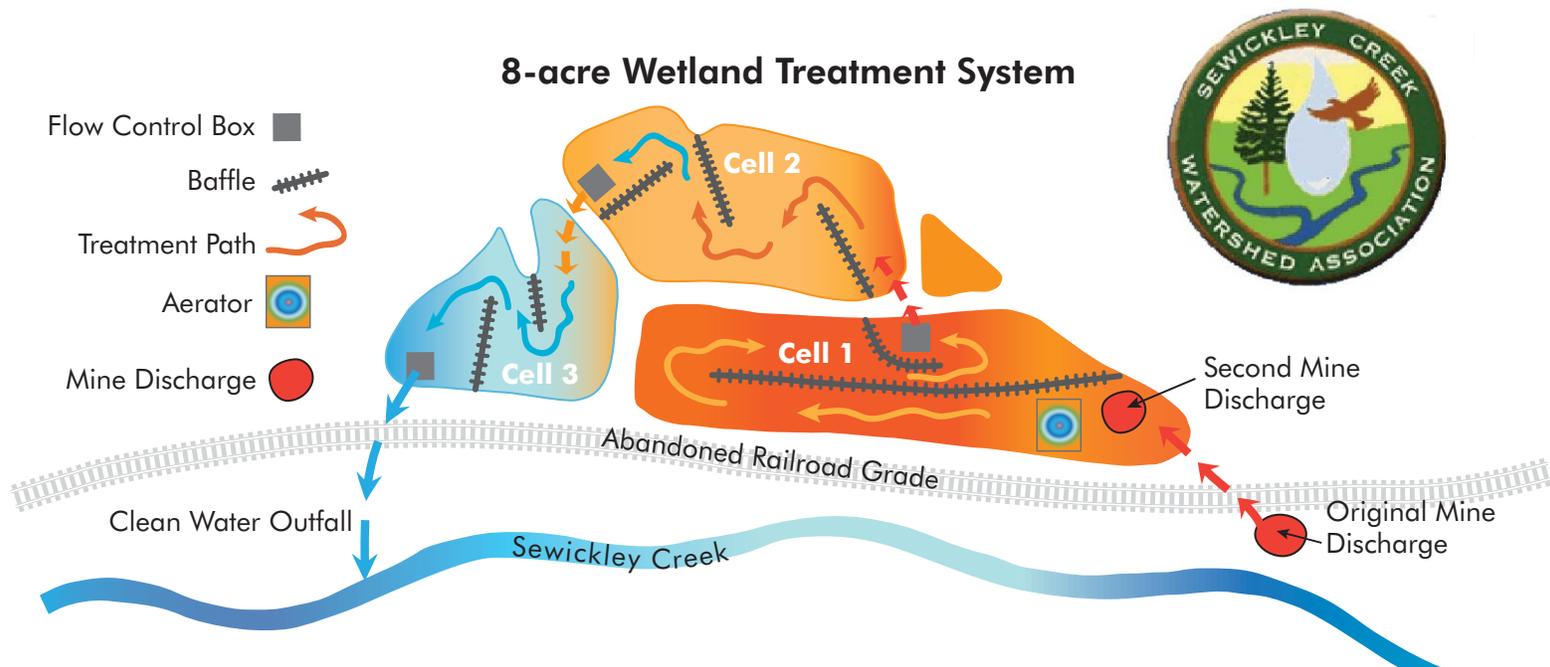


FACT SHEET

Cleaning up the BRINKERTON Abandoned Mine Discharge



LOCATION

This abandoned mine discharge cleanup project is located near the small town of Brinkerton, which is in the southeastern part of Westmoreland County, approximately halfway between Armbrust and United, in Mount Pleasant Township.

This cleanup project, which is named after the town of Brinkerton, is adjacent to Sewickley Creek. Sewickley Creek flows roughly west, from Norvelt toward New Stanton.

The cleanup project is in the upper part of the Sewickley Creek Watershed, which is Westmoreland County's central watershed. The Sewickley Creek Watershed encompasses 168 square miles, including high forested ridges, gently rolling farmland, and the county's busiest commercial corridor. The area near the Brinkerton cleanup site is primarily rural.

WHY SEWICKLEY CREEK IS POLLUTED AT BRINKERTON

At one time, there were many active coal mines in this area.

But for the past 50 years or so, those mines have been abandoned. And over these past five decades, the maze of abandoned underground coal-mine caverns has filled up with water from rain, snow and ice, and with water from nearby streams. Water from these sources gets into the mine through cracks in the earth that occur naturally in most soils and in the underlying rock.

Once water is inside a coal mine, it picks up some of the minerals that the coal mining exposed. And eventually this water – and its payload of minerals – finds its way back up to the surface of the ground through natural or man-made openings. The site where the water comes out is called a mine discharge.

At Brinkerton, the opening where the main discharge occurs was deliberately created years ago by the coal miners. They created it because they needed a place to drain water

out of the mine so they could keep extracting the coal. At that time, there were no environmental laws in place to prevent this kind of practice.

Today, water continues to flow out of the opening that the miners created, even though there no longer is any active mining here. The discharge occurs because the natural downward force of gravity exerts enough pressure inside the mine to push the water up and out wherever it finds an opening in the surface of the ground.

So much water comes out of the opening that the miners created here at Brinkerton – 2,000 to 4,000 gallons per minute, depending on the time of the year – that this is the largest mine discharge in the entire Sewickley Creek Watershed.

The water at the Brinkerton discharge contains iron, a pollutant. It is there because the water picked up pyrite (iron sulfide) from inside the mine. The pyrite dissolved easily in the water and formed sulfuric acid, which dissolved iron. When the water comes out of the mine and into contact with the air, the dissolved iron oxidizes and becomes iron oxide, a muddy orange deposit. Iron oxide is the reason portions of Sewickley Creek, like many other creeks affected by drainage from coal mines, has an orange color.

The discharge at Brinkerton is alkaline and not acidic, which is easier to treat than mine water that contains acid.

WHAT'S BEING DONE TO FIX THE PROBLEM

The Sewickley Creek Watershed Association and a number of partners have been working together since 1995 to study the problem and develop a way to clean up the pollution at Brinkerton. In fact, the pollution problem at Brinkerton was one of the first projects that the Sewickley Creek Watershed Association addressed after it was formed in 1991.

Several initial attempts to clean up Brinkerton proved unworkable, including a proposal to add oxygen to the water while it was still inside the mine and so have the iron drop out there, before it came to the surface of the ground.

The cleanup solution that finally was put in place was to stop the discharge from going into the stream and to direct it instead first through a mechanical aerator and then into a large wetland that the watershed and its partners created.

The purpose of the aerator is to artificially saturate the discharge water with oxygen almost as soon as it comes out of the mine. This causes the oxidation process – the formation of iron oxide – to happen almost immediately.

The purpose of the wetland is to hold the aerated discharge water long enough for most of the heavy iron oxide particles to settle out and sink to the bottom of the wetland. Then the clean water can be returned to the stream.

Construction of the large, eight-acre wetland was completed in 2005. The wetland is divided into a series of smaller holding ponds (called cells) by plastic sheet pilings. Brinkerton was the first project in Pennsylvania to use these pilings as internal wetland dividers (baffles).

Pipes and manual-control valves were added to regulate the flow of the water from one cell to another.

NEW DEVELOPMENTS

But before water could flow through the wetland, the Brinkerton project suffered another delay. A new discharge appeared. This new discharge occurred because the mine is very close – maybe only 30 feet – under the surface of the ground and the increased water pressure inside the mine caused the water to be forced up through another fracture in the ground.

The new discharge began at a rate of about one gallon per minute but within three weeks was flowing at the rate of a few hundred gallons per minute. Fortunately, this discharge occurred at the beginning of the treatment area, close to where the original discharge water flowed into the first cell of the wetland. So the watershed association moved the aerator to a new location where it could capture water from both discharges.

Finally, in 2007, water from both discharges began flowing into the wetland. On average, the water stays in the wetland two or three days. As the water moves slowly from cell to cell through the wetland, it mixes with oxygen in the air. This causes the chemical reaction, which previously occurred in the stream, and forms iron oxide. Iron oxide particles are heavy and, in time, they drop out of the water and onto the bottom of the wetland. When this happens, the water gets cleaner and cleaner. At the last cell in the wetland, the cleaned water is directed back into Sewickley Creek.

With the wetland system alone, about 80% of the iron is being removed from the water. When the aerator is added and all the flow is going through the system, nearly 100% of the iron will be removed from the water.

ADDITIONAL CLEANUP METHODS

The watershed association and its partners wanted to improve the treatment process at Brinkerton.

To do that, they raised the level of the discharge about two feet so that they could increase the holding capacity and retention time of the wetlands by making them deeper.

Because the water exits the mine with essentially no oxygen in it, another thing they did was to add an electrically powered aerator close to the discharge point(s). The aerator will artificially saturate the water with oxygen almost as soon

as it comes out of the mine, and that will cause the oxidation process to begin almost immediately.

Without the aerator, the water comes out of the discharge clear and the iron doesn't begin to drop out until closer to the end of its travels through the wetland.

Unfortunately, the aerator has not yet been put to use because there is no electricity on the site. The group is hopeful that electrical power can be brought to the site in the near future.

CURRENT NEEDS

The nonprofit Sewickley Creek Watershed Association operates on the dues of its members (\$10 for an individual; \$25 for a family; \$25 – \$1,000 for businesses) and the success of its fundraising efforts.

The association is a 501(c)(3) charitable organization, and contributions made to it are tax-deductible.

At Brinkerton, the watershed association estimates that it will take thousands of dollars to bring electricity to the site, and approximately \$400 each and every month to pay for the power to run the aerator.

The group also is in need of volunteers to help monitor the Brinkerton site, as well as its other stream cleanup sites.

BRINKERTON PROJECT PARTNERS

The Sewickley Creek Watershed Association

U.S. Department of Agriculture, Natural Resources Conservation Service

U.S. Department of Energy

U.S. Department of Interior, Office of Surface Mining

U.S. Environmental Protection Agency

Pennsylvania Department of Environmental Protection

Pennsylvania Game Commission

Pennsylvania's Growing Greener II County Environmental Initiative

Penn's Corner Resource Conservation and Development Area Westmoreland County

Westmoreland Conservation District

Mount Pleasant Township

Foundation for Pennsylvania Watersheds

Western Pennsylvania Conservancy

Boy Scouts of America

Environmental Solutions, Inc.

M&Y, Inc.

Steff Excavation

Stoy Excavation

Wetlands Construction, Inc.

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