2 and 3, page 10).[41] The number could actually be higher, since these inventories consist mostly of sites that are eligible for reclamation funding. Many of these sites have the potential to release CMD into surface water or groundwater.

Like active mine sites, inactive and abandoned mines receive little monitoring for toxic releases despite being important sources of water contamination. PA DEP databases contain location data for 49 of these inactive and abandoned mines within the area that drains into the stretch of the Monongahela separating Greene and Fayette counties. Like most of the active mines, these sites are usually located close to surface streams, particularly the main stem of the Monongahela River. Not surprisingly, what little monitoring data have been collected show high levels of aluminum, iron, and manganese, all of which are indicators of CMD pollution.

Abandoned mines are sometimes selected for remining, the process of extracting leftover coal and coal-containing mine spoils, followed by reclamation of the mined lands. Although improvements in water quality have been observed in some areas, remining projects in the coal seams in Greene County tend to increase water pollution with iron and manganese. This means that additional abatement measures, such as controlling water flow and adding limestone to increase alkalinity, become necessary to control water quality problems.[42]

Mine Backfilling

Another important threat to water quality in Greene County is the use of both active and abandoned mines as dump sites for coal ash. The rationale for filling mines with coal ash is that not only do they provide a disposal site for large amounts of waste, but that alkaline ash will make mine drainage less acidic and prevent the release of iron, manganese, and other contaminants associated with CMD. However, toxic metals found in coal ash are frequently released when the ash comes into contact with mine drainage.[43]

Four minefill sites currently exist in Greene County. Despite the likelihood that these sites will worsen the already poor water quality, the PA DEP's approach has been to allow backfilling projects to proceed relying on the results of short-term monitoring, which cannot detect contamination problems that take more time to fully develop. Also, experience at other sites in Pennsylvania has shown that the agency's decisions to approve projects based on chemical analyses of the ash, without considering site-specific hydrological conditions, have allowed further degradation of water quality.[44]

Approximately 80 additional backfilling sites in Monongalia, Marion, and Preston counties in West Virginia, outside of the PA DEP's jurisdiction, are also adding to the pollutant load carried by tributaries of the Monongahela River. More research is needed to measure this impact, but water quality data from West Virginia minefills indicates that levels of arsenic, selenium, thallium, antimony, lead, and nickel routinely exceed safe drinking water standards in the surface water and groundwater that drains these minefills and eventually flows into the Monongahela. These levels of metals are occurring in concentrations not measured in baseline acid mine drainage at the sites. Two active sites in particular, the Albright Minefill and the Stacks Run Refuse Site, both in Preston County, are significant sources of these contaminants.[45] For example, arsenic was measured at 907 ppb in downgradient groundwater at the Stacks Run Refuse Site, more than 90 times the new arsenic drinking water standard.[46] Arsenic in surface water downstream of the Stacks Run Refuse Site was measured at 76 ppb, over 7 times the new federal standard. At the Albright Minefill, arsenic was measured at 504 ppb in groundwater downgradient of the minefill.[47]

Both the Hatfield's Ferry and Fort Martin power plants are also significant sources of water pollutants.

WATER POLLUTION FROM POWER PLANTS

Both the Hatfield's Ferry and Fort Martin power plants are also significant sources of water pollutants to the Monongahela River by direct release of wastewater into the river and through the leaching of chemicals from their ash landfills. These landfills are a source of contamination for both surface and groundwater. While the plants reported releasing 1,435 pounds of pollutants to water in 2002, this amount does not include chemicals not captured by wastewater treatment or stormwater/leachate collection systems. While there is no scientific assessment of the total amounts of chemicals leaching out of the ash disposal areas, our extensive review of PA DEP files and other available information suggests that there is great potential for water contamination. This is cause for concern, since both power stations are located upstream of the water intakes of several water systems that provide drinking water to Greene County residents.

Reported Toxics Releases from Hatfield's Ferry

Hatfield's Ferry reported the release of 203 pounds of chemicals into the Monongahela River in 2002, according to the EPA Toxics Release Inventory (TRI) (Table 5, page 14). The releases included arsenic, barium, chromium, and cobalt. This amount may not include waterborne chemicals in flow not captured by wastewater treatment or stormwater/leachate collection systems (including some surface runoff and ground-

TABLE 5
Discharges to Surface Water from Pipe Outfall Reported by Hatfield's Ferry (in pounds)

Chemical	2000	2001	2002
Arsenic*	0	0	56
Barium*	0	120	110
Beryllium*	0	0	—
Chromium	0	10	13
Cobalt*	0	43	—
Copper	0	37	24
Dioxin*	0	0	—
Lead*	0	0	—
Manganese	0	0	—
Mercury*	0	0	—
Nickel*	0	18	—
Selenium*	15	9	—
Sulfuric acid*	—	—	—
Vanadium*	0	0	—
Zinc	0	130	—
Total	**15**	**367**	**203**

Source: EPA Toxics Release Inventory (TRI).

*Not required to be routinely monitored in discharges. NRDC considers TRI-reported discharge levels to be unreliable.

water discharge) and chemicals entering the river through atmospheric deposition. No manganese was reported, although this is one of the chemicals monitored (and detected) in wastewater effluent. Because many of the chemicals are not required to be regularly monitored, NRDC considers TRI-reported discharge levels unreliable, and likely often underestimated.

National Pollution Discharge Elimination System (NPDES) Monitoring and Violations: Hatfield's Ferry

The station is required to monitor effluent from its pipe outfall for aluminum, chlorine, chromium, copper, iron, manganese, oil and grease, pH, suspended solids, temperature, thallium, and zinc by its NPDES permit. Not all outfalls are monitored for the same parameters. No monitoring is required for parameters such as arsenic, boron, and molybdenum, which are some of the contaminants that leach from coal ash.

Data concerning pollutant releases do not give a complete picture of the amount of chemicals released. The outfalls carrying stormwater runoff are required to be monitored by taking a sample only once per month, and outfall 007, which carries treated landfill leachate and runoff, is sampled only once per week. Also, as noted above, many key parameters are not monitored at all.

PA DEP inspection reports and incident reports made by the company show there have been at least 32 violations of NPDES parameters since 1983, in addition to other permit violations (Table 6).[48] Fourteen of them occurred from January 1999 to 2004. The parameters most commonly violated since 1983 have been aluminum, iron, manganese,

TABLE 6
Violations of Water Permit Limits and Other Pollution Incidents, Hatfield's Ferry

Date	Violation
July 2004	pH and total suspended solids from outfall 004 (emergency overflow from coal pile collection basin)
July 2004	Thallium from outfall 007 (ash landfill sedimentation pond)
July 2004	Total suspended solids from outfall 102 (emergency overflow from neutralization basin)
July 2004	Low pH and total suspended solids from outfall 302 (emergency overflow control basin #2)
February 29, 2004	Aluminum and manganese from outfall 007 (ash landfill sedimentation pond)
January 31, 2004	Manganese from outfall 007 (ash landfill sedimentation pond)
July 8, 2003	pH and total suspended solids (TSS) at outfalls 302 and 004, respectively (due to bypass)
March 31, 2003	TSS (emergency overflow from neutralization basin)
June 2002	pH and TSS at outfall 302 (emergency overflow control basin #2)
June 6, 2002	Spill of 200 gallons of firefighting foam into river
March 22, 2002	Low pH in lagoon outfall
March 7 & 13, 2002	Manganese from outfall 007 (ash landfill sedimentation pond)
November 20, 2001	Aluminum in effluent from outfall 007
October 2, 2001	Coal fines entered storm drains and discharged into river
August 1, 2001	Low pH at wastewater lagoon outfall 006
July 31, 2001	pH in outfall 006 effluent (wastewater lagoon)
June 23, 2001	Wastewater treatment bypass at outfall 006; 24-day delay in reporting (permit requires reporting within 24 hours)
January 11, 2001	Chemical and biological oxygen demand (CBOD) in outfall 001 (package sewage treatment plant, coal handling area)
June 27, 2000	pH and TSS from outfall 004 (coal yard stormwater collection system, due to bypass)
April 6, 1999	Foam in river
January 14, 1999	Aluminum from outfall 007 (ash landfill sedimentation pond)
April 9, 1996	CBOD in discharge No. 202 (package STP)
August 17, 1995	pH in coal pile runoff, due to bypass of coal pile runoff collection system
November 5, 1994	Acid wastewater spill from outfall 006
January 25, 1994	Discharge of industrial waste to creek
January 20, 1994	Aluminum and iron from outfall 007 (ash sedimentation pond)
January 7, 1994	Iron from outfall 007 (ash landfill sedimentation pond)
December 31, 1993	Iron from outfall 007 (ash landfill sedimentation pond)
December 28, 1993	Iron from outfall 007 (ash landfill sedimentation pond)
December 27, 1993	Iron from outfall 007 (ash landfill sedimentation pond)
December 6, 1993	Iron and aluminum from outfall 007 (ash landfill sedimentation pond)
December 1, 1993	Iron and aluminum from outfall 007 (ash landfill sedimentation pond)
November 22, 1993	Aluminum, iron, pH
November 16, 1993	Iron and aluminum from outfall 007 (ash landfill sedimentation pond)
November 3, 1993	Iron and aluminum from outfall 007 (ash landfill sedimentation pond)
September 29, 1993	Aluminum, iron, and TSS at ash disposal site
September 21, 1993	Aluminum, iron, and TSS
September 17, 1993	Aluminum, iron, and TSS
August 2, 1993	Aluminum, iron, TSS, and fecal coliform (ash/sedimentation basin)
July 29, 1992	pH and oil
March 30, 1989	Diesel fuel oil spill; fined $100 for littering
August 14, 1984	Low pH discharge; fined $5,628 ($3,128 for the PA DEP and $2,500 for Fish Commission)
August 30, 1983	Low pH discharge; fined $2,750 ($1,250 for the PA DEP and $1,500 for Fish Commission)
1975	Industrial waste discharges; Consent Order and Agreement dated June 19, 1975

and pH. Two violations of the manganese limit and aluminum limits have been recorded this year as of May 31, 2004. A wetland treatment system began operating in 2001 to control iron and manganese at outfall 007, which carries effluent from a sedimentation pond that receives landfill leachate. The two manganese violations recorded in early 2004 occurred at this outfall, which discharges into an unnamed tributary of Little Whiteley Creek, a tributary of the Monongahela River. The list of violations shows that the landfill is a persistent source of water contamination. In fact, the actual extent of the pollution problem is worse than the list of violations indicates, since parameters such as arsenic, barium, boron, molybdenum, and nickel, among others, are not required to be monitored and are not subject to NPDES limits in Hatfield's permit.

In addition to these multiple violations of NPDES permit limitations, Hatfield has also reported eight bypasses of the wastewater treatment system since 1992, resulting in the direct release of untreated or partially treated wastewater into the Monongahela River. Six of the bypasses have occurred since June 2001. The June 2001 incident resulted in the release of 72,000 gallons of polluted water carrying oil and solvents. The company did not report the bypass to the PA DEP for 24 days, not within 24 hours as required by the station's permit. By that time, the Greene County Conservation District had already received an anonymous report of the discharge. This incident prompted a written complaint to the PA DEP from the president of the Utility Workers Union of America Local 102, who wrote to urge the agency to hold Allegheny Energy accountable for the spill. The complaint letter says the station was operating with inadequate personnel because 30 maintenance workers who had left had not been replaced. In 2002, EPA imposed a $55,000 penalty on Allegheny Energy for this incident.

Hatfield has also reported eight bypasses of the wastewater treatment system since 1992, resulting in the direct release of untreated or partially treated wastewater into the Monongahela.

Other problems with unauthorized pollutant discharges have included five minor oil discharges since 1998 and six other releases since 1994 involving coal fines, firefighting foam, coal pile runoff, and acid wastewater.

Hatfield's repeated violations of its discharge permit led the PA DEP to assess a $14,190 civil penalty against Allegheny Energy in 2002 for those incidents that occurred between January 1999 and October 2001.

When the PA DEP renewed the facility's NPDES permit in 2003, it did not consider it necessary to revise permit limits for outfall 007, except for thallium.[49] In its Statement of Basis for the permit, the PA DEP says no NPDES violations were found in the Permit Compliance System for the period January 2000 to January 2003. However, our review of PA DEP files showed seven violations at the plant's outfalls during that period, two of them at outfall 007. At least two more violations have occurred at that outfall since the new permit went into effect in January 2004.

Other Sources of Surface Water Contamination at Hatfield

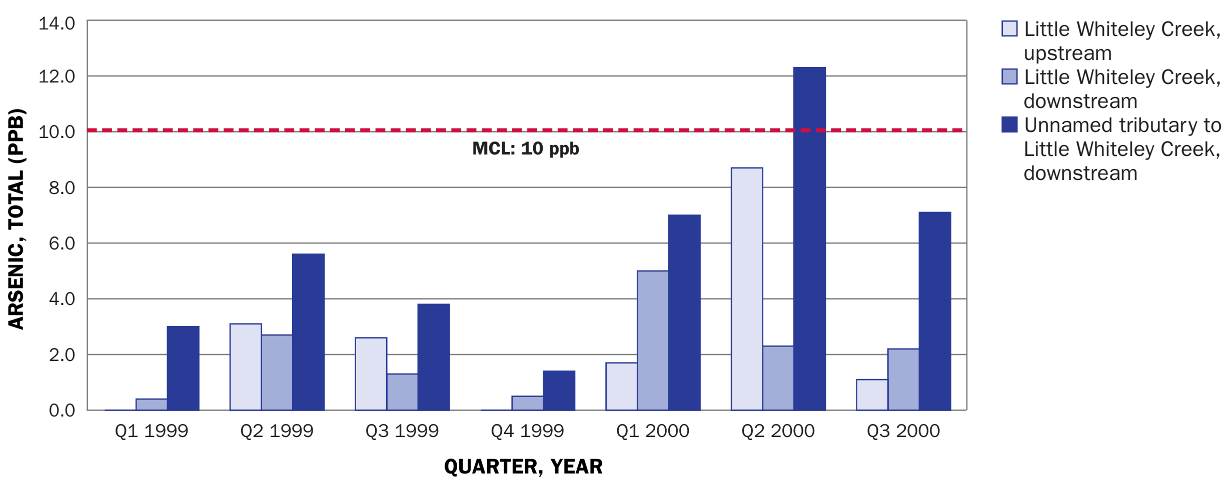
Surface runoff and windblown fly ash from the landfill area may be a source of contamination for the Monongahela River. The landfill was designed with some erosion control features to reduce this type of contamination, which included surface collection and drainage systems, and revegetation of completed disposal areas. Runoff collected from the landfill is treated in a sedimentation pond before being discharged into an unnamed tributary of Little Whiteley Creek, which in turn enters the Monongahela

River. During our review of PA DEP records, we did not find information on the extent to which surface runoff not captured by the collection system or windblown ash may be carrying pollutants into the river.

Surface water monitoring data for this area of the Monongahela are scarce. A brief metals survey of the river in 2001 showed exceedances of drinking water standards only for aluminum, iron, and manganese.[50] These elements are found in ash leachate as well as in contaminated mine drainage, which is an important source of pollution in the watershed. Little Whiteley Creek also had exceedances for iron and manganese. Arsenic was not detected in any of the samples in the survey. This survey involved only one sample from each location on the same date. It is at best a very modest snapshot that cannot be considered a representative sample of the Monongahela's water quality over time.

