



Section 319

NONPOINT SOURCE PROGRAM SUCCESS STORY

West Virginia

Partnership Uses Passive Treatment to Reduce Acid Mine Drainage

Waterbody Improved

Remnants of past mining activities contributed metals and acidity to the 4.4-mile-long Lambert Run. As a result, the West Virginia Department of Environmental Protection (WV DEP) added the run to the 1996 Clean Water Act (CWA) section 303(d) list of impaired waters. In 2002 a partnership of academia, private citizens, and state and federal agencies collaborated to assess and remediate the mine drainage issues in the watershed. Partners implemented passive treatment systems at four sites to reduce the metal and acidity loads. Water quality has improved, and WV DEP expects to remove the upper reaches of Lambert Run from the CWA section 303(d) list of impaired waters in the near future.

Problem

West Virginia's Lambert Run drains an 8-square-mile watershed in Harrison County and empties into the West Fork River near the town of Spelter. Unregulated abandoned mines leached metals and acidity into Lambert Run, causing it to fail to meet its designated use of aquatic life support. As a result, WV DEP added the entire length of Lambert Run (4.4 miles) to the 1996 CWA section 303(d) list of impaired waters for pH and metals. The run has remained on the impaired waters list since then. The impairment begins in the headwaters and continues down to the stream mouth (Figure 1).

In 2002 WV DEP completed a total maximum daily load (TMDL) for the West Fork River (the receiving stream for Lambert Run) and identified Lambert Run as impaired for both pH and metals. The TMDL establishes necessary load reductions for three metals: aluminum (81 percent reduction), iron (97 percent reduction) and manganese (99 percent reduction).

Project Highlights

In 2002 a partnership of WV DEP; the Office of Surface Mining, Reclamation, and Enforcement; the West Virginia University National Mine Land Reclamation Center; and the Guardians of the West Fork was formed with the goal of restoring Lambert Run. In 2003 a watershed-based plan for Lambert Run was developed and approved. This allowed the partners to pursue two CWA section 319 grants. Since 2004 the partners have identified, assessed, designed and installed four passive treatment



Figure 1. Stained water from Lambert Run (entering at left) flows into the West Fork River.

systems to remediate abandoned mine drainage. The partners plan to implement two additional projects to address remaining sources of loadings of metals to Lambert Run.

Results

The four new treatment systems have reduced metal and acidity loadings into Lambert Run. In 2006 the partners installed the first treatment system at Site 3, also known as the Muzzleloader Club site. Before construction, the site's drainage had a pH of 3.5 and discharged approximately 12 tons per year of acidity, 1.57 tons per year of iron, and 0.72 ton of aluminum into Lambert Run. The new passive treatment system at Site 3—a leach bed filled with steel slag (calcium aluminosilicate oxide)—has neutralized the 12 tons per year of acid and is producing approximately 4 tons per year of



Figure 2. Water gains alkalinity as it flows through a leach bed at Site 3.

alkalinity (Figure 2). The average pH is 7.1, and the iron and aluminum loads have been reduced by 1.52 and 0.7 tons per year, respectively.

In 2007 the partners installed a treatment project at Site 8, also called the Oldaker Property (Figure 3). Before construction, the abandoned mine portal drainage had a pH of 6.1 and discharged approximately 0.8 ton per year of acidity, 17 tons per year of iron, and 1 ton of aluminum into Lambert Run. The new passive treatment system has neutralized the 1 ton per year of acid and is producing approximately 23.5 tons per year of alkalinity. The pH of the discharge is 7.2. The iron and aluminum loads have been reduced by 16.8 and 0.95 tons per year, respectively.

Partners installed a project in 2008 at Site 5, also known as the Alan Meadows property. Before treatment, the water discharging from the mine portal had a pH of 6.4. It contributed 26.4 tons per year of acidity, 0.76 ton per year of aluminum and 5.6 tons per year of iron. The new passive treatment system's discharge is 7.4. It has also neutralