

# FROM SEWER PLANT TO DRINKING GLASS



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Daniel P. Creighton/The Mercury



**Marlene Schmitt, left, and Alesia Snyder watch operations at the Warwick Drainage Co.'s sewage treatment plant in St. Peters. Despite routine violations at the plant, which dumps untreated sewage into French Creek when it rains, the facility is too small to be included in PennEnvironment's examination of permit violations at "major" polluting facilities, the results of which are shown at right.**

It sounds like the opening line bad joke: "Have you heard the about the boy fish born with sister's ovaries?"

But the stuff found in America's streams, and the effect that stuff is having on the animals that depend on those streams — humans included — is no laughing matter.

The problem goes way beyond fish.

A study by West Virginia University pointed to male alligators that failed to develop mature sex organs, male panthers with almost no testosterone and male tadpoles with ovaries.

In addition to the dirt, the manure, the pesticides, the petrochemicals and the plain old trash that gets washed into our waterways when it rains, consider the lengthy and terrifying list of poisons we knowingly put into our nation's drinking water.

First of all is the human biological waste, and the parasites, microbes and viruses that go with there's the alphabet soup of chemicals — DDT, DDE, PCB, MTBE and TCE.

There are the chemicals with mysterious-sounding names and even more mysterious side-effects, things like toxaphene, kepone, dioxin and perchlorate.

And more recently, scientists have begun to wonder about the cumulative effect of all the medicine we ingest and flush down the toilet.

This brings us back to our fish with the sexual identity problem.

**(See WASTEWATER on A3)**



**Inside today**

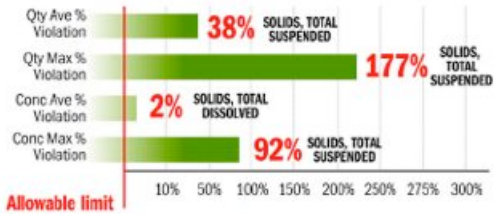
- Chemical pollution has made life hard for area resident — A7
- Abandoned mines produce nasty discharge — A7

**The Pine Knot Tunnel in Schuylkill County, at left, discharges 20,000 gallons of metal-laden water into a Schuylkill tributary every minute; causing 30 percent of all heavy metal pollution in the entire Schuylkill Watershed. — See A7**

## Amity Wastewater Plant

Discharge into Schuylkill River

Date ranging from 3/31/03 - 6/30/03



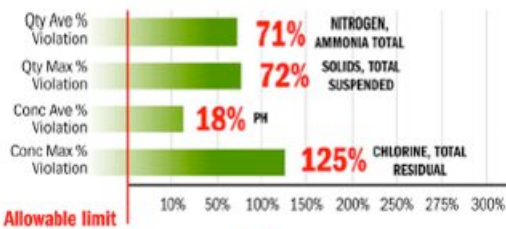
TOTAL VIOLATIONS: 4

SOURCE: Penn Environment

## Berks, Montgomery Wastewater Plant

Discharge into Swamp Creek

Date ranging from 3/31/02 - 6/30/03



TOTAL VIOLATIONS: 13

SOURCE: Penn Environment

## Birdsboro Wastewater Plant

Discharge into Hay Creek

Date ranging from 1/31/02 - 4/30/03



TOTAL VIOLATIONS: 10

SOURCE: Penn Environment

## Lower Perkiomen Valley Wastewater Plant

Discharge into Schuylkill River & Perkiomen Creek

Date 2/28/03



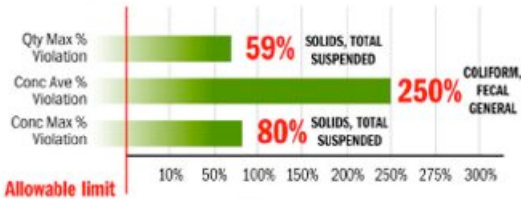
TOTAL VIOLATIONS: 1

SOURCE: Penn Environment

## Phoenixville Wastewater Plant

Discharge into Schuylkill River

Date ranging from 5/31/02 - 12/31/02



Allowable limit

**TOTAL VIOLATIONS: 6**

SOURCE: Penn Environment

## Reading Wastewater Plant

Discharge into Schuylkill River

Date ranging from 2/28/02 - 6/30/03



Allowable limit

**TOTAL VIOLATIONS: 39**

SOURCE: Penn Environment

## Upper Montgomery Wastewater Plant

Discharge into Green Lane Reservoir & Perkiomen Creek

Date 2/28/03



Allowable limit

**TOTAL VIOLATIONS: 1**

SOURCE: Penn Environment

More on A3

## Upper Montgomery Wastewater Plant

Discharge into Green Lane Reservoir & Perkiomen Creek

Date 2/28/03



Allowable limit

**TOTAL VIOLATIONS: 1**

SOURCE: Penn Environment

More on A3

## **An abundance of hormones**

Last November, a study downstream of sewage treatment plants in three Colorado rivers found an alarming number of male white suckers developing female sex organs.

In Boulder Creek, female white suckers outnumbered males five-to-one and fully 50 percent of the males had female tissues.

The culprit, scientists believe, is too much of the female hormone estrogen in the water.

More alarming is that many chemical compounds found in the water — detergents, soaps, paint, rubber and cosmetics — can mimic estrogen.

And just in case you think this is a problem only in Colorado, consider that those chemicals are found in 80 percent of the streams tested in 30 states.

“USGS has been conducting studies that have found caffeine and pharmaceuticals in our water,” said Eleanor Vine, who is with the Montgomery County Health Department. “It’s an indication that a lot of medication just gets flushed,” she said.

Also called endocrine disrupters because of the effect the chemicals have on those hormones, some of the substances mentioned above can have a wide range of biological impacts.

In humans, they are suspected to have a hand in declining sperm counts, climbing rates of breast and testicular cancer and increasing incidence of hyperactivity and learning disorders in children.

Some of these chemicals may also play a role in birth defects and enlargement of the thyroid gland.

The U.S. Geological Survey reports that in 80 percent of streams sampled, half contained seven or more chemicals ranging from fire retardants to “plasticizers” to synthetic hormones.

One-third of the streams contained 10 or more.

“Certain pharmaceuticals, especially those that are highly toxic at low levels and steroid hormones, should be looked at more closely than chemicals such as caffeine,” researchers told *Environmental Science and Technology*, a magazine published by the American Chemical Society.

The magazine also reported the doubts of some who operate water systems.

“Who knows when a contaminant that is considered safe now will finally be found to be harmful to humans?” asked the director of a California water system.

Bern Sweeney, director and senior research scientist at the Stroud Water Research Center in Chester County, has one solution.

“People have to stop thinking of streams and rivers as something that carries pollution away from their property,” he said.

## Dumping waste into water

In all there are 52 places in the Schuylkill Watershed where surface water is pulled out for drinking.

But there are 3,372 places with permits to dump something back into those same waters.

They include 400 hazardous waste sites, of which 22 are designated by the Environmental Protection Agency as “Superfund” clean-up sites.

The Philadelphia Water Department, which conducted extensive data collection and evaluation of the entire watershed, identified the Perkiomen, Unami, Skippack and Wissahickon creeks as having the highest concentration of industrial pollutants.

There are 82 sewage treatment plants that discharge into the Schuylkill Watershed. It’s no secret that what we flush down the toilet usually ends up back in the water cycle that provides drinking water to someone else downstream.

“In Schuylkill County they have a saying, ‘flush twice, Philadelphia needs the water,’” said Christopher Crockett, manager of the watershed protection program run by the Philadelphia Water Department.

Granted, sewage treatment has become increasingly more sophisticated.

Pottstown school children who tour the borough authority’s wastewater treatment plant are often surprised and a little disturbed when their tour guide dips a ladle into the treated water about to be sent back to the Schuylkill and takes a deep drink.

What that unsuspecting tour guide might not know is there is an increasing chance he is taking a dose of Sudafed, Tylenol or even Prozac.

The number of adults taking the family drugs to which Prozac belongs —they’re called selective serotonin re-uptake inhibitors — has tripled since it was first introduced in 1987, according to the Centers for Disease Control and Prevention.

Eventually, much of that drug ends up going down the toilet in one form or another.

Many argue the small amount contained in daily water intake — usually measured in “parts per billion” is not enough to represent a health threat to us humans.

(To understand what one part per billion represents, imagine one grain of salt in a swimming pool.)

“I’m not worried,” Alan Robertson, director of regulatory affairs for the American Water Works Association told the Christian Science Monitor last year.

Most of those chemicals are found in water “at levels that are several orders of magnitude lower than a health concern.”

But even if humans are safe — by no means a foregone conclusion — scientists are making some disturbing discoveries about the effect on wildlife, like frogs made too mellow by Prozac to avoid predators, thereby disrupting the ecological balance.

And other chemicals, like mercury, PCBs and chlordane, can “bio-accumulate” in animals further up the food chain, like fish.

In 2002, 28 states had fish consumption advisories in place for every single one of its water bodies because of pollution.

Fish consumption advisories have been issued for 15 percent of the nation’s total river miles and 92 percent of the Atlantic Coast.

## **Chain of responsibility**

These new threats to water quality, and the new government regulations which are likely to eventually follow, pose new problems and new costs upon the people charged with keeping our water safe.

“These new substances we’re constantly finding in our water — our water treatment plants aren’t geared to test for them at all,” said Vine. “Some of them can’t be filtered out, and there are a lot of things those plants are not even looking for.”

As science discovers those pollutants, water treatment plants may then be required to remove them.

“There’s a new paradigm in regulations, and we’re looking at treatment options like ozone and ultraviolet light,” said Crockett.

“So now, even though no one is sick, we’re going to need to add expensive A, B, C, or D processes to your plant,” he said.

And who is going to pay for that?

Already, the EPA estimates that \$700 billion needs to be spent across the nation to upgrade and replace aging water infrastructure to current standards, said Don Welsh, EPA’s administrator for the mid-Atlantic region, which includes Pennsylvania.

“When you have a city with 40 percent living below the poverty level, and that’s Philadelphia, you have to consider cost,” said Nicholas DeBenedictis, chairman and CEO of Aqua America, the nation’s largest publicly traded water company.

“When the treatment standard goes from a risk level of one in 100,000 to one in a million, it can cost a phenomenal amount of money,” DeBenedictis said.

## **Testing the limits**

Wide-scale water quality regulation in the United States began in 1972 with the passage of the Clean Water Act.

But its goals of making all waterways swimmable and fishable by 1983 and the elimination of all pollution discharges into the nation’s waters by 1985 remain woefully distant.

About 39 percent of our rivers, 51 percent of our estuaries and 46 percent of our lakes are too polluted for swimming or fishing.

The EPA estimates there are at least 40,000 sanitary sewer overflows each year, potentially

causing illnesses as minor as diarrhea and as serious as cholera, dysentery and infectious hepatitis.

Currently, the EPA estimates more than 20,000 bodies of water throughout the country are too polluted to meet basic water quality standards. A report released last year titled “Troubled Waters” states that a good many of those are in Pennsylvania.

The report, compiled by an advocacy group called Penn Environment, looked at reporting for an 18-month period —from January of 2002 to June of 2003 — by facilities with permits to discharge into the nation’s waters.

The results were disturbing:

More than 3,700 major facilities, or 60 percent of all Clean Water Act permit holders, reported exceeding at least once the limits in their permits.

All total, the report found more than 32,000 occasions when permit levels were exceeded and more than 2,900 times when limits were exceeded by at least 500 percent.

With nearly 2,000 overages, Pennsylvania ranked fourth overall, behind only Ohio, New York and North Carolina. We had the dubious distinction of being among only 10 states in which the limit was exceeded by 500 percent on at least 100 occasions.

Locally, the worst offender was the Reading Sewage Treatment plant which reported 39 instances in which limits for substances ranging from nitrogen to ammonia to “solids” were exceeded in the effluent discharged into the Schuylkill River.

Three other local plants made the list of those exceeding their limits 10 or more times in that period: the Berks/Mont Municipal Authority in Gilbertsville which discharges into Swamp Creek; the Birdsboro Municipal Authority which discharges into Hay Creek and the PennRidge Wastewater Authority in Bucks County, which discharges into the East Branch of Perkiomen Creek.

## **How much of drinking water is safe?**

As unsettling as these findings are, consider that they are based on facilities reporting their own mistakes. What is not recorded is the amount of illegal discharge from “wildcat sewers.”

The problem is so severe that the EPA may be overestimating the percent of drinking water that meets health-based standards.

The EPA reported meeting its annual goal — 95 percent of the drinking water being safe — while at the same time acknowledging “the data used to draw those conclusions was flawed and incomplete,” according to a report by the Inspector General.

Ironically, some of the substances found in water and now considered potential risks were meant to improve human health or prevent pollution.

One example is MTBE, methyl tertiary butyl ether. It is an additive first put into gasoline to raise octane, replacing lead after it was identified as a massive airpollution public health risk.

Unfortunately, MTBE is extremely soluble in water and has leaked out of untold underground gasoline tanks and into groundwater and surface water drinking supplies.

Earlier this year, the substance was the subject of a Congressional debate over protecting oil companies from liability because of lawsuits over an estimated 2,300 polluted drinking water systems in 36 states.

The protection was not included and in July, the Associated Press reported that some internal EPA documents are now suggesting MTBE is a “likely carcinogen.”

Even more surprising, perhaps, is the current debate about adding fluoride to drinking water to prevent dental cavities, a practice that began as far back as 1945.

The practice is endorsed by the Centers for Disease Control and the American Dental Association and it is credited with a 50 to 60-percent reduction in tooth decay since World War II.

However, new science has linked fluoride with bone damage, lower IQ in children and even a rare form of cancer called osteosarcoma in young boys.

In Berks County, only five water systems add fluoride: Fleetwood, Maiden creek, Mount Penn, Reading and Western Berks. In Chester County, Coatesville, Downingtown, Kennett Square, Phoenixville and West Chester are the only systems with fluoridated water.

Pottstown is the only water system in Montgomery County to add fluoride to its water.

Juggling all these potential contaminants, their risks and the cost of treating them can be mind-boggling.

For Vine, however, it illustrates a very simple rule: “This is a consequence of the fact that everything we do has an impact and sometimes, that impact is on us.”

## Norristown Wastewater Plant

Discharge into Schuylkill River

Date 3/31/02



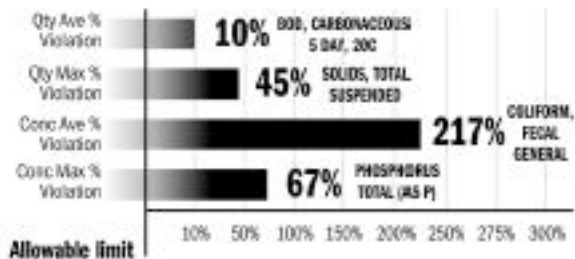
**TOTAL VIOLATIONS: 2**

SOURCE: Penn Environment

## Pennridge Wastewater Plant

Discharge into Perkiomen Creek

Date ranging from 3/31/02 - 6/30/03



**TOTAL VIOLATIONS: 16**

SOURCE: Penn Environment

About 39% of our rivers, 51% of our estuaries and 46% of our lakes are too polluted for swimming or fishing.

— U.S. Environmental Protection Agency

The information for this illustration and the one on page A1 was selected from a report issued in March, 2004 by Penn Environment. The report analyzed data collected by the U.S. Environmental Protection Agency from “major” facilities that self-report on violations.

The report documented an examination of records from an 18-month period from January, 2002 through June, 2003.

The charts show only the highest violations in a number of different categories, which is why there are often fewer than the “total violations” listed at the bottom.

The report outlines five ways in which a permit can be violated. They fit primarily into two categories. Either a raw quantity of pollutant is discharged or a concentration of a pollutant within a body of water.

This is what the symbols on the chart refer to:

- **Qty Ave % Violation** — This averages the quantity of a pollutant over a fixed period of time and indicates the percentage over the permitted amount.
- **Qty Max % Violation** — This deals strictly with the raw amount of the pollutant and its percentage over the permitted amount.
- **Conc Min % Violation** — This shows the percentage under which a minimum of required measurements of the makeup of wastewater such as dissolved oxygen have fallen.
- **Conc Ave % Violation** — This shows the percentage over the permit limit of pollution concentration as averaged over a fixed period of time.
- **Conc Max % Violation** — This deals with the percentage over the maximum permitted concentration of a pollutant.