Hatfield's own water monitoring has detected elevated concentrations of arsenic, boron, and manganese in Little Whiteley Creek and the unnamed tributary to the creek that receives treated landfill leachate. The arsenic level in the tributary exceeded the EPA's new drinking water standard of 10 ppb on at least one occasion (see Figure 4). Manganese levels in the tributary and in Little Whiteley Creek downstream of the outfall have been consistently above the 0.05 ppm secondary standard (see Figure 5). Boron, one of the characteristic elements of coal ash, has also been found at very high levels in both the tributary and the downstream portion of the creek, usually at levels above the EPA's Removal Action Level, or RAL (see Figure 6). RALs are contaminant levels that are considered by the EPA to decide whether to provide alternate sources of drinking water under Superfund removal authority to people affected by contaminated drinking water sites.[51] Although Little Whiteley Creek is not used as a source of drinking water, these high concentrations are indicative of serious water quality problems caused by the discharge of treated leachate from Hatfield's landfill. They are also evidence that the ash sedimentation pond used to treat the leachate is insufficient to remove pollutants. For example, data collected from 1998 to 2000 show that boron concentrations were reduced

FIGURE 4
Arsenic in Little Whiteley Creek and Tributary, Up- and Downstream of Hatfield's Ferry Landfill Outfall



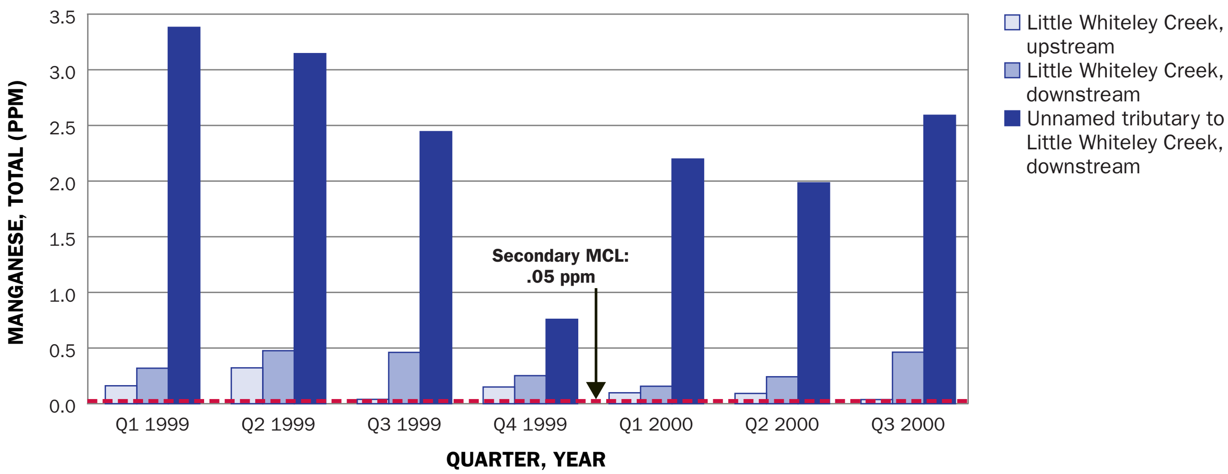
Source: Allegheny Energy Supply, Form 14R, Residual Waste Landfills and Disposal Impoundments Quarterly and Annual Water Quality Analyses, 1999 and 2000.

from 14 to 17 ppm in the untreated leachate to only 10 to 14 ppm in the effluent and the unnamed tributary to Little Whiteley Creek. These levels are still more than 10 to 14 times the RAL. As shown in Figures 4 to 6, levels of pollutants such as arsenic, boron, and manganese in Little Whiteley Creek increase downstream of the tributary. The pollutants carried by the creek are discharged into the Monongahela, adding to an already high pollutant load in the river, which is the primary source of drinking water for Greene County.

Groundwater Contamination at Hatfield

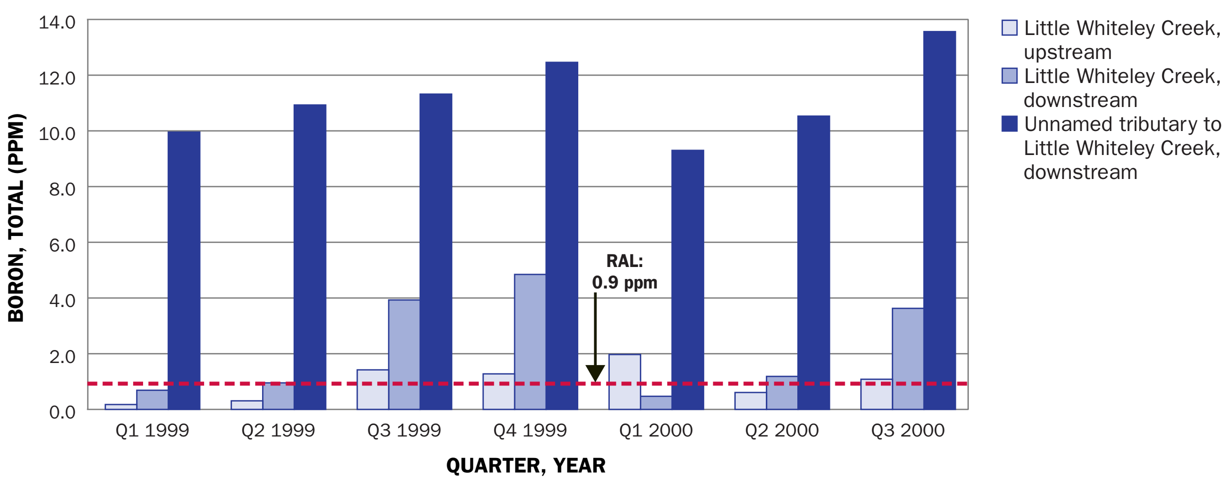
Coal ash contains elevated concentrations of heavy metals and other contaminants. While not all of the metals contained in the ash are released into the water, given the

FIGURE 5
Manganese in Little Whiteley and Tributary, Up- and Downstream of Hatfield's Ferry Landfill Outfall



Source: Allegheny Energy Supply, Form 14R, Residual Waste Landfills and Disposal Impoundments Quarterly and Annual Water Quality Analyses, 1999 and 2000.

FIGURE 6
Boron in Little Whiteley and Tributary, Up- and Downstream of Hatfield's Ferry Landfill Outfall



Source: Allegheny Energy Supply, Form 14R, Residual Waste Landfills and Disposal Impoundments Quarterly and Annual Water Quality Analyses, 1999 and 2000.

amounts of toxic chemicals and the volume of ash that has been disposed in and around Hatfield's Ferry, this is a significant source of water contamination. There are two primary ash disposal areas that are contributing to groundwater contamination: a surface mining pit on Hatfield's property that was used for ash disposal until 1984, and the current landfill. Hatfield's Ferry originally disposed of its coal combustion ash in the surface mine, which until the early 1980s produced coal for use at the power plant. The ash was co-disposed with mine spoils here as a mine reclamation measure until 1984, when the current landfill was permitted. The lower portion of the mine spoil is in contact with groundwater, some of which is discharged through springs, causing the release of metals and other pollutants. The shallowest of the three aquifers underlying the Hatfield's Ferry site consists of the co-disposed mine spoil and ash, and is located upgradient or upslope of the current ash landfill. A 1996 report submitted by the company to the PA DEP says the co-disposal of fly ash with mine spoil in this surface mine was responsible for the fact that high levels of boron are found in groundwater upgradient of the current landfill, not just downgradient as might be expected if the landfill were the only source of groundwater contamination.

The currently operating ash landfill began operations in 1984 and accepts approximately 350,000 tons of fly ash annually. It is a Class II (single-liner) landfill with a blanket of permeable material to collect and drain groundwater. It is located in two small valleys that converge to an unnamed tributary of Little Whiteley Creek. Collected landfill leachate is treated in a sedimentation pond before being discharged into this tributary. The Uniontown aquifer, which underlies the landfill, shows clear signs of increasing contamination from coal ash, as indicated by high levels of boron. Groundwater in this aquifer is discharged into the drainage area of Little Whiteley Creek, and from there into the Monongahela River.

Hatfield's Ferry reported the land disposal of nearly 2.3 million pounds of metals and other toxic chemicals from 2000 to 2002.

Hatfield's Ferry reported the land disposal of nearly 2.3 million pounds of metals and other toxic chemicals from 2000 to 2002 (see Table 7, page 20). These toxics are contained in the coal combustion ash disposed in the landfill.

The ash has been tested in the laboratory to determine the concentrations of metals in ash leachate, which is at best an imperfect indicator of the mobility of these pollutants into water. Table 8 shows the concentrations of some of the pollutants released by fly and bottom ash when tested in a laboratory setting according to EPA procedures. It must be noted that the Toxicity Characteristic Leaching Procedure (TCLP) used in the laboratory analysis may underestimate the concentrations of contaminants released under real-world conditions for many pollutants.[52] Even so, levels of arsenic, cadmium, and chromium in fly ash leachate exceeded their respective federal primary drinking water standards, or Maximum Contaminant Levels (MCLs), indicating that landfill leachate is likely to degrade groundwater quality, even though the concentrations obtained in the test are within levels allowed by the PA DEP.

The Hatfield's Ferry station is required to monitor groundwater through a series of wells around the landfill to detect any deterioration of groundwater that may be due to the leaching of chemicals from the ash. Although none of the three aquifers

TABLE 7
Land Releases of Chemicals (in pounds), Hatfield's Ferry

Chemical	2000	2001	2002
Arsenic	76,000	46,000	15,000
Barium	440,000	300,000	110,000
Beryllium	9,300	6,200	2,600
Chromium	71,000	48,000	22,000
Cobalt	19,000	13,000	5,700
Copper	99,000	67,000	23,000
Dioxin	—	—	—
Ethylene glycol	—	1,600	—
Hydrochloric acid	—	—	—
Hydrogen fluoride	—	—	—
Lead	28,000	18,000	6,718
Manganese	110,000	77,000	36,000
Mercury	170	100	19.4
Nickel	60,000	42,000	21,000
Selenium	6,700	4,200	1,200
Sulfuric acid	—	—	—
Vanadium	170,000	120,000	36,000
Zinc	100,000	67,000	20,000
Total	**1,189,170**	**810,100**	**299,237**

Source: EPA Toxics Release Inventory

TABLE 8
Ash Analysis by Toxicity Characteristic Leaching Procedure (TCLP)

		CONCENTRATION (PPM)	
Parameter	**MCL (ppm)**	**Bottom ash**	**Fly ash**
Arsenic	0.010	<0.002	**0.2241**
Barium	2	0.4245	0.3710
Cadmium	0.005	0.0003	**0.0111**
Chromium	0.1	0.0199	**0.1170**
Lead	0.015	0.0087	0.0011
Mercury	0.002	<0.0002	0.0002

Test date: December 2001. Levels that exceed the primary drinking water standard, or MCL, are noted in **bold.**

potentially impacted by the landfill are used for drinking water, polluted groundwater may enter the Monongahela River.

Groundwater monitoring data show levels of sulfate, iron, manganese, fluoride, and pH that repeatedly exceed the applicable primary or secondary drinking water standards in some monitoring wells. Also, there are 18 parameters that show upward trends over time in upgradient wells[53] and 16 parameters with upward trends in downgradient wells.[54] Twelve of the 16 trends also occur at the upgradient wells. The occurrence of rising trends in chemical concentrations both up- and downgradient of the landfill was cited by Allegheny Energy in its 2001 Annual Evaluation Report for the landfill as evidence that much of the groundwater contamination is produced by natural geochemical conditions.[55] As mentioned previously, fly ash and mine spoil that were disposed in a surface mining pit is impacting groundwater quality in the upgradient wells. Therefore, these wells are not representative of background or natural conditions, and certainly do not support the theory that the landfill is not responsible for an increase in groundwater contamination. Higher chemical concentrations in downgradient wells relative to upgradient wells indicate that contaminants in the coal ash are reaching the groundwater. Increasing contamination by boron and other metals characteristic of coal ash in the Uniontown Sandstone aquifer underlying the landfill are also strong evidence that the landfill is affecting groundwater quality.

Reported Toxic Chemical Releases, Fort Martin Power Plant

Fort Martin reported the release of 1,232 pounds of chemicals into the Monongahela River in 2002, an increase of 587 pounds from the previous year, according to the EPA's Toxics Release Inventory (see Table 9). This amount may not include waterborne chemicals in flow not captured by wastewater treatment or stormwater/leachate collection systems (including some surface runoff and groundwater discharge) and chemicals entering the river through atmospheric deposition. Most of the reported increase was due to manganese and nickel releases. As many reported chemicals are

TABLE 9
Discharges to Surface Water from Pipe Outfall Reported by Fort Martin (in pounds)

Chemical	2000	2001	2002
Arsenic	50	38	41
Barium*	980	475	580
Beryllium*	1	0	—
Chromium compounds	51	5	—
Cobalt*	26	0	—
Copper*	94	22	11
Dioxin*	0	0	—
Ethylene glycol*	—	—	—
Hydrochloric acid*	—	—	—
Hydrogen fluoride*	—	—	—
Lead compounds*	0	0.6	—
Manganese	1,200	54	420
Mercury*	0	0	—
Nickel*	190	50	180
Selenium	1	—	—
Sulfuric acid*	—	—	—
Vanadium*	0	0	—
Zinc	160	0	—
Total	**2,753**	**645**	**1,232**

Source: EPA Toxics Release Inventory (TRI).

*Not required to be routinely monitored in discharges. NRDC considers TRI-reported discharge levels to be unreliable.

not required to be routinely monitored in discharges, NRDC considers TRI-reported discharge levels to be unreliable.

Originally, Fort Martin relied on settling ponds that were alleged to be sufficient to control pollutants in the wastewater. This proved inadequate, and the first treatment system was built in 1972. The DEP required the plant to improve its system again in 1990 to reduce pollutant discharges. For many years, Fort Martin discharged its effluent into an unnamed tributary of Crooked Run but redirected its outfall to the river in 1994, as required by a WV DEP order issued in 1988.

NPDES Monitoring and Violations, Fort Martin

The station monitors its main outfall (007) effluent for arsenic, boron, hexavalent chromium, iron, manganese, molybdenum, pH, selenium, sulfate, total dissolved solids, and total suspended solids, as required by its NPDES permit. The facility is required to test only one sample per month. Permit limits are in effect for arsenic, hexavalent chromium, iron, manganese, pH, selenium, and total suspended solids, but not for boron, sulfate, and total dissolved solids. The requirements of a 2001 WV DEP order to control hexavalent chromium and selenium from outfall 007 were incorporated into the current permit, which was issued in 2002.

NRDC found records of 11 violations of NPDES permit limits for chemicals in effluent. Five incidents have occurred since 1999.

The station's stormwater outfalls (010 and 020) are also monitored for aluminum, but not for sulfate or suspended solids. The stormwater effluent is tested only once every six months. There are no limits for chemical parameters for these outfalls; the facility is only required to report the data.

The station's combined NPDES/Solid Waste permit also sets requirements for groundwater monitoring around the landfill (discussed in "Groundwater" section below).

A review of WV DEP files dating back to 1979 showed that there have been at least 13 overflows and bypasses of the wastewater treatment systems. Four of those incidents have occurred since 2001 (three of them in 2003, all allegedly due to electrical problems).

NRDC found records of 11 violations of NPDES permit limits for chemicals in effluent. Five incidents have occurred since 1999. In 2001, the WV DEP determined that the facility was in violation of the Clean Water Act due to hexavalent chromium and selenium discharges. Because monitoring is infrequent (once per month) it is not possible to say whether existing records of violations give the full picture of the plant's environmental performance.

Nine accidental spills (all occurring from 1979 to 1991) were reported. These included spills of fuel oil, sulfuric acid, algaecide, mineral oil, acidic water, and fly ash.

The plant is inspected for NPDES compliance roughly once per month; not all inspections cover the entire facility. The most recent problem, in 2001, involved the release of dark effluent, apparently caused by changes in ash characteristics after the company installed new burners. Previous inspection reports record 25 inspections in which deficiencies were found, occurring from 1980 to 1988.

The WV DEP issued 20-Day Notices (notices of violation) to Fort Martin for its NPDES violations and deficiencies in its wastewater treatment system, but NRDC did not find any evidence that the company had ever been required to pay fines.

Other Sources of Surface Water Contamination, Fort Martin

Surface runoff and windblown fly ash from the landfill area may be a source of contamination for the Monongahela River, but there is no data on how much these sources may be contributing to pollution in the river.

The USGS sampled one location in the Monongahela River downstream of Fort Martin for chemical parameters in 2002. Aluminum, iron, and manganese exceeded the secondary drinking water standard (see Table 10). These metal levels may be indicative of pollution from both mine drainage and Fort Martin's discharges. Only two or three samples were taken for each parameter, and no other locations appear to have been sampled for chemical concentrations by USGS in this area of the river during the last 10 years.

TABLE 10
Monongahela at Lock & Dam 8, Point Marion: Exceedances of Secondary Drinking Water Standards (SMCLs)

Parameter	SMCL (ppm)	Sampling Date	Result (ppm)
Aluminum, recoverable	0.05–0.2	4/15/2002 6/17/2002	0.400 0.700
Iron, recoverable	0.3	4/15/2002 6/17/2002	0.690 101.0
Manganese, recoverable	0.05	4/15/2002 6/17/2002 8/8/2002	0.200 0.090 0.070

Source: USGS National Water Information System.

TABLE 11
Land Releases of Chemicals (in pounds), Fort Martin

Chemical	2000	2001	2002
Arsenic	7,800	110	210
Barium	76,000	19,000	23,000
Beryllium	1,400	300	420
Chromium	12,000	2,700	3,900
Cobalt	3,200	760	1,100
Copper	15,000	3,200	4,100
Dioxin	0.001139	0.001006	0.001143
Ethylene glycol	—	3,400	—
Hydrochloric acid	0	0	0
Hydrogen fluoride	0	0	0
Lead	3,600	460	650
Manganese	20,000	5,400	8,000
Mercury	22	2.2	2.8
Nickel	12,000	2,800	4,100
Selenium	680	—	—
Sulfuric acid	0	0	0
Vanadium	27,000	6,300	6,900
Zinc	14,000	2,600	3,100
Total	**192,702**	**47,032**	**55,483**

Source: EPA Toxics Release Inventory.

Groundwater Contamination, Fort Martin

The ash landfill appears to be the most significant potential source of groundwater contamination. It is an unlined Class F industrial landfill and is regulated by the station's combined NPDES/Solid Waste permit. The landfill has been operating since 1982 (two years before the Hatfield's Ferry landfill) and has expanded to its maximum permitted area of 67.3 acres. Both bottom and fly ash are disposed in the landfill.

In 2002, the facility disposed of waste (mostly ash) containing approximately 55,483 pounds of toxic chemicals reportable to the EPA's Toxics Release Inventory (see Table 11, page 23). While not all of the chemicals contained in the ash are released into the water, given the volume of ash in the landfill and the lack of an impermeable liner to prevent the release of toxic chemicals, this is likely to be a significant source of water contamination.

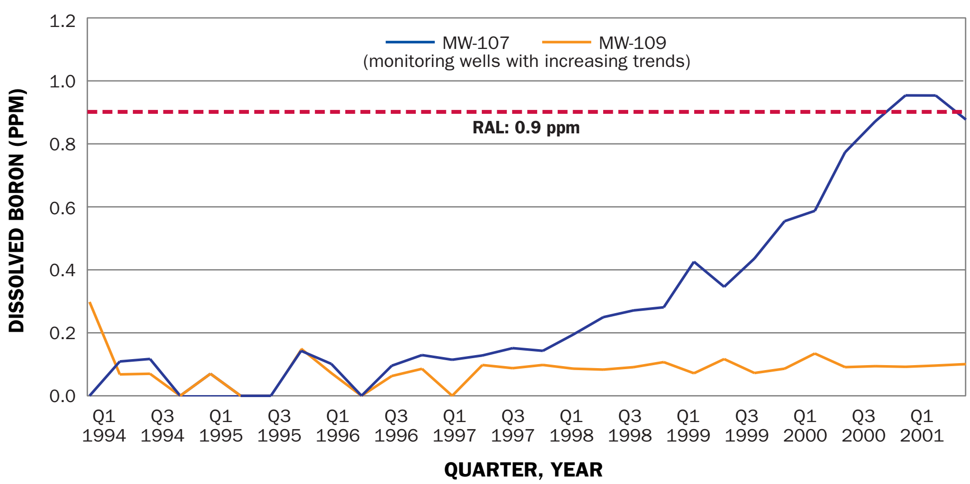
There are four sedimentation ponds (Ponds 3, 4, 5, and 6) that capture surface runoff and leachate from the landfill's underdrain system. The site surface drains to Crooked Run, an unnamed tributary to Crooked Run, and the Monongahela River. There are two wells and one spring in the area that are used as private water supplies.

Groundwater has been monitored quarterly since the landfill began operating. The landfill sits over an area of weathered and fractured bedrock containing an unconfined aquifer. There are 11 monitoring wells around the landfill and the sedimentation ponds. Existing wells were installed from 1993 to 1995 to replace an old well network installed in the 1980s. The existing well network has been monitored quarterly since 1994.

Groundwater Monitoring, Fort Martin

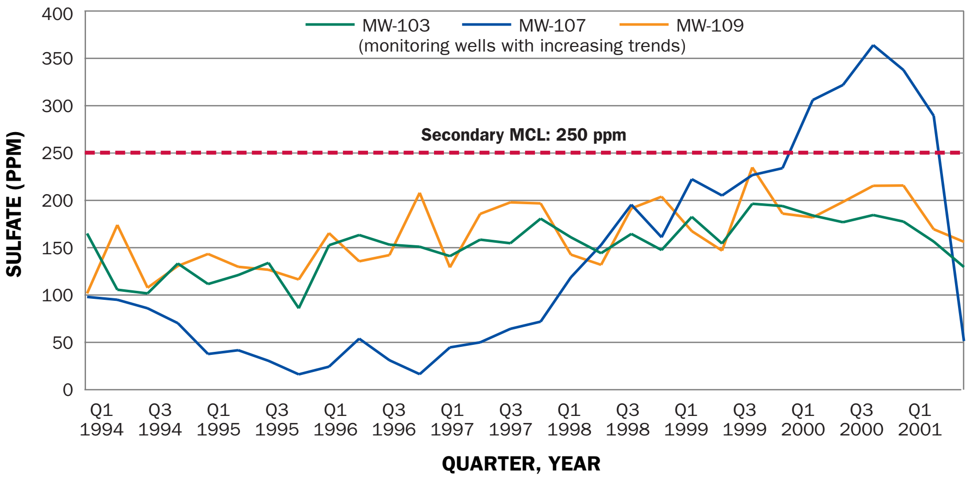
The parameters monitored in groundwater around Fort Martin's landfill include aluminum, antimony, arsenic, beryllium, boron, cadmium, chromium, iron, manganese, molybdenum, and selenium, among others. Groundwater monitoring up- and downgradient of Fort Martin's landfill has detected five parameters with increasing

FIGURE 7
Dissolved Boron in Groundwater, Fort Martin



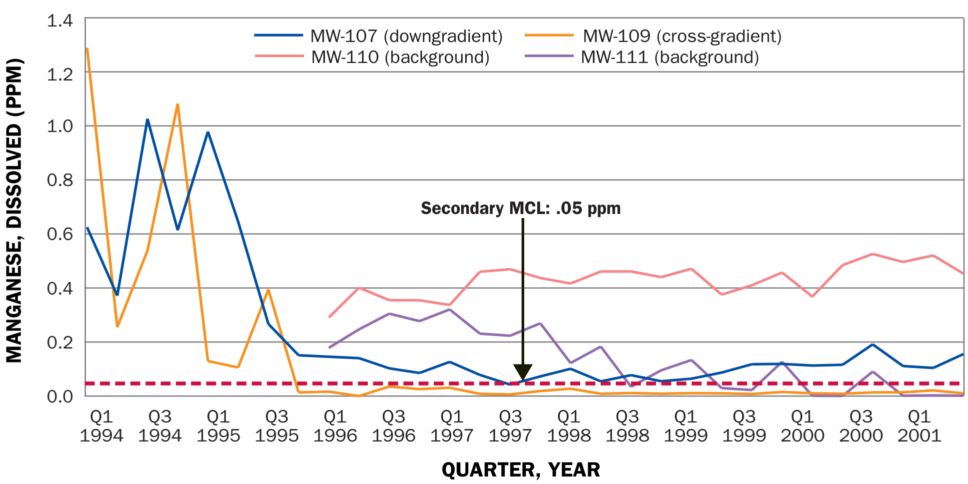
Source: Hydrosystems Management, Inc., *Assessment of Ground-Water Monitoring Well System, Fort Martin Power Station CCB Landfill, Monongalia County, West Virginia* (Monroeville, PA: Allegheny Energy Supply), April 1, 2002.

FIGURE 8
Sulfate in Groundwater, Fort Martin



Source: Hydrosystems Management, Inc., *Assessment of Ground-Water Monitoring Well System, Fort Martin Power Station CCB Landfill, Monongalia County, West Virginia* (Monroeville, PA: Allegheny Energy Supply), April 1, 2002.

FIGURE 9
Dissolved Manganese in Groundwater, Fort Martin

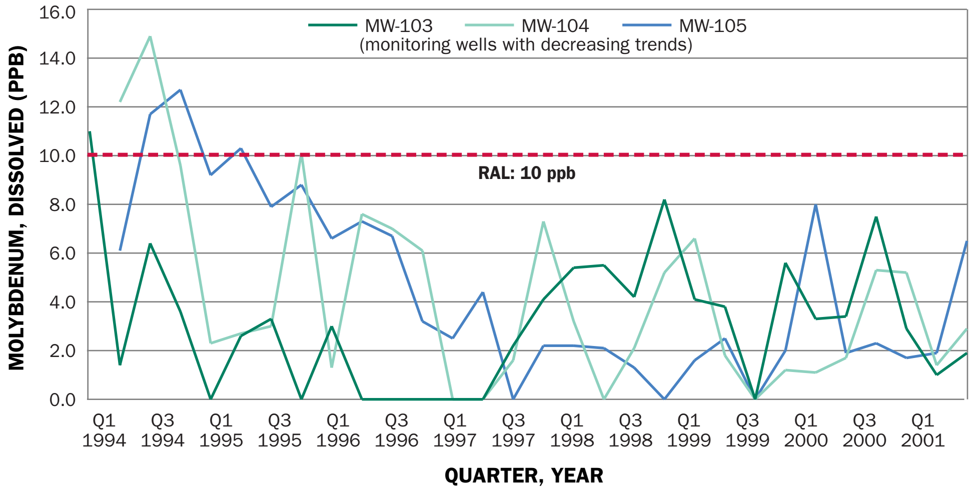


Source: Hydrosystems Management, Inc., *Assessment of Ground-Water Monitoring Well System, Fort Martin Power Station CCB Landfill, Monongalia County, West Virginia* (Monroeville, PA: Allegheny Energy Supply), April 1, 2002.

trends over time: boron, sulfate, hardness, manganese, and total dissolved solids (TDS). Of the chemical parameters, boron increased in downgradient well MW-107 and cross-gradient well MW-109, sulfate increased in downgradient well MW-103, while manganese increased in background well MW-110 (see Figures 7–9).

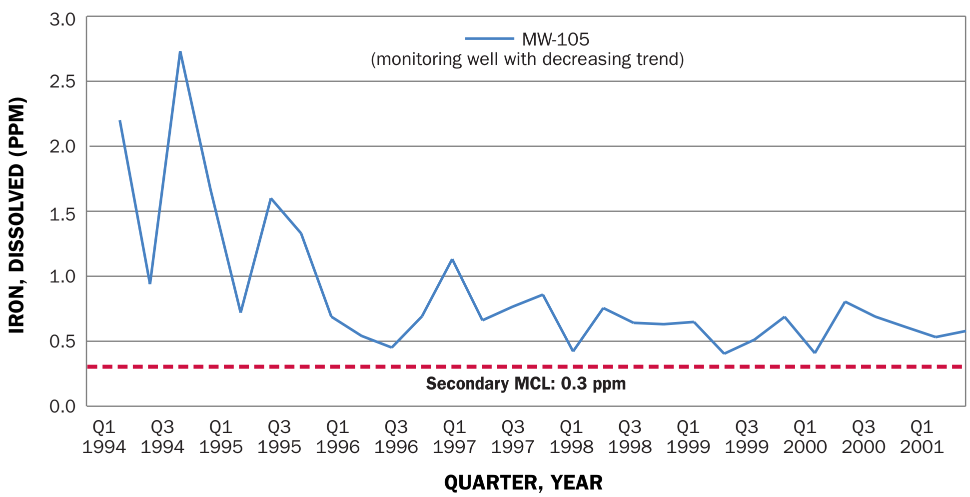
Three parameters have decreased over time: molybdenum in downgradient wells MW-103, MW-104, and MW-105; iron in downgradient well MW-105 (see Figures 10 and 11); and manganese in downgradient well MW-107, crossgradient well MW-109, and background well MW-111 (Figure 9).

FIGURE 10
Dissolved Molybdenum in Groundwater, Fort Martin



Source: Hydrosystems Management, Inc., *Assessment of Ground-Water Monitoring Well System, Fort Martin Power Station CCB Landfill, Monongalia County, West Virginia* (Monroeville, PA: Allegheny Energy Supply), April 1, 2002.

FIGURE 11
Dissolved Iron in Groundwater, Fort Martin



Source: Hydrosystems Management, Inc., *Assessment of Ground-Water Monitoring Well System, Fort Martin Power Station CCB Landfill, Monongalia County, West Virginia* (Monroeville, PA: Allegheny Energy Supply), April 1, 2002.

Overall, concentrations of iron and manganese showed the greatest tendency to exceed secondary drinking water standards in the monitoring wells, while most other parameters remained below SMCL levels. As shown in Figures 9 and 11, both metals generally remained above their respective SMCLs even in wells with decreasing trends. There are no drinking water standards for boron or molybdenum, both of which are toxic metals of concern, but both metals sometimes reached concentrations above the EPA's Removal Action Levels (RALs). RALs are contaminant levels considered by the

EPA in deciding whether to provide alternate sources of drinking water under Superfund removal authority to people affected by contaminated drinking water sites.[56] Although SMCLs and RALs do not apply for regulatory purposes to these wells, they are used here for reference. These monitoring results, illustrated in Figures 7 through 11, show that groundwater quality is being adversely affected by coal ash.

POLLUTION FROM SEWAGE

Approximately 90 percent of the Monongahela riverfront in Fayette and Greene counties was not covered by municipal treatment service as of 1997.[57] Many communities within the study corridor rely on on-lot septic systems and discharge untreated sewage through so-called "wildcat sewers"—that is, pipes that simply take raw human sewage and dump it into a stream or river. Soils in the watershed have low permeability and the water table tends to be high. As a result, 90 percent of the soils are rated as moderate to severe for sanitary facilities such as septic systems, meaning that without special designs and extra maintenance, on-lot sanitary facilities can significantly pollute surface waters.[58]

Many communities within the study corridor rely on on-lot septic systems and discharge untreated sewage through so-called "wildcat sewers"—that is, pipes that simply take raw human sewage and dump it into a stream or river.

Bacterial contamination, often from untreated sewage, is an important measure of drinking water quality. Test results from water samples taken by the Greene County Conservation District in April 2001 show the presence of coliform bacteria, including *E. coli,* in Whiteley Creek and Little Whiteley Creek, which are tributaries of the Monongahela River. The presence of these bacteria is an indicator of contamination with fecal matter. *E. coli* were found in nine sampling locations in these creeks.[59] Virtually no data is available on bacterial levels in the Monongahela River in the study area.

INDUSTRIAL, WASTE DISPOSAL, AND HAZARDOUS WASTE SITES

The PA DEP's eMap database identifies the locations of 951 known and potential non-mining pollution sources in areas of Greene and Fayette counties that drain into the stretch of the Monongahela River separating the two counties. These include both point and nonpoint sources in categories such as air pollution sources (included in this section because they may contribute to surface water pollution), beneficial use sites where biosolids or septage are applied for soil treatment or as fertilizer, municipal waste sites, industrial and nonindustrial water pollution discharges, and facilities that generate hazardous waste, among others (see Table 12, page 28). Possible sources of water pollution in this area also include at least 830 active and abandoned oil and gas wells. Abandoned wells that have not been plugged may contribute to water pollution through oil and gas leaks that contaminate groundwater, and by allowing contaminated drainage from nearby mines or brine from deep geologic formations to reach the surface and run off into streams.[60] Unplugged wells can also create hydraulic connection between two aquifers, allowing contaminated water from one aquifer to infiltrate another aquifer. Those pollution sources closest to the Monongahela River are shown in Figure 12, page 29.

TABLE 12
Pollution Sources in Greene and Fayette Counties Potentially Affecting Water Quality

Site or facility type	Description	Number
Air emission plant	Facility that releases air emissions, including both fugitive and point (e.g., smokestack) emissions.	15
Beneficial land use	Area where biosolids or residential septage (liquids and/or solids removed from septic tanks, cesspools, or other similar systems) are applied as soil amendment or as fertilizers.	3
Brownfields	Properties that are contaminated from long-period uses.	7
Captive hazardous waste	Facilities operated by industries that generate hazardous waste that are used only to treat or dispose of their own waste.	23
Land recycling cleanup	Contaminated sites undergoing or proposed for cleanup, and other contaminated sites that have been identified but where no further action is expected.	2
Municipal waste	Includes landfills, resource recovery facilities, waste transfer stations, and land application (agricultural utilization) sites. All the landfills within Greene County whose locations have been identified in the database are inactive, closed, and/or abandoned.	15
Oil and gas location	Includes oil and gas wells, approved pits that are used to store oil and gas well fluids, and land application sites (where drilling cuttings or waste are disposed by land application).	830
Residual waste	Facilities that generate, process, transfer, incinerate, dispose of, or utilize waste generated at an industrial, mining, or wastewater facility.	5
Storage tank	Includes aboveground and underground storage tanks.	7
EPA Toxics Release Inventory (TRI)	Includes only facilities reporting to TRI where toxic chemicals are stored.	3
Water pollution control facility	Includes facilities such as discharge points (outfalls), industrial wastewater treatment plants, biosolids treatment facilities, and septic tanks containing industrial wastewater.	41

Source: Pennsylvania Department of Environmental Protection, eMap PA.

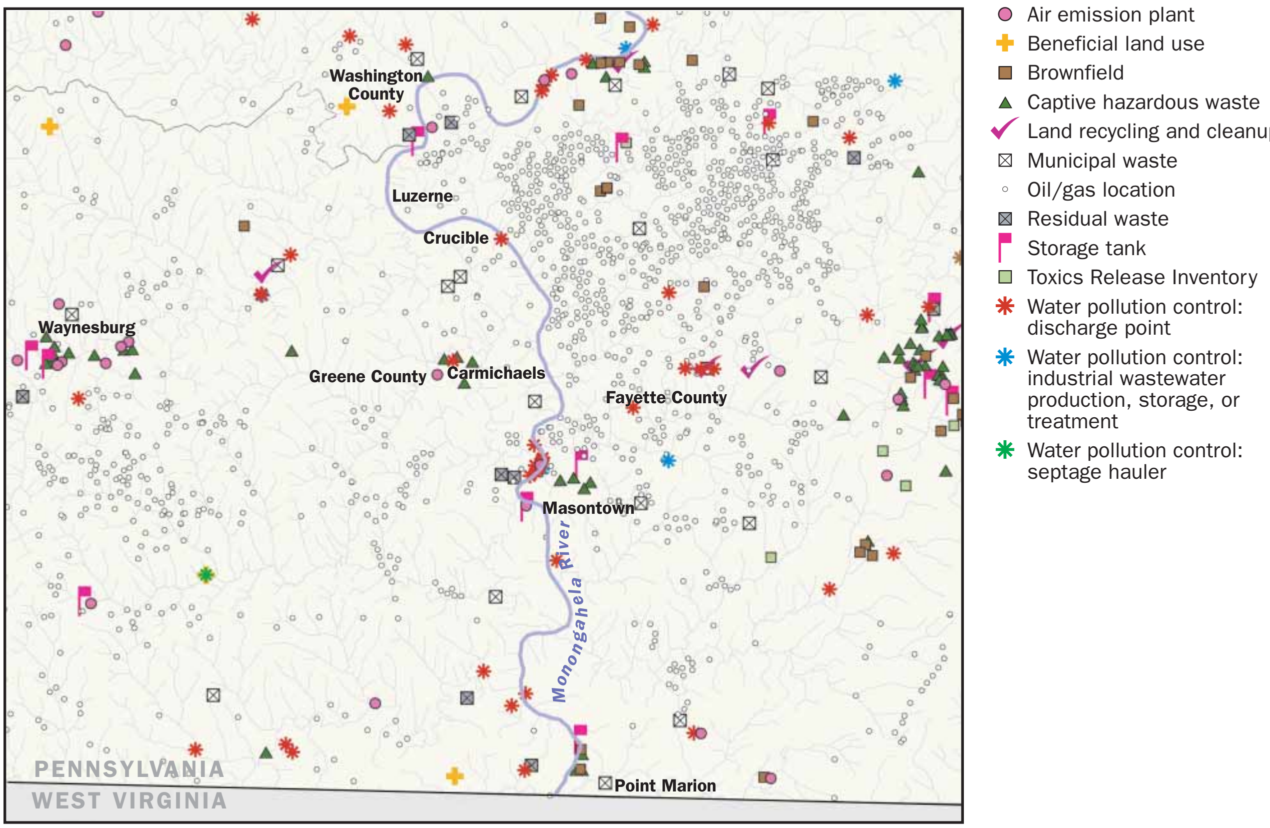
POLLUTED RUNOFF

Polluted runoff in the Monongahela watershed (often called nonpoint source pollution because it is not discharged through a pipe) is a major source of contaminants. The major polluted runoff sources include major roads and transportation corridors, atmospheric deposition, storm water/wet weather runoff from urban and developed areas, navigation, agricultural fertilizers and pesticides, runoff from surface mines, and pollution from malfunctioning on-lot septic systems.[61] In addition, accidental spills along roads, bridges, railroads, or barges can cause substantial contamination.

More than 50 percent of the Monongahela's watershed is forested, but there are some areas of significant urban development, in particular the city of Morgantown, West Virginia. Approximately 20 percent of the watershed is urbanized.[62] Sources of contamination in these areas include motor vehicles, landfills, illegal waste dumps, and different forms of chemical releases from various commercial activities. Twenty-four percent of the watershed is dedicated to agriculture. Potential contaminants resulting from this use include nitrates and coliform bacteria found in fertilizers and animal wastes, respectively.

Another source of water pollution that is particularly troublesome is the open dumping of coal ash from power plants in low-lying areas with the purpose of disposing of ash and reclaiming previously mined areas. While federal and state regulations set requirements that landfills must meet in order to receive this kind of

FIGURE 12
Non-Mining Pollution Sources Near the Monongahela River, Greene and Fayette Counties, PA



Source: Pennsylvania DEP

waste, the PA DEP allows companies to dispose of this ash in valleys instead of landfills without applying the same pollution-prevention measures (other than a layer of soil cover and some vegetation). Boron and other contaminants in the ash make it difficult for vegetation to become established, which leaves these sites more vulnerable to erosion and allows the formation of polluted runoff that contaminates streams. The lack of any significant barriers against pollution also means that groundwater becomes polluted as well. Without requirements to monitor groundwater after the dumping of the coal ash, the magnitude of the groundwater pollution often remains undetected. Groundwater and surface water monitoring at coal ash mine dump sites in West Virginia reveal significant contamination flowing from the coal ash.

CHAPTER 3

Drinking Water Quality Problems

There are six principal public water systems serving Greene County that have intakes in the Monongahela River or purchase their water from other suppliers who obtain their water from the Monongahela (see Table 13). The largest of these systems is Southwestern Pennsylvania Water Authority, which serves a population of approximately 34,000.

The following sections show the results of the most recent monitoring at these drinking water utilities. As noted below, many contaminants are monitored infrequently (such as once every nine years), so these results may be highly unreliable. For example, several water systems in the county detected elevated levels of arsenic and other contaminants in their water several years ago, but a single subsequent monitoring event years later may not have detected the contaminant.

EPA regulations allow waivers of inorganic chemical monitoring, based upon several rounds of early monitoring showing levels of the contaminants below standards, and a case-by-case review of the water system's source water, pumping patterns, variability in concentration of the contaminant, changes in stream flow, and other factors.[63] The case-by-case waiver, and determination of monitoring frequency, "shall be made in writing and [the state] shall set forth the basis for the determination."[64] However, the PA DEP issued a blanket rule that allows waivers of monitoring for nine years for systems that have levels of a contaminant below the MCL, with no

TABLE 13
Public Water Suppliers in Greene County with Intakes in the Monongahela River

Facility	Population served	Withdrawal (gal/day)	Intake location (river mile)
Brave Water Authority[a]	200	36,000	
Carmichaels Municipal Water Authority[b]	3,900	300,000	75.2
Dunkard Valley Joint Municipal Water Authority[c]	1,400	100,000	83
East Dunkard Water Association[c]	3,400	400,000	88.1
Mt. Morris Water & Sewage Authority[a]	1,500	100,000	
Southwestern PA Water Authority[b]	34,000	4,000,000	71.2
Total	**44,400**	**4,936,000**	

[a] Purchases water from another supplier, which has its intake on the Monongahela River.
[b] Intake downstream of both Fort Martin and Hatfield's Ferry power stations.
[c] Intake downstream of Fort Martin Power Station.

case-by-case review and no written determination justifying the waiver.[65] This is a clear violation of the federal rules.

NRDC does not consider a single or a few monitoring events, spread out over several years, to be adequate to determine the extent of any drinking water problem. This is particularly true for surface water supplies like those in Greene County using the Monongahela, whose source water quality can literally change by the minute. What does emerge from these data and the discussions below is a picture of several relatively small water systems struggling to maintain compliance while dealing with the sometimes challenging water quality from the Monongahela.

SOUTHWESTERN PENNSYLVANIA WATER AUTHORITY (SPWA)

This system serves areas of Greene, Fayette, and Washington counties. The SPWA obtains raw water from the Monongahela River at milepoint 71.2. Agricultural activity, roads, sewage treatment plants, and other possible sources of contamination upstream of the intake may affect raw water quality. Muddy Run's confluence with the Monongahela is about 1.7 miles upstream and on the same side as the water intake, which may also impact water quality due to turbidity and sewage.[66]

The SPWA's water treatment plant in Cumberland was built in 1995 with a design capacity of 9.2 million gallons per day (MGD), but currently produces about 4.33 MGD. The plant is permitted to withdraw 7.0 MGD from the river. A Filter Plant Performance Evaluation gave it an "Acceptable" performance rating. The evaluation looked specifically at turbidity in the finished water, removal of *Giardia*- and *Cryptosporidium*-sized particles, and general operation of the plant, including chemical treatment and filter backwashing. No problems were found in any of these areas, except for some chemical treatment procedures. The PA DEP recommended changing the time and order in which some treatment chemicals were added to ensure maximum effectiveness. The plant could have problems complying with an upcoming EPA rule on disinfection by-products (trihalomethanes and haloacetic acids) in drinking water. The average trihalomethane concentration measured in the third quarter of 2003 was 0.078 ppm, very close to the drinking water standard of 0.080 ppm (based on an annual average).[67] An upcoming EPA rule is expected to tighten this standard. Excessive ingestion of trihalomethanes may cause liver, kidney or central nervous system problems and increase the risk of cancer. In addition, recent evidence links elevated levels of these chemicals to reproductive problems, including birth defects, miscarriages, and low birth weight.

NRDC does not consider a single or a few monitoring events, spread out over several years, to be adequate to determine the extent of any drinking water problem.

Drinking Water Monitoring

According to the SPWA's 2002 Annual Drinking Water Quality Report (also known as Consumer Confidence or Right-to-Know Report), the authority's drinking water met all federal and state requirements. The parameters reported were: turbidity, barium, copper, fluoride, lead, nitrate, total trihalomethanes (TTHMs), and haloacetic acids (HAA-5). The PA DEP instructed the SPWA to include in its 2003 report one violation (late reporting of turbidity data). No violations were reported in the 1998, 1999, 2000,

TABLE 14
Southwestern Pennsylvania Water Authority (SPWA): Most Recent Monitoring Data, January 2001–March 2004 (in ppm, except as indicated)

Utility: SPWA	Parameter	Samples taken	Range	Average	MCL	Violations
South-Western Pennsylvania Water Authority (SPWA) (Current monitoring requirements became effective in 1994.) **Source: Monongahela River**	Total coliform	40 monthly Jan. 2001–Mar. 2004	Not detected	Not detected	5% pos.	
	Chlorine	Approx. 1 daily Jan. 2001–Mar. 2004, all at entry point	0.2–1.73	1.12	4.0	
		—2004: 91 samples (1 daily Jan. –Mar.)	0.4–1.5	1.09		
		—2003: 383 samples (1 or 2 daily)	0.3–1.73	1.09		
		—2002: 365 samples (1 daily)	0.2– 1.7	1.16		
	Disinfectant residual	2001: 376 samples (1 or 2 daily) at entry point	0.9–2.34	1.593		
	Haloacetic acids (Five)	Total: 36 samples (4 per quarter Feb. 2001–Feb. 2004)	2.6–39.7 ppb	16.8 ppb	60 ppb	
		—Max. residence: 9 samples	2.6–25.2 ppb	15.2 ppb		
		—Distribution: 27 samples	7.0–397.0 ppb	17.0 ppb		
	Trihalomethanes	Total: 56 samples (4 or 5 samples each quarter Feb. 2001–Feb. 2004)	10.3–101.5 ppb	44.0 ppb	80 ppb	The following values reported >MCL, but not necessarily viols.:
		—Max. residence: 14 samples (1 per quarter)	25.8–101.5 ppb	56.5 ppb		81.5 (11/17/03) 83.5 (8/18/03) 101.5 (11/6/02)
		—Distribution: 42 samples (3 per quarter)	10.3–84.0 ppb	39.5 ppb		81.0 (8/7/02) 84.0 (8/7/02
	Lead	30 samples in 2001	90th percentile: 5.0 ppb		15.0 ppb	
	Copper	30 samples in 2001	90th percentile: 49.0 ppb		1,300 ppb	
	Turbidity	112 to 2,000 per month	Not given	Not given	1 NTU	
	Volatile organic chemicals (VOCs)	1 annual	Not detected	Not detected	Various	
	Pesticides	2 samples each pesticide in 2003	Not detected	Not detected	Various	
	Synthetic organic chemicals (SOCs)	2 samples each SOC in 2003	Not detected	Not detected	Various	
	Inorganic chemicals (IOCs)	1 sample each IOC in 2002	Antimony, arsenic, beryllium, cadmium, chromium, cyanide (free), mercury, nickel: Not detected	Not detected	Various	
			Barium: 0.03		2	
			Fluoride: 0.93		4	
	Radiation	1 sample each in 2002	Alpha/excl. radon & uranium: 1.6		15 pCi/L	
			Radium 228: 1.5		5 pCi/L	
	Nitrate	4 samples (1 per year 2001–2004)	0.58–0.97	0.81	10	
	Total organic carbon	10 samples raw water and 10 from plant (1 each monthly Jan.–Oct. 2002)	Raw water: 1.2–2.7	1.85		
			Plant: 0.7–1.9	1.21		
	Total alkalinity	10 samples (1 monthly Jan–Oct 2002)	Raw water: 17.5–34.9	24.53		

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

or 2001 reports. The system had not reported any violations of drinking water quality standards in 2004 as of the first week of June. Recent water monitoring results reported to the PA DEP by the SPWA are shown in Table 14.

PA DEP monitoring found a few instances in 1996 in which non-enforceable secondary drinking water standards were exceeded. Samples taken from the residences of four SPWA customers in 1996 showed one concentration of 0.609 ppm of iron, above the secondary standard of 0.3 ppm, and an aluminum concentration of 0.0778 ppm, above the secondary standard of 0.05 ppm.

It is not possible to determine whether the lack of violations is truly representative of the quality of the drinking water supplied by the SPWA. Monitoring for inorganic contaminants, such as arsenic, barium, beryllium, cadmium, chromium, nickel, and selenium, is required only once per nine-year period (see Table 15), despite the fact that there are known sources of many of these contaminants in the watershed; most notably, the Hatfield's Ferry and Fort Martin power plants and mine or ash pile drainage areas.

A PA DEP memorandum indicates that the SPWA's Crucible plant should have monitored for inorganic chemicals (IOCs) for three consecutive years when it began operations in 1996. Instead, the SPWA assumed the plant was under the same reduced monitoring waiver that applied to its older treatment plant. Monitoring began instead in the period 1999–2002. Since three years of consecutive monitoring did not detect IOCs in excess of drinking water standards, the plant is now allowed to test every nine years. Only low concentrations of barium and fluoride were detected. Apparently, the PA DEP did not take any enforcement action for the lack of initial monitoring. The

TABLE 15
Drinking Water Monitoring Requirements: SPWA

Parameter	Monitoring requirements
Total coliform	40 monthly samples
Disinfectant residual	Sampled daily, reported monthly
Haloacetic acids (five)	1 quarterly sample
Trihalomethanes	1 quarterly sample
Lead	30 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Copper	30 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Turbidity	Sampled daily, reported monthly
Volatile organic compounds (VOCs)	1 annual sample by 12/31
Synthetic organic compounds (SOCs)	2 samples every three years. Due by 9/30/2003, 9/30/2006, and 9/30/2009.
Inorganic chemicals (IOCs)	**1 sample every nine years.** Due between 1/1/2002 and 12/31/2004.
Radiation	1 sample every four years. Due between 6/25/00 and 6/24/04.
Nitrate	1 annual sample due by 12/31

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

lack of detection of arsenic and some other IOCs is not reliable, since the three-year monitoring was apparently based on a single annual sample.

Public Complaints

There have been three complaints concerning the SPWA documented during the last 10 years in PA DEP files. The most recent complaint found by NRDC occurred in April 2004 and concerned high levels of lead found in a drinking water fountain in the Clarksville Post Office. Lead levels were 169 ppb. The EPA has set an action level for lead of 15 ppb (this is the level at which public water systems are required to take action to control the corrosivity of their water to minimize the leaching of lead from water pipes). A sample taken later by the PA DEP on a faucet that had been flushed the previous night showed only 2.4 ppb, but it is unclear whether the sample was taken in accordance with the EPA's protocol, which requires first draw water to be taken after the faucet has sat unused overnight. The PA DEP apparently took no further action.

The PA DEP received another complaint from an SPWA customer in 2000 regarding dirty water. The customer complained her daughter had become ill after drinking the water. The SPWA attributed the problem to the recent use of fire hydrants, which released sediments in the water lines. Another complaint was made in 1999 and concerned a chemical spill that had allegedly occurred in July 1997. The anonymous caller said the SPWA had not neutralized the spill and allowed the chemical to enter a lagoon that discharged into the river. This supposedly caused rise in the pH of the effluent that lasted three days and was not reported in the water treatment plant's Discharge Monitoring Report (DMR). Written communications between PA DEP staff discuss the possibility of an investigation, but we were not able to locate any documents indicating whether there was any further action.

A complaint in April 2004 concerned high levels of lead found in a drinking water fountain in the Clarksville Post Office.

BRAVE WATER AUTHORITY

Brave Water Authority purchases its water from the Morgantown Utility Board. The sources of this water are the Monongahela River and the Cobun Creek Reservoir. There is little information specific to this system in PA DEP files, perhaps because Brave is apparently only responsible for chlorination, and most water quality monitoring and treatment are carried out by the water supplier, not Brave.

Drinking Water Monitoring

As shown in Table 16, monitoring requirements for Brave Water are even less stringent than those for the SPWA because Brave is a smaller system serving only about 200 customers.

The system's Annual Drinking Water Quality Report for 2002 does not show any violations of drinking water quality standards for turbidity, fluoride, nitrate, total trihalomethanes, or haloacetic acids, the only chemicals reported. Brave is required to test for lead and copper, total coliform, cadmium, turbidity, and chlorine residual. Drinking Water Quality Reports for 1998 and 1999 showed no violations of drinking

TABLE 16
Drinking Water Monitoring Requirements: Brave Water Authority

Parameter	Monitoring requirements
Total coliform	1 monthly sample
Disinfectant residual	1 monthly sample
Haloacetic acids (five)	1 annual sample by 9/30
Trihalomethanes	1 annual sample by 9/30
Lead	5 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Copper	5 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Turbidity	Sampled daily, reported monthly
Volatile organic compounds (VOCs)	1 annual sample (monitored by Morgantown Utility Board)
Synthetic organic compounds (SOCs)	1 sample every three years (monitored by Morgantown Utility Board)
Inorganic chemicals (IOCs)	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files
Nitrate	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

water standards for those chemicals. PA DEP files show a violation for total coliform bacteria in three samples taken in 2001, which tested positive.

The most recent water quality monitoring for IOCs by the Morgantown Utility Board reported in the 1998 and 1999 Annual Water Quality Reports detected nitrate, barium, chromium, and fluoride, all below drinking water standards. Water monitoring results reported to the PA DEP by Brave Water are shown in Table 17.

CARMICHAELS MUNICIPAL WATER AUTHORITY

The Carmichaels water treatment plant was originally built in 1949 and refurbished in 1993. The plant withdraws water from the Monongahela River at milepost 75.2. The plant has a permitted water allocation of 500,000 gallons per day and serves approximately 3,900 consumers.

A Filter Plant Performance Evaluation in 2000 gave the Carmichaels water treatment plant an “acceptable” rating. No *Giardia* or *Cryptosporidium* were found in the finished water. The plant was not expected to have problems complying with the upcoming EPA rule on disinfection by-products (trihalomethanes and haloacetic acids) in drinking water because concentrations of total organic carbon (TOC) in both the raw and finished water were low.

The 2002 Source Water Assessment Report for Carmichaels mentions heavy metal discharge from local power plants, cumulative release of petroleum products from marinas along the river, and storm water runoff from developed areas as potential sources of contamination. The report also mentions potential contamination from wildcat sewers along the river. One of these appears to be about two miles upstream

TABLE 17
Brave Water Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Brave Water Authority (Current monitoring requirements became effective in 1994.) **Source: This system supplies water purchased from Morgantown Utility Board.**	Total coliform	1 routine sample monthly Jan. 2001–Mar. 2004	3 positive routine samples: May, Jun., Jul. 2001 (4 check samples taken for each positive routine sample, 1 check sample positive in each set of 4)		1 pos./ month	May, Jun., and Jul. 2001, and 1 pos. for E.coli (1 of 4 check samples positive each month)
	E. coliform	1 routine sample and 1 check sample in May 2001	1 routine sample positive in May 2001, check sample negative			May 2001 (check sample negative)
	Chlorine	1 sample Dec. 2003 from distribution	0.5 (1 sample)		4.0	
	Disinfectant residual	37 samples;* 1 monthly Jan. 2001–Feb 2004	0.06–2.5*	0.70*		
		—2004: 2 samples from distribution	0.4–0.6	0.5		
		—2003: 11 samples* from distribution	0.4–1.7*	0.77*		
		—2002: 12 samples from distribution	0.3–2.5	0.81		
		—2001: 12 samples from distribution	0.06–1	0.57		
	Haloacetic acids	No testing reported in database	No testing reported in database	No testing reported in database	60 ppb	
	Trihalomethanes	No testing reported in database	No testing reported in database	No testing reported in database	80 ppb	
	Lead	5 samples in 2002	90th percentile: 6.0 ppb		15 ppb	
	Copper	5 samples in 2002	90th percentile: 30.0 ppb		1,300 ppb	
	Turbidity	Not reported in PA DEP database	Not reported in PA DEP database. These chemicals are monitored by Morgantown Utility Board. In compliance according to 2002 Annual Drinking Water Quality Report.			
	Volatile organic chemicals (VOCs)					
	Synthetic organic chemicals (SOCs)					
	Inorganic chemicals (IOCs)					
	Radiation					
	Nitrate					
	Nitrite					

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

*Excluding outlier (301 ppm) of 10/15/2003.

of the water treatment plant intake, according to the map accompanying the report. There are other wildcat lines farther upstream.

Drinking Water Monitoring

The 2002 Annual Drinking Water Quality Report shows no violations of drinking water quality standards for turbidity, nitrate, barium, fluoride, lead, copper, synthetic organic compounds (SOCs), coliform bacteria, haloacetic acids, or total trihalomethanes. However, two samples tested positive for coliform bacteria in 2002. In addition, a test for trihalomethanes, chemicals that may cause cancer, certain birth defects, and miscarriages, detected a level of 93 ppb, which is higher than EPA's new standard of 80 ppb. However, it is unclear whether a violation took place, because violations are determined based on the results of a year of monitoring, which Carmichaels did not report. Subsequent monitoring reportedly found somewhat lower levels of trihalomethanes.

The PA DEP instructed the system to report one violation in its report for 2003, late reporting of coliform bacteria results in August, September, and October 2003. Reports for 1998, 1999, 2000, and 2001 show no violations of drinking water quality standards. Water monitoring results reported to the PA DEP by Carmichaels are shown in Table 18.

Tests for inorganic chemicals are required only once every nine years, under the same unlawful waiver provision applied to the other public water systems in the state. In 1998, tests found low concentrations of barium and fluoride. Of the regulated VOCs, xylene and toluene have been found, both in 2002 at concentrations below drinking water quality standards.[68] However, this detection means that the system has to monitor for VOCs annually by taking one sample during four consecutive years. If no additional detections are made, the system will be allowed to go back to a reduced monitoring schedule. Monitoring requirements for Carmichaels Municipal Water Authority are shown in Table 19.

Carmichaels employees found the remains of a rodent in the water meter servicing the home, but did not take water samples to check for bacterial contamination.

Public Complaint: Rat?

A public complaint concerning Carmichaels came from a customer who alleged that she detected a foul odor in her water and found animal remains in the screen on her faucet. Carmichaels employees found the remains of a rodent in the water meter servicing the home, but did not take water samples to check for bacterial contamination. The customer arranged to have her water tested by another laboratory, and results were positive for coliform bacteria. The water system apparently did not help the customer in cleaning out the water lines or with other measures necessary to clean out the contamination. Carmichaels later reimbursed the customer's costs, though it denied any responsibility for the problem.

DUNKARD VALLEY JOINT MUNICIPAL WATER AUTHORITY

Dunkard's water treatment plant was built in 1945, and the first water supply permit for the system was issued in 1950. The system serves a population of approximately 1,400 in Greensboro and Monongahela. The water comes from the left bank of the

TABLE 18
Carmichaels Municipal Water Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Carmichaels Municipal Water Authority (Current monitoring requirements became effective in 1995.) **Source: Monongahela River**	Total coliform	5 monthly 2001–04 from distribution; 6 check samples in 2002	2 positive routine samples in '02 (Sep & Oct); check samples negative		1 pos./ month	
	E. coli	2 samples Sept. and Aug. 2002	Not detected	Not detected		
	Chlorine	Total: 33 samples in Dec. 2003	0.21–1.67	1.21	4.0	
		—5 samples from distribution	0.21–1.14	0.714		
		—28 samples at entry point	1.08–1.67	1.297		
	Disinfectant residual	Total: 1,115 samples, approx. 1 per day Jan '01-Mar '04	0–1.87	1.23		
		—2004: 87 samples—entry point	0.95–1.57	1.21		
		—2003: 355 samples	0–1.87	1.269		
		—Entry point: 301 samples	0–1.87	1.36		
		—Distribution: 54 samples	0.09–1.45	0.76		
		—2002: 323 samples	0.23–1.79	1.32		
		—Entry point: 268 samples	1.01–1.79	1.43		
		—Distribution: 55 samples	0.23–1.29	0.751		
		—2001: 350 samples	0.13–1.8	1.12		
		—Entry point: 290 samples	0.7–1.8	1.24		
		—Distribution: 60 samples	0.13–1.29	0.56		
	Haloacetic acids	No testing reported	No testing reported	No testing reported	60 ppb	
	Trihalomethanes	Max. residence: 2 samples in Sept. 2002	92.9 – 92.9 ppb	92.9 ppb	80 ppb	2 values reported >MCL, not necessarily viols.
	Lead	20 taken in 2001	90th percentile: 12.0 ppb		15.0 ppb	
	Copper	20 taken in 2001	90th percentile: 194.0 ppb		1,300 ppb	
	Turbidity	84 – 145 per month	Values not given	Values not	1 NTU	
	Volatile organic chemicals (VOCs)	6 samples each VOC Mar. 2001–Apr. 2003	Only two detected:			
			—Toluene: 0.5 (1 sample)		1,000 ppb	
			—Xylenes (total): 2.7 ppb (1 sample)		10,000 ppb	
	Pesticides	2 samples in 2001, all at entry point	Not detected	Not detected	Various	
	Synthetic organic chemicals (SOCs)	2 or 3 samples each SOC in 2001, all at entry point	Only one detected:			
			Di(2-ethyl)phthalate: 0–0.003	0.001	0.006	

TABLE 18 (continued)
Carmichaels Municipal Water Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Carmichaels Municipal Water Authority (Current monitoring requirements became effective in 1995.) **Source: Monongahela River**	Inorganic chemicals (IOCs)	No testing reported	No testing reported	No testing reported		
	Radiation	1 sample from entry point in Jan. 2003	Alpha/excl. radon & uranium: 0.2		15 pCi/L	
			Combined uranium: 1		*	
			Radium 226: Not detected		5 pCi/L (combined)	
			Radium 228: Not detected			
	Nitrate	1 per year 2001–2004	0.2–0.833	0.636	10	
	Total organic carbon	12 samples raw water and 12 from plant (1 each monthly in 2003)	Raw water: 1.05–3.06	1.6967		
			Plant: 0.69–2.51	1.279		
	Total alkalinity	10 samples raw water (approx. 1 monthly in 2003)	16–51	29.3		

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

*30 ppb as of 12/08/03.

TABLE 19
Drinking Water Monitoring Requirements: Carmichaels

Parameter	Monitoring requirements
Total coliform	5 monthly samples
Disinfectant residual	5 monthly samples
Haloacetic acids (five)	1 quarterly sample
Trihalomethanes	1 quarterly sample
Lead	20 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Copper	20 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Turbidity	Sampled daily
Volatile organic compounds (VOCs)	1 annual sample by 12/31
Synthetic organic compounds (SOCs)	2 samples every three years. Due by 9/30/2003, 9/30/2006, and 9/30/2009
Inorganic chemicals (IOCs)	**1 sample every nine years.** Due between 1/1/2002 and 12/31/2004
Nitrate	1 annual sample due by 12/31

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

Monongahela River at milepost 83. The Grays Landing lock and dam is 0.75 miles downstream. A 1987 Public Water Supply Evaluation mentions a wildcat sewer discharging into the river about half a mile upstream of the water intake.

A 2001 Filter Plant Performance Evaluation gave the plant an "acceptable" rating. There was acceptable removal of *Giardia*- and *Cryptosporidium*-sized particles, although low concentrations of these were observed. It was determined that chlorine contact time was not sufficient to meet the 90 percent *Giardia* inactivation requirement. The filters are backwashed in sequence every other day. There was no filter-to-waste procedure after filter backwashing at the time of the 2001 evaluation, meaning that the gunk in the filters that has been taken out of the water is simply rerouted back into the source water, potentially concentrating pathogens in the water.

The plant was not expected to have problems complying with the upcoming EPA rule on disinfection by-products (trihalomethanes and haloacetic acids) in drinking water because concentrations of total organic carbon (TOC) in both the raw and finished water were low.

Reports of inspections and sanitary survey updates between 1997 and 2000 do not mention any violations of operational procedures. Inspection reports from April and October 1995 and October 1996 state that the plant had not completed its Operations and Maintenance Plan, but this type of violation is not mentioned again after 1996.

Drinking Water Monitoring

Dunkard's 2002 Annual Drinking Water Quality Report states there were no violations of drinking water quality standards for coliform bacteria, turbidity, radioactive contaminants, copper, lead, nitrate, haloacetic acids, or trihalomethanes. However, the PA DEP instructed Dunkard to report a violation of lead and copper monitoring requirements because the system did not take the number of samples required. The PA DEP Drinking Water Reporting System database, on the other hand, says no such monitoring is expected. PA DEP files did not clarify this inconsistency.

Dunkard was required to report another monitoring violation in its report for 2003 due to late reporting of coliform bacteria results in August, September, and October 2003. The EPA also issued a Notice of Violation (NOV) to Dunkard in November 2002 for late submission of the 2002 report. Reports for 1998, 1999, 2000, and 2001 show no violations of drinking water quality standards or monitoring requirements. Water monitoring results reported to the PA DEP by Dunkard Valley are shown in Table 20, page 42.

PA DEP records show some additional monitoring violations for failure to report turbidity data during seven months in 2002. Dunkard Valley is under a reduced monitoring schedule for inorganic contaminants (IOCs), like the other public water systems serving Greene County. This means that the system is required to test one sample every nine years. Monitoring requirements for Dunkard Valley are shown in Table 21, page 44.

Arsenic Contamination

The 1998 Annual Drinking Water Quality Report and lab reports evaluated by NRDC in PA DEP files show that 30 ppb of arsenic were detected in 1996. This concentration is below the old drinking water quality standard of 50 ppb set in 1942, but is three times the level allowed under the new standard of 10 ppb, which becomes enforceable in 2006. According to a 2001 National Academy of Sciences report on arsenic in drinking water, a person who drinks water containing this level of arsenic, 30 ppb, faces a lifetime fatal cancer risk of about 1 in 100—in other words, one out of every hundred people drinking this water for a lifetime would be expected to die prematurely of cancer as a result.[69] As noted in Table 20, no arsenic was detected in the most recent sample, but the data is inadequate to evaluate the true ongoing levels of arsenic in the water supply.

One out of every hundred people drinking this water for a lifetime would be expected to die prematurely of cancer.

Despite the new EPA arsenic standard of 10 ppb and past detections well above that level, according to a recent conversation with a PA DEP water supply inspector, it is not clear whether the agency will take any action to modify the reduced monitoring waivers that have been granted to the water systems.[70]

EAST DUNKARD WATER ASSOCIATION

The system serves a population of approximately 3,400 in the townships of Dunkard, Monongahela, Greene, and Cumberland. Its water treatment plant was built in 1983, and its water intake is about one mile downstream of the Cheat River confluence. There are wildcat sewers in the watershed upstream of this intake. The water treatment plant produces an average of 0.335 MGD.

Serious Filtration Problems

In 2002 a Filter Plant Performance Evaluation gave the plant an "unacceptable" rating. The evaluation identified an unacceptable performance in its ability to remove *Giardia* cysts, an insufficient coagulant control strategy, inconsistent operation of the clarification unit, inadequate process control testing, and no monitoring of the filters. Chlorine

TABLE 20
Dunkard Valley Joint Municipal Water Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Dunkard Valley Joint Municipal Water Authority (Current monitoring requirements became effective in 1995.) **Source: Monongahela River**	Total coliform	2 monthly 2001–2004 from distribution; 4 check samples in 2001	1 positive in routine samples; not detected in check samples		1 pos./mo.	
	E. coliform	1 sample in 2001 from distribution	Not detected			
	Chlorine	2 monthly; approx. 1 daily in Dec. 2003	Only Dec 2003 reported: All: 0.86–2.19	1.65	4.0	
		—Entry point, Dec. 2003: 31 samples	1.22–2.19	1.69		
		—Distribution, Dec. 2003: 2 samples	0.86–1.01	0.93		
	Disinfectant residual	All: 1,041; approx. 1 daily 2001–2004*	0.043–2.32*	1.32*		
		—2004: 97 samples Jan. 2004-Mar. 2004	1.02–2.14	1.692		
		—Entry point: 91 samples	1.47–2.14	1.72		
		—Distribution: 6 samples	1.02–1.52	1.27		
		—2003: 358 samples*	0.042–2.17*	1.51		
		—Entry point: 334 samples*	0.62–2.17	1.56		
		—Distribution: 24 samples	0.042–1.89	0.801		
		—2002: 192 samples	0.39–1.84	1.16		
		—Entry point: 180 samples	0.67–1.84	1.90		
		—Distribution: 12 samples	0.39–1.27	0.644		
		—2001: 394 samples	0.047–2.32	1.15		
		—Entry point: 366 samples	0.57–2.32	1.187		
		—Distribution: 28 samples	0.047–1.02	0.65		
	Haloacetic acids	Max. residence: 1 sample in 2002	7.0 ppb		60 ppb	
	Trihalomethanes	Max. residence: 1 sample in 2002	46.0 ppb		80 ppb	
	Lead	10 taken in 2001	90th percentile: 5.0 ppb		15.0 ppb	
	Copper	10 taken in 2001	90th percentile: 90 ppb		1,300 ppb	
	Turbidity	101–520 samples per month	Values not given	Values not given		
	Volatile organic chemicals (VOCs)	1 or 2 annual for each VOC	Not detected	Not detected	Various	
	Pesticides	1 sample in 2001	Not detected	Not detected	Various	
	Synthetic organic chemicals (SOCs)	1 sample in 2001	Not detected	Not detected	Various	
	Inorganic Chemicals (IOCs)	1 sample in 2001 and 1 in 2003	Antimony, arsenic, beryllium, cadmium, chromium, cyanide (free), mercury, selenium, thallium: Not detected	Not detected [Note: arsenic found at 30 ppb in 1996]	Various	
			Barium: 0.03–0.04 (2 samples)	0.035	2	
			Fluoride: 0–0.1	0.05	4	
			Nickel: 0–0.04	0.02	None	

TABLE 20 (continued)
Dunkard Valley Joint Municipal Water Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Dunkard Valley Joint Municipal Water Authority (Current monitoring requirements became effective in 1995.) **Source: Monongahela River**	Radiation	1 sample in Jan. 2003	Alpha/excl. radon & uranium: 1.6		15	
			Combined uranium: 1		**	
			Radium 226: 0.2		5 pCi/L (combined)	
			Radium 228: Not detected			
	Nitrate	1 annual 2001–2003	0.46–0.703	0.531	10	
	Total organic carbon	1 raw water and 1 from plant monthly Jan. 2003–Mar. 2004	Raw water: 0.89 – 2.53	1.29		
			Plant: 1.04–3.26	1.59		
	Total alkalinity	Raw water: 13 (1 monthly in 2004)	0–38	20.5		

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

*Excluding outlier (139 ppm) of 9/2/2003. **30 ppb as of 12/08/03.

TABLE 21
Drinking Water Monitoring Requirements: Dunkard Valley

Parameter	Monitoring requirements
Total coliform	2 monthly samples
Disinfectant residual	2 monthly samples
Haloacetic acids (five)	1 quarterly sample
Trihalomethanes	1 quarterly sample
Lead and copper	No monitoring of lead or copper is expected according to the PA DEP Drinking Water Reporting System database. However, PA DEP files say the agency required the system to report a violation of monitoring requirements for taking fewer samples than required.
Turbidity	Sampled daily, reported monthly.
Volatile organic compounds (VOCs)	1 annual sample by 12/31 if previously detected
Synthetic organic compounds (SOCs)	1 sample every three years. Due by 9/30/2003, 9/30/2006, and 9/30/2009
Inorganic chemicals (IOCs)	1 sample every nine years. Due between 1/1/2002 and 12/31/2004.
Radiation	1 sample every four years between 6/25/00 and 6/24/04
Nitrate	1 annual sample due by 12/31
Total organic carbon	1 monthly sample
Total alkalinity	1 monthly sample

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

contact time was deemed to be sufficient for inactivation (i.e., to kill bacteria and viruses), except perhaps under cold-water conditions. The pH in the finished water was 9.5, above the non-enforceable secondary drinking water standard of 6.5 to 8.5.

Drinking Water Monitoring

According to East Dunkard's 2002 Annual Drinking Water Quality Report, there were no violations of drinking water quality standards for turbidity, copper, lead, or total trihalomethanes. East Dunkard had a monitoring requirement violation in 2002 for late testing for volatile organic compounds (VOCs), which should have been sampled between January and March 2002. The 1998, 1999, 2000, and 2001 reports mention no violations of water quality standards or monitoring requirements.

The PA DEP has instructed East Dunkard to report a violation in its upcoming Drinking Water Quality Report for 2003. The violation involved late reporting of results for total coliform bacteria for September and October 2003. PA DEP records also show there was a violation for late reporting of turbidity results during September 2003. Water monitoring results reported to the PA DEP by East Dunkard are shown in Table 22.

Arsenic Contamination

Like Dunkard Valley, East Dunkard reported a detection of 30 ppb of arsenic in April 1996. This concentration is below the current drinking water quality standard,

TABLE 22
East Dunkard Water Association: Most Recent Monitoring Data, January 2001 - March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
East Dunkard Water Association (Current monitoring requirements became effective in 1994.) **Source: Monongahela River**	Total coliform	6 samples monthly 2001-Mar. 2004	Not detected	Not detected	1 pos./mo.	
	Chlorine	96 samples*; approx. 1 daily Dec. 2003–Feb. 2004	0.5–1.7	0.93	4.0	
		—2004: 60 samples at entry point	0.5–1.6	0.92		
		—2003: 36 samples*	0.8–1*	0.94*		
		—Entry point: 31 samples	0.8–1	0.94		
		—Distribution: 5 samples*	1–1*	1*		
	Disinfectant residual	All: 1,273; approx. 1-2 daily 2001–2003	0–2.2	0.98		
		—2003: 399 samples**	0.5–2**	0.96**		
		—Entry point: 334 samples**	0.5–2**	1.04**		
		—Distribution: 65 samples	0.5–1	0.55		
		—2002: 436 samples	0.5–2.2	0.99		
		—Entry point: 365 samples	0.5–2.2	1.06		
		—Distribution: 71 samples	0.5–1	0.593		
		—2001: 437 samples	0–1.8	0.98		
		—Entry point: 365 samples	0.5–1.8	1.04		
		—Distribution: 72 samples	0–1	0.72		
	Haloacetic acids	Max. residence: 2 samples, 1 in 2002 and 1 in 2004	Not detected	Not detected	60 ppb	
	Trihalomethanes	Max. residence: 2 samples, 1 in 2002 and 1 in 2004	34.0–13.01 ppb (2 samples)	23.5 ppb (2 samples)	80 ppb	
	Lead	20 taken in 2001	90th percentile: 5.0 ppb		15 ppb	
	Copper	20 taken in 2001	90th percentile: 5.0 ppb		1,300 ppb	
	Turbidity	37–78 monthly from 2001-Mar. 2004	Values not given	Values not given		
	Volatile organic chemicals (VOCs)	3 samples (1 annually)	Not detected	Not detected	Various	
	Pesticides	1 sample in 2001	Not detected	Not detected	Various	
	Synthetic organic chemicals (SOCs)	1 sample in 2001	Not detected	Not detected	Various	
	Inorganic chemicals (IOCs)	1 sample in 2003	Antimony, arsenic, beryllium, cadmium, chromium, cyanide (free), mercury, nickel, selenium, thallium: Not detected	Not detected [Note: arsenic found at 30 ppb in 1996]	Various	
			Barium: 0.03		2	
	Radiation	1 sample in 2003	Alpha/excl. radon & uranium: 0		15	
			Combined uranium: 0		***	
			Radium 226: 0.645		5 pCi/L (combined)	
			Radium 228: 0			
	Nitrate	2 samples, 1 in 2001 & 1 in 2002	0–0.54 (2 samples)	0.27	10	
	Nitrite	No testing reported	No testing reported	No testing reported		
	Total organic carbon	Raw water: 3 samples in 2004	0.86–1.22	1.09		

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

*Excluding outlier (10 ppm) of 12/3/03. **Excluding outlier (10 ppm) of 12/3/03. ***30 ppb as of 12/08/03.

TABLE 23
Drinking Water Monitoring Requirements: East Dunkard

Parameter	Monitoring requirements
Total coliform	4 monthly samples
Disinfectant residual	Daily; reported monthly
Haloacetic acids (five)	1 quarterly sample
Trihalomethanes	1 quarterly sample
Lead	20 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Copper	20 samples every three years by 9/30/2004, 9/30/2007, and 9/30/2010.
Turbidity	Sampled daily, reported monthly
Volatile organic compounds (VOCs)	1 annual sample by 12/31
Synthetic organic compounds (SOCs)	1 sample every three years. Due by 9/30/2003, 9/30/2006, and 9/30/2009.
Inorganic chemicals (IOCs)	**1 sample every nine years.** Due between 1/1/2002 and 12/31/2004.
Radiation	1 sample every four years between 6/25/2000 and 6/24/2004.
Nitrate	1 annual sample due by 12/31

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

TABLE 24
Drinking Water Monitoring Requirements: Mt. Morris

Parameter	Monitoring requirements
Total coliform	2 monthly samples
Disinfectant residual	2 monthly samples
Haloacetic acids (five)	1 quarterly sample
Trihalomethanes	1 quarterly sample
Lead	10 samples every three years. Due by 9/30/2004, 9/30/2007, and 9/30/2010.
Copper	10 samples every three years by 9/30/2004, 9/30/2007, and 9/30/2010.
Turbidity	Sampled daily, reported monthly
Volatile organic compounds (VOCs)	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files.
Synthetic organic compounds (SOCs)	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files.
Inorganic chemicals (IOCs)	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files.
Radiation	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files.
Nitrate	Monitored by Morgantown Utility Board. Frequency not described in PA DEP files.

Source: PA DEP, Drinking Water Reporting System, www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html.

TABLE 25
Mt. Morris Water & Sewage Authority: Most Recent Monitoring Data, January 2001–March 2004 (in ppm except as indicated)

Utility	Parameter	Samples taken	Range	Average	MCL	Violations
Mt. Morris Water & Sewage Authority (Current monitoring requirements became effective in 1993.) **Source: This system supplies water purchased from Morgantown Utility Board.**	Total coliform	2 monthly Jan. 2001–Mar. 2004	Not detected		1 pos./ month	
	Chlorine	2 samples in Dec '03	1.28–1.3 (2 samples)	1.29 (2 samples)	4.0	
	Disinfectant residual	70 samples; 2 monthly Jan '01 —Nov '03	0.4–1.4	0.88		
		—2003: 22 samples from distribution	0.6–1.4	0.98		
		—2002: 24 samples from distribution	0.4–1.4	0.89		
		—2001: 24 samples from distribution	0.4–1.4	0.79		
	Haloacetic acids	Max. residence: 2 samples; 1 in 2003 and 1 in 2004	25.2–58.8 ppb	42.0 ppb	60 ppb	
	Trihalomethanes	Max. residence: 2 samples; 1 in 2003 and 1 in 2004	25.3–68.7 ppb	47.0 ppb	80 ppb	
	Lead	10 in 2001	90th percentile: 5.0 ppb		15.0 ppb	
	Copper	10 in 2001	90th percentile: 15.0 ppb		1,300 ppb	
	Turbidity	Not reported in PA DEP database	Not reported in the PA DEP database. These chemicals are monitored by Morgantown Utility Board. In compliance according to 2002 Annual Drinking Water Quality Report.			
	Volatile organic chemicals (VOCs)					
	Synthetic organic chemicals (SOCs)					
	Inorganic chemicals (IOCs)	3 samples; 1 annual 2001–2003	Cadmium: 0.3–0.5 ppb (No other reported)	0.4 ppb	5.0 ppb	
	Radiation	Not reported in the PA DEP database	Not reported in the PA DEP database. These chemicals are monitored by Morgantown Utility Board. In compliance according to 2002 Annual Drinking Water Quality Report.			
	Nitrate					
	Nitrite					
	Total organic carbon					
	Total alkalinity					

Source: PA DEP, Drinking Water Reporting System, www.drinking water.state.pa.us/dwrs/HTM/DEP_frm.html.

but three times the new EPA arsenic standard of 10 ppb that will become effective January 23, 2006. East Dunkard is under a reduced monitoring schedule for inorganic contaminants (IOCs), including arsenic, like the other public water systems serving Greene County. According to a 2001 National Academy of Sciences report on arsenic in drinking water, a person who drinks water containing this level of arsenic, 30 ppb, faces a high lifetime fatal cancer risk of about 1 in 100[71]—in other words, one out of every hundred people drinking this water for a lifetime would be expected to die prematurely of cancer as a result. The potentially good news is that a single sample IOC test in 2003 reportedly found no detectable arsenic. More frequent monitoring is absolutely crucial for this water supply to determine how often arsenic is a problem, and at what levels. Current monitoring requirements for East Dunkard are shown in Table 23.

More frequent monitoring is absolutely crucial for this water supply to determine how often arsenic is a problem, and at what levels.

MT. MORRIS WATER & SEWAGE AUTHORITY

This system serves a population of approximately 1,500 people. Mt. Morris purchases its water from the Morgantown Utility Board. The sources of this water are the Monongahela River and Cobun Creek Reservoir. There is little information specific to this system in PA DEP files, perhaps due to the fact that there is minimal water treatment (other than chlorination) and most water quality monitoring is carried out by its supplier.

Drinking Water Monitoring

The system's Annual Drinking Water Quality Reports for 1998, 1999, 2000, 2001, and 2002 do not show any violations of drinking water quality standards or monitoring requirements. The system is required to test for lead, copper, total coliform, cadmium, and chlorine residual (see monitoring requirements in Table 24). PA DEP files show no violations for the last 10 years. Monitoring for inorganic chemicals (IOCs) and volatile organic chemicals (VOCs) by the Morgantown Utility Board, which supplies the water served by Mt. Morris, found only low concentrations of barium, chromium, and fluoride below drinking water standards. Water monitoring results reported to the PA DEP by Mt. Morris are shown in Table 25.

A PA DEP investigation in 2001 detected regulated and unregulated volatile organic compounds (VOCs) in the drinking water. These included o-xylene (68.2 ppb), n-butylbenzene (0.299 ppb), acetone (4.59 ppb), methyl ethyl ketone (3.75 ppb), isopropylbenzene (1.02 ppb), MIBK (4.49 ppb), m/p xylene (163 ppb), and chloroform (111 ppb). Of these, only chloroform and xylenes are regulated, and the concentrations detected were below drinking water standards. We did not find any agency records indicating what prompted the investigation, or whether there was any further PA DEP involvement. The occurrence of these toxic chemicals in the town's water supply is a serious concern.

CHAPTER 4

Sources of Air Pollution

POLLUTION UNCHECKED

A Case Study of Greene County, Pennsylvania

December 2004

Even though Greene County is home to the Hatfield's Ferry power plant, the second largest air polluter in Pennsylvania, ambient air quality monitoring in the county is extremely limited. There are major gaps in our knowledge of the health threats posed by air pollution in the county. According to the most recent published Pennsylvania DEP report on air quality monitoring, there is only a single ambient air quality monitoring station in Greene County, situated in Holbrook (apparently upwind of the Hatfield plant under prevailing wind patterns).[72] This station monitors only three "criteria" air pollutants: ozone, sulfur dioxide, and carbon monoxide—not nitrogen oxides, particulate matter, lead, or any air toxics. For example, beryllium, a highly toxic metal, is not monitored in Greene or in other nearby counties, even though Hatfield's Ferry releases over half of the reported beryllium emissions in the entire state of Pennsylvania (see Table 26, page 50).

In spite of this exceedingly limited monitoring, Greene County has still been designated as a non-attainment area—that is, it does not meet the EPA's health-based National Ambient Air Quality Standard for ozone.[73] The county received the designation because of multiple violations of the 8-hour ozone standard; there were 21 days of violation in 1999, 6 days in 2000, 12 days in 2001, 9 days in 2002, and 3 days in 2003.[74] The state has classified Greene as a transport county, meaning that the ozone problem is in part from long-range transport of pollution from distant, often

EPA AIR POLLUTANT DEFINITIONS

Criteria air pollutants: The EPA has set National Ambient Air Quality Standards to protect human health and welfare from six criteria air pollutants: ozone (O_3), carbon monoxide (CO), total suspended particulates (also know as particulate matter, or PM), sulfur dioxide (SO_2), lead (Pb), and nitrogen oxides (NO_x). These pollutants are hazardous to human health.

Hazardous air pollutants: These pollutants are not regulated by ambient air quality standards but, as defined in the Clean Air Act, may present a threat of adverse human health effects or adverse environmental effects. Such pollutants include asbestos, beryllium, mercury, benzene, coke oven emissions, radionuclides, and vinyl chloride.

Source: U.S. Environmental Protection Agency, Terms of the Environment, http://www.epa.gov/OCEPAterms/.

TABLE 26
Atmospheric Emissions of Pollutants (in pounds), Hatfield's Ferry Power Station

Chemical	2000	2001	2002	
			TOTAL RELEASES (LBS)	AS A PERCENT OF TOTAL AIR RELEASES IN PA
Arsenic	3,203	3,403	3,904	20.6
Barium	8,108	8,627	6,428	8.8
Beryllium	240	260	270	50.9
Chromium	1,658	1,805	1,705	1.5
Cobalt	420	452	420	6.1
Copper	1,143	1,303	1,111	0.9
Dioxin	0.00145	0.00165	0.001492	0.2
Ethylene glycol	—	1	—	—
Hydrochloric acid	7,107,100	6,806,800	5,405,400	10.6
Hydrogen fluoride	660,660	750,750	680,680	12.6
Lead	1,401	1,531	1,571	1.7
Manganese	2,312	2,506	2,302	2.7
Mercury	581	681	421	4.6
Nickel	1,475	1,505	1,506	0.5
Selenium	12,012	14,014	12,012	22.3
Sulfuric acid	1,001,000	1,101,000	960,960	9.3
Vanadium	3,203	3,403	2,503	10.2
Zinc	4,104	4,509	3,871	0.3
Total	**8,808,620**	**8,702,550**	**7,085,064**	

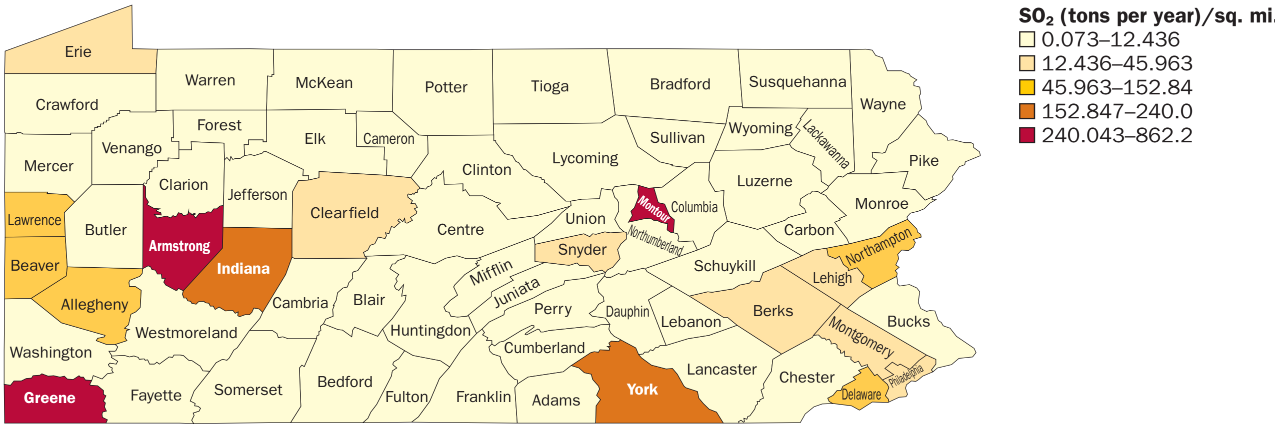
Source: EPA Toxics Release Inventory

out-of-state sources.[75] The county also is listed in the "basic" non-attainment category; that is, its ozone problems were serious but not as severe as a few highly industrialized areas, such as around Philadelphia. Greene County is required to come into compliance with the ozone standard no later than June 2009.[76]

The state does not monitor particulate matter in Greene County at all—neither $PM_{2.5}$ (particulate matter with a size of less than 2.5 microns), which is especially dangerous to health because it can penetrate deep into lungs, nor PM_{10} (soot under 10 microns). Despite this lack of monitoring (or perhaps, because of it), the PA DEP considers the county to be in attainment for PM, as the agency stated in its recommendations to the EPA in February 2004.[77] However, in June 2004, the EPA proposed designating Greene County as a non-attainment area for $PM_{2.5}$ due to the proximity of particulate sources, a decision the state is expected to fight. A final decision is expected in late 2004. In contrast, the PA DEP recommended Washington, Beaver, Allegheny, and Westmoreland, which surround Greene and Fayette counties to the north, as non-attainment areas based on monitoring data there showing PM problems, and they have been so designated by the EPA.[78]

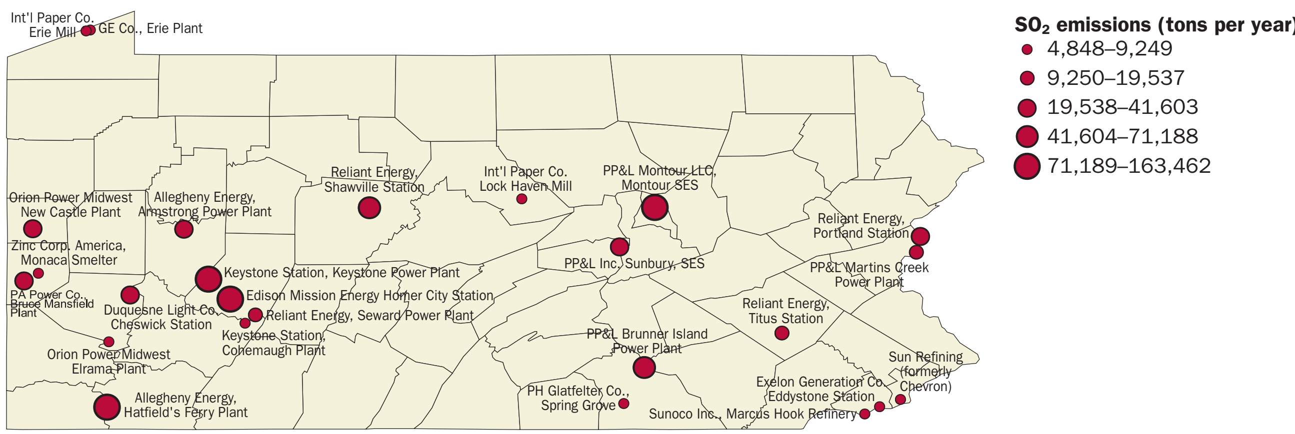
Greene County is currently designated as an attainment area for carbon monoxide, nitrogen dioxide, and sulfur dioxide. However, the county has among the highest

FIGURE 13
SO_2 Emissions Density, 1999



Source: Pennsylvania DEP, 2002

FIGURE 14
Top 25 SO_2-Emitting Facilities, 1999



Source: Pennsylvania DEP, 2002

densities of sulfur dioxide emissions in the state, due to the Hatfield's Ferry power plant (see Figure 13).

Allegheny Energy's Hatfield's Ferry and Fort Martin power stations are the most significant local sources of air pollution in Greene County—and the Hatfield plant is one of the largest in the state (see Figure 14). According to the EPA's Toxics Release Inventory (TRI), these plants reported the release of a total of 13.1 million pounds of toxic air pollutants in 2002, the most recent year for which data are available.[79] This figure does not include the approximately 99 million pounds of nitrogen oxides and 511 million pounds of sulfur oxides released by the two stations annually. In addition, both Hatfield and Fort Martin are important sources of airborne particulate matter, which is released during the combustion of coal and during the handling and disposal of fly ash remaining from the combustion process.

HEALTH EFFECTS OF SOME POLLUTANTS IN GREENE COUNTY AIR

Arsenic: Inhaling arsenic increases the risk of lung cancer. Inhaling low doses over long periods may cause skin problems and nervous system disorders. Arsenic released into the air may contaminate water supplies. Oral ingestion of arsenic increases the risk of cancer of the bladder, kidneys, liver, lungs, prostate, and skin.

Beryllium: Beryllium inhalation may cause lung damage and increase the risk of lung cancer.

Nitrogen oxides (NO_x): NO_x may cause lung damage and is associated with premature death. Inhaling NO_x may aggravate heart disease and respiratory illnesses, such as bronchitis and emphysema. NO_x contributes to the formation of ground-level ozone (smog).

Ozone: Ozone irritates the lungs and causes breathing problems. It may also aggravate asthma, reduce lung capacity, increase susceptibility to bronchitis and pneumonia, and cause permanent lung damage.

Particulate matter (PM): PM may cause breathing difficulties, worsen asthma symptoms, and cause chronic bronchitis, decreased lung function, and premature death.

Sulfur dioxide (SO_2): SO_2 may cause breathing difficulties, lung disease, and aggravate asthma and heart disease.

Sources: Agency for Toxic Substances and Disease Registry, Public Health Statements (PHSs), available online at: http://www.atsdr.cdc.gov/phshome.html; EPA, "What Are the Six Common Air Pollutants?" 2004, www.epa.gov/air/urbanair/6poll.html.

As discussed below, in addition to releasing large amounts of toxic chemicals, these facilities also have a history of regulatory compliance problems stretching back over 30 years. The information regarding their compliance record and environmental impacts was compiled after a review of records and databases of the following agencies: the PA DEP, the West Virginia Department of Environmental Protection (WV DEP), the EPA, and the USGS.

HATFIELD'S FERRY POWER STATION

The Hatfield's Ferry power station is located in Monongahela Township, Greene County, Pennsylvania, on the banks of the Monongahela River. This coal-fired plant, which has been in service since 1969, is owned by Allegheny Energy Supply Company and has a generating capacity of 1,710 megawatts.[80]

Toxic Chemicals

According to the EPA's Toxics Release Inventory (TRI), the Hatfield's Ferry power plant in Monongahela Township is Pennsylvania's second largest source of air pollutants, with more than 7 million pounds released in 2002.[81] Of this amount, more than 6.1 million pounds were chemicals classified as hazardous air pollutants by the EPA. These included arsenic, beryllium, chromium, cobalt, hydrochloric acid, hydrogen fluoride, lead, manganese, mercury, nickel, and selenium. A reduction of

1.6 million pounds in total reported releases was due mostly to a decrease in hydrochloric acid emissions.

Hatfield's Ferry is representative of a larger problem affecting the state of Pennsylvania. According to an August 2004 report by the National Environmental Trust, Pennsylvania's power plants ranked first in arsenic emissions, second in dioxin and acid gases, third for lead and chromium, and fifth for organic chemical releases in 2002. Hatfield's Ferry itself ranked third nationwide for arsenic releases among the approximately 400 coal and oil-fired power plants that reported releases to the TRI.[82]

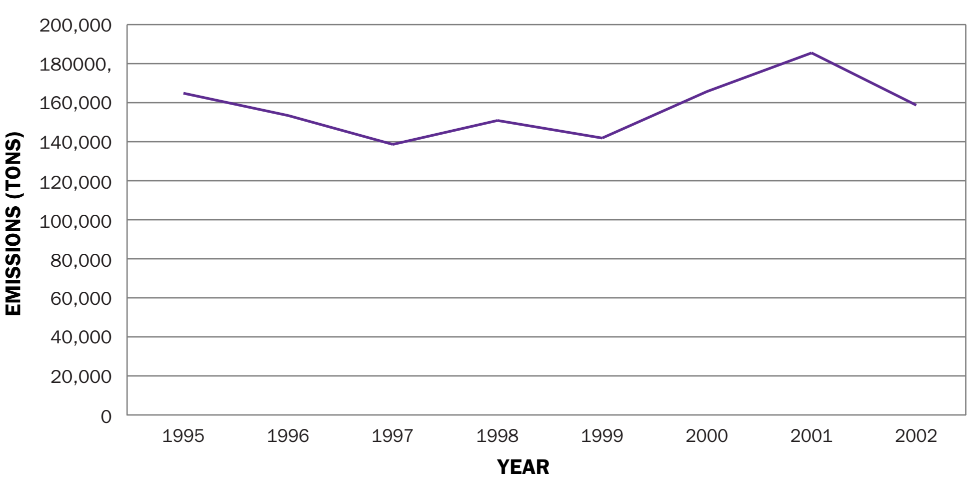
Sulfur Dioxide and Nitrogen Oxides

Releases of SO_2 and NO_x are not part of the TRI reporting system. Both SO_2 and NO_x can cause or aggravate respiratory problems. In addition, NO_x emissions are a precursor of ground-level ozone, and Greene County air does not meet federal ozone standards.

In 2001, Hatfield's Ferry was first among the nation's power plants for releases of SO_2.[83] According to EPA data, this station released approximately 185,496 tons (371 million pounds) of SO_2 to the air that year. SO_2 emissions increased by 12 percent from 1995 to 2001. However, a decrease of 26,783 tons was reported in 2002, a reduction of 14 percent compared to 2001, which still leaves Hatfield in second place among U.S. power plants for SO_2 emissions. Figure 15 shows the trend in SO_2 emissions from 1995 to 2002.

Hatfield released 27,402 tons (54.8 million pounds) of NO_x in 2001, and was ranked thirty-third among all power plants for NO_x emissions that year. After slowly decreasing from 1995 to 1999, NO_x emissions increased again from 2000 to 2001, when they were 5 percent higher than 1995 levels. Like SO_2, NO_x emissions reportedly decreased by 4,337 tons (16 percent) from 2001 to 2002 (see Appendix, Table A-1).[84]

FIGURE 15
Hatfield's Ferry SO_2 Emissions, 1995–2002



Source: EPA Acid Rain Program.

New Source Review (NSR) and Prevention of Significant Deterioration (PSD) Violations for SO_2 and NO_x

In 2000, the EPA required Allegheny Energy to provide information on operations and maintenance of some of its power stations, including Hatfield's Ferry, to determine compliance with NSR and PSD regulations. The NSR rules require that if significant modifications are made at an air pollution source that may increase air emissions, improved air pollution controls must be installed to reduce emissions. PSD rules prohibit pollution sources from modifications that could degrade air quality in attainment areas (where certain EPA health standards are met). The company provided information in 2000, 2001, and 2002. The information request was made pursuant to Section 114 of the Clean Air Act. EPA and company officials met in July 2003.[85] However, as has been widely reported, under the Bush administration, the EPA essentially abandoned the enforcement of air pollution rules against power plants, leaving the problem in the laps of the states. Several senior EPA enforcement officials resigned in protest.[86]

After the EPA dropped the ball, on April 23, 2004, the Commonwealth of Pennsylvania notified Allegheny Energy that the state believed the Hatfield plant was in violation of the NSR and PSD rules due to several modifications of the plant that caused increased SO_2 and NO_x emissions. In addition, Pennsylvania and three other state attorneys general issued a Notice of Intent to sue referencing the Hatfield plant on May 20, 2004.[87] That joint notice stated, in part:

> *Hatfield's Ferry plant in Masontown, Pennsylvania: The companies undertook the following major modifications of the plant including, but not necessarily limited to: (i) at Unit 1, replacement of the secondary superheater outlet header in or around 1996 and replacement of lower slope panels in or around 1997; (ii) at Unit 2, replacement of reheater pendants and roof tubes in or around 1993; replacement of the secondary superheater outlet header in or around 1996; and replacement of lower slope panels in or around 1999; and (iii) at Unit 3, replacement of the secondary superheater outlet header and ash hopper tube panels in or around 1996. The information available to us indicates that the companies should have projected a net emissions increase in emissions of NO_x and/or SO_2 from those projects, triggering the PSD and nonattainment NSR requirements.*[88]

This letter placed Allegheny Energy on formal notice that Pennsylvania and the other states intended to bring an enforcement action against the company for violations at five West Virginia plants, including Fort Martin. It noted Pennsylvania's investigation and suggested the possible joint prosecution of a suit against the company's Hatfield's Ferry plant and two others in Pennsylvania.

Particulate Matter

Hatfield's Ferry also releases large amounts of particulate matter in the form of large particles and also small particulates (PM_{10} and $PM_{2.5}$, the two most relevant from a health standpoint). The smaller particles are regarded as the most serious health threat because they can penetrate deep into the lungs.

The release of smaller particulate matter from this station has been a problem throughout its operating history. $PM_{2.5}$ and PM_{10} penetrate the respiratory tract and are associated with asthma attacks, impaired lung function, the aggravation of respiratory illnesses such as chronic bronchitis and emphysema, and premature deaths. To ensure that particulate emissions remain within acceptable limits, the company is required to monitor the opacity of its smokestack emissions, which is an indicator of particulate matter concentrations.[89] However, records show that the station has a history of exceeding opacity limits.

The first documented intervention by the PA DEP, based on a review of existing agency records, occurred in 1976 and involved the issuance of a Consent Order and Agreement requiring the company to reduce its particulate emissions. Problems have been documented on many other occasions since. For example, violations occurred during at least 10 of the 32 quarterly reporting periods from 1988 to 1995. The plant also violated the opacity standard during every quarter from the first quarter of 1999 to the fourth quarter of 2003. Hatfield reported 1,635 days of violation for emissions from its first stack during those five years, and 1,528 days of violation for its second stack during the same period.[90] The company was fined $150 in 2002 for violations of the opacity standard. Another fine of $6,750 was imposed in 2003 for other opacity violations that occurred in 2002.

The release of smaller particulate matter from this station has been a problem throughout its operating history.

The most significant incident related to particulate emissions in recent years took place from February to April 2002. The incident came to the attention of the PA DEP about a month after problems began when someone (apparently a station employee) complained to the agency that a tear in a precipitator gasket was causing a serious emissions problem. The situation lasted approximately two months. Despite the severity of the problem, a proposed $28,000 penalty was reduced to $10,000 after the company alleged the equipment failure was due to normal wear and tear, and electricity demand prevented it from making repairs sooner.

Particulates are released not only when coal is burned, but also during ash handling operations. The company was issued two Notices of Violation (NOVs) in 2002 for violating regulations concerning the handling of fly ash. One of these incidents was discovered after a station employee complained to the PA DEP about fly ash falling into the river and was blamed by the agency on improper ash handling procedures. The company was required to pay a penalty of $800 and submit an abatement plan. Later that same year, an incident occurred that involved fugitive emissions from a fly ash silo, which the company attributed to an equipment malfunction. The PA DEP took no enforcement action after issuing the NOV, citing the lack of public health complaints and the company's "good compliance history." However, citizens would not necessarily associate their health symptoms with the plant's operations, especially if they do not know that a violation is taking place. In an area where health effects due to everyday particulate releases from Hatfield may already be common, residents' complaints should not determine whether to impose penalties when a violation occurs.

Quarterly dustfall monitoring reports for a period from the second quarter 2000 to the third quarter of 2003 show that the area surrounding the plant has been consistently affected by a significant amount of large particulates exceeding the current dustfall standard of 42.8 tons per square mile (TSMM). Concentrations ranging from 45.90 TSMM to 114 TSMM were recorded during 18 of the 36 months in that reporting period. Since Hatfield is by far the most significant industrial source of particulates in the area and dustfall concentrations are strongly influenced by local sources, it appears likely that these high values are to a great extent the result of the station's particulate releases.

Despite high dustfall concentrations, PA DEP records show only two complaints about dustfall by residents living near the plant, both of which were made in the 1990s. Most recently, there was a complaint in 2003 about burn marks on a roadway and on the property of the St. George Serbian Orthodox Church, which is adjacent to the Hatfield's plant. Some church members who had experience working for the coal industry attributed the burn marks to stack emissions from the plant. The complaint also mentioned unusual noise activity at the plant. Although public complaints can be informative, they are not a reliable indicator of the extent of problems caused by the plant, as area residents have lived with three decades of constant particle emissions.

There also is a question about the extent of the contribution of these particles to surface water contamination in and around Greene County. At this point, NRDC was unable to locate any studies that provide answers about the extent that these particles may contribute to local water pollution problems.

TABLE 27
Atmospheric Emissions of Pollutants (in Pounds), Fort Martin Power Station

Chemical	2000	2001	2002	
			TOTAL RELEASES (LBS)	AS A PERCENT OF TOTAL AIR RELEASES IN WV
Arsenic	220	180	210	1.4
Barium	180	178	140	0.1
Beryllium	7	6	7	0.7
Chromium compounds	263	191	220	0.4
Cobalt	39	34	38	2.4
Copper	219	183	200	2.9
Dioxin	0.001	0.001	0.001143	0.8
Ethylene glycol	—	3	—	0.0
Hydrochloric acid	6,806,800	4,804,800	4,904,900	9.3
Hydrogen fluoride	530,530	470,470	540,540	14.2
Lead	100	153	100	0.7
Manganese	286	240	280	0.5
Mercury	420	400	421	8.3
Nickel	292	220	260	0.3
Selenium	10,010	—	—	0.0
Sulfuric acid	540,540	480,480	550,550	9.9
Vanadium	200	170	160	0.1
Zinc	811	717	753	3.4
Total	**7,890,917**	**5,758,425**	**5,998,779**	

Source: EPA Toxics Release Inventory.

FORT MARTIN POWER STATION

The Fort Martin power station is a coal-fired power plant located in Maidsville, West Virginia, on the banks of the Monongahela River just south of the Pennsylvania–West Virginia state line. The plant began operating in 1967. It is owned by Allegheny Energy Supply Company and has a generating capacity of 1,107 megawatts. [91]

Toxic Chemicals

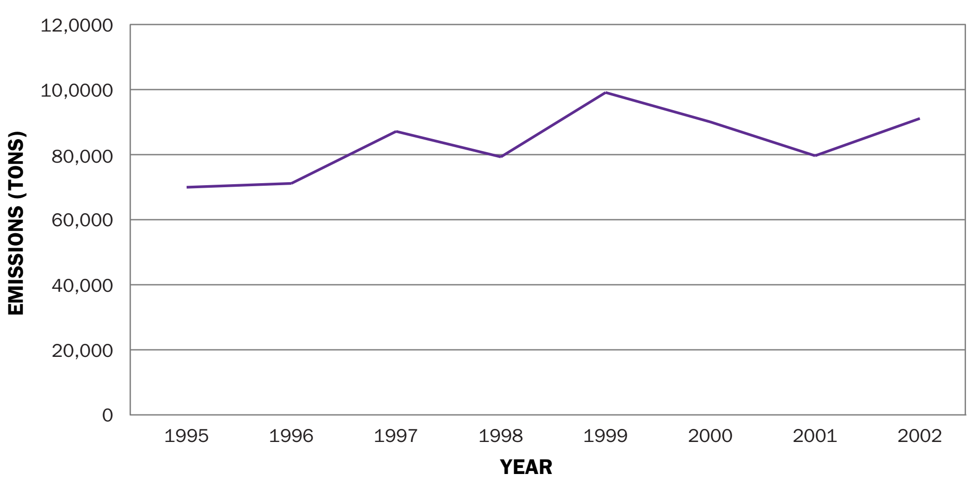
According to the TRI, the Fort Martin power station is West Virginia's fourth largest source of air pollutants, with nearly 6 million pounds released in 2002 (see Table 27).[92] Of this amount, more than 5.4 million pounds were chemicals classified as hazardous air pollutants by the EPA. These included arsenic, beryllium, chromium, cobalt, hydrochloric acid, hydrogen fluoride, lead, manganese, mercury, and nickel.

The figures above do not include releases of SO_2 and NO_x, which are not part of the TRI reporting system. Like Hatfield's Ferry, the Fort Martin station is an important source of both these pollutants.

Fort Martin's SO_2 emissions increased by 30.2 percent from 1995 to 2002 (see Appendix, Table A-2).[93] A 14 percent increase was reported from 2001 to 2002. This increasing trend is shown in Figure 16. The station also released 11,236 tons (22 million pounds) of NO_x in 2002. NO_x emissions actually decreased from 1995 to 2002. Reported 2002 emissions were 9 percent lower than 2001 levels.

Two NOVs for violating SO_2 emissions regulations were issued in 1981, and one in 1993. High SO_2 emissions levels may have significant local effects under certain conditions. A 1974 study found that levels of SO_2 in the area downwind from the station were among the highest ambient levels measured anywhere until that time, up to 0.1 ppm under conditions of poor atmospheric dispersion. That year the plant released 78,300 tons of total sulfur oxides, 12,819 tons less than the SO_2 released in

FIGURE 16
Fort Martin SO_2 Emissions, 1995–2002



Source: EPA Acid Rain Program.

2002. However, it is important to note this was a short-term study, and changes in other local sources of SO_2 must have occurred since 1974. No NOVs or other documents showing violations of NO_x limits were found in WV DEP files.

NSR and PSD Violations for SO_2 and NO_x

As noted above with respect to the Hatfield's Ferry plant, in 2000, the EPA initiated a process to evaluate whether Allegheny Energy power stations, including Fort Martin, were in compliance with NSR and PSD regulations. The NSR rules require emissions reductions for plants that make changes projected to increase emissions, while the PSD rules prohibit pollution sources from degrading air quality in attainment areas. After the Bush administration essentially abandoned this enforcement program against polluting power plants, on May 20, 2004, Pennsylvania and three other state attorneys general issued a Notice of Intent to sue Allegheny Energy for NSR and PSD violations at the Fort Martin plant and four others in West Virginia.[94] That joint notice stated, in part:

> *The companies undertook major modifications of the Fort Martin plant including, but not necessarily limited to: (i) at Unit 1, replacement of the pendant superheater assembly and the forced draft fan wheel in or around 1996; and (ii) at Unit 2, replacement of the pulverizers in or around 1987, replacement of the superheater outlet header and reheater pendants in or around 1996, and replacement of the superheater outlet bank, commencing in or around 2001. The information available to us indicates that the companies should have projected a net emissions increase (as defined in CSR §45-14-2) in emissions of NO_x and SO_2 from those projects, triggering the PSD requirements.*[95]

Particulate Matter

Like the Hatfield's Ferry station, Fort Martin is also an important source of particulate matter due to coal combustion and ash handling and disposal operations. But unlike Hatfield's Ferry, Fort Martin is not required to monitor dustfall to track the deposition of large particles.

Fort Martin does monitor the opacity of its smokestack emissions, which is an indicator of $PM_{2.5}$ and PM_{10} emissions. The plant's pollution control equipment (electrostatic precipitators) was tested in 2002 and found to be in compliance with permit requirements. However, there were 19 incidents involving exceedances of the opacity standards from 2000 to September 2003.[96] Six of those incidents reportedly were related to unit start-ups, and were alleged to be exempt from the opacity limit. The other 13 incidents were supposedly due to causes such as weather damage to equipment, electrical problems, and excess ash accumulation in the ash hoppers. Most of these were alleged to be "malfunctions" and also supposedly were excluded from the permit limit. There were also at least 36 other incidents from 1996 to 1999. Exceedances also occurred during all four quarters of 1994.

Fort Martin's history of particulate pollution problems dates back to the 1970s, when repeated inspections found violations of opacity standards.[97] The WV DEP issued a

Cease and Desist Order against the plant in 1978 to control particulate pollution. A Consent Order in 1979 and a Consent Decree in 1980 reaffirmed the order to replace the pollution control equipment. The new precipitators went online in 1982.

Despite many exceedances of opacity standards, NOVs were issued only in 1978 (10 NOVs), 1979 (3 NOVs), 1989 (1 NOV), and 1994 (2 NOVs). Since most of the incidents were said to be due to malfunctions, the permit limit does not apply. WV DEP records revealed only one fine imposed against the company for violations at the Fort Martin plant, a $4,000 penalty in the 1980 Consent Decree.

WV DEP files showed two complaints from area residents concerning particulate matter during the last 10 years. These were related to fly ash and occurred in July and August 2000. According to the agency, the plant addressed the cause of the complaints. Previous complaints reflected by the records occurred in 1975 (54 complaints), 1980, 1983, and 1989. The small number of recent complaints is not an indication of a lack of public health effects or other consequences, since area residents have likely become accustomed to elevated particulate matter levels in the more than 30 years the plant has been operating.

Despite many exceedances of opacity standards, records revealed only one fine imposed against the company for violations at the Fort Martin plant.

In 1997, the company informed the WV DEP of its intention to modify its fly ash handling process at Fort Martin by loading a portion of the ash into pneumatic tanker trucks for transport to the landfill, instead of loading it all into open dump trucks. This was expected to reduce actual emissions of particulate matter by 62.8 lbs/hr. In 2003, the company proposed to build a bottom ash screening facility at the plant, which could add potential total emissions of 3.67 lbs/hr, and 16.08 tons per year.[98] It is unclear from our DEP file review whether these changes have been undertaken or completed.

Burning of Hazardous Waste

The company is allowed by "small quantity" burner regulations to burn a total of 40 gallons of used oil and hazardous waste every month, provided the waste meets minimum BTU requirements, and levels of hazardous constituents remain within regulatory limits. In 1997, the WV DEP issued an NOV to the facility for violating the minimum BTU requirement and burning waste in excess of the 40 gallon limit. The company responded that it would review results of laboratory tests before burning waste to ensure compliance with the BTU requirement. However, another NOV was issued against the company in 1999 for violating the BTU requirement. The company proposed similar corrective measures as it did in 1997. The WV DEP imposed no penalties for either violation, but issued a Cease and Desist Order in 1999.

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CHAPTER 5

CONCLUSION

Major pollution sources like the Allegheny Energy power plants and nearby active and abandoned mines discharge millions of pounds of toxic air and water pollutants into Greene County's environment every year. County air sometimes violates the EPA's health standards, but government officials have failed to ensure that local air quality is adequately monitored to guarantee that particulate matter, heavy metals, and other risky contaminants are kept to safe levels. A single monitor in the county that tests for only three air pollutants is insufficient. The state plan, announced in May 2004, to sue Allegheny Energy for air pollution (SO_2 and NO_x) violations is welcome news and should be encouraged, but a comprehensive state audit of the power plants' air and water emissions and permit compliance is necessary.

Findings of arsenic, other heavy metals, and a suite of other contaminants in the Monongahela, and sometimes in county residents' tap water, is a concern. Local drinking water and recreational waters, including the Monongahela, should be tested frequently and comprehensively to ensure safety; waivers allowing testing only once every nine years are unacceptable. The lack of resources and effort put into health tracking and health protection is also unacceptable.

Available data indicate that there are some serious public health threats from environmental contamination in Greene County, but the lack of high-quality data on pollutant exposures and the incidence of most diseases associated with environmental contamination makes it impossible to determine the extent to which the sources of pollution identified in this report are affecting the health of county residents. However, the PA DEP, WV DEP, and the EPA should not wait until more studies are completed to enforce existing environmental laws, and to set more stringent limits on pollutant emissions from power plants. The states should also act diligently to expedite the cleanup of contaminated drainage from abandoned mines using available federal and state funds, and should allocate additional money for this purpose. The PA DEP should also require that protective measures are put in place at active mine sites to prevent additional contamination. In addition, aggressive action is needed to remedy the problem of wildcat sewers in order to reduce the threat of serious water pollution. Moreover, the EPA should strengthen its New Source Review rules and enforcement to address power plant emissions, and should substantially strengthen rules for ash disposal.

Citizen groups like PEC and Monongahela Riverkeeper and local citizen activists should be commended for blowing the whistle on many of the environmental problems facing Greene County. But much more needs to be done. A detailed citizen monitoring, public education, health tracking, and citizen advocacy program could help to encourage local, state, and federal officials as well as industry to address the environmental challenges of Greene County. NRDC looks forward to working with local and state groups and concerned state and local officials to develop such a strategy.

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APPENDIX 1

DATABASES CONSULTED

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APPENDIX 2

Additional Air Pollution Data

TABLE A-1
SO_2 and NO_x emissions, Hatfield's Ferry, 1995–2002

Year	SO_2 (tons)	NO_x (tons)
1995	164,841	26,050
1996	153,413	25,274
1997	138,630	24,717
1998	150,869	21,583
1999	141,872	20,067
2000	165,695	23,234
2001	185,496	27,402
2002	158,712	23,065

Source: EPA Acid Rain Program.

TABLE A-2
SO_2 and NO_x emissions, Fort Martin, 1995–2002

Year	SO_2 (tons)	NO_x (tons)
1995	69,974	25,561
1996	71,152	22,710
1997	87,146	30,014
1998	79,304	24,649
1999	99,101	30,422
2000	90,055	26,330
2001	79,661	12,334
2002	91,119	11,236

Source: EPA Acid Rain Program.

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89 25 Penn. Code § 123.41 states: "A person may not permit the emission into the outdoor atmosphere of visible air contaminants in such a manner that the opacity of the emission is either of the following: (1) Equal to or greater than 20% for a period or periods aggregating more than 3 minutes in any 1 hour. (2) Equal to or greater than 60% at any time."

90 PennFuture, *Notice Letter to Hatfield's Ferry Power Plant Regarding Air Pollution,* October 5, 2004, www.pennfuture.org/smokestack/hatfieldsferry/noticeletterhatfieldsferry1004.html.

91 Allegheny Energy, Inc., *The Allegheny Energy Evolution,* 2001, www.alleghenyenergy.com/Newsroom/History/companyhistory.com; Allegheny Energy Supply, "Generating Facilities, www.alleghenyenergysupply.com/generating/default.asp.

92 EPA, *Toxics Release Inventory,* www.epa.gov/tri.

93 EPA, *Clean Air Markets—Data and Maps,* http://cfpub.epa.gov/gdm/.

94 Office of New York State Attorney General Elliot Spitzer, "Letter from Attorneys General of NY, CT, NJ and PA to Allegheny Energy et al.," May 20, 2004, www.oag.state.ny.us/press/2004/may/may20c_04_attach1.pdf.

95 Ibid.

96 The plant's permit sets an opacity limit of 10 percent based on a 6-minute block average (45 C.S.R. § 2-3.1).

This excludes start-up and shutdown periods. This is lower than the EPA's opacity standard of 20 percent. Fort Martin is allowed to release 249.2 lbs of particulate matter per hour from Stacks 1 and 2.

97 For example, in 1976 the plant was releasing 814 lbs of particulate matter per hour, when its permit only allowed 256 lbs/hour. In 1977, it was still releasing 400 lbs/hr.

98 The WV DEP determined that the company would not need a permit to build the ash screening facility. Under a new rule effective June 2003 a facility needs a permit if the potential total emissions are greater than 6 lb/hr *and* 10 TPY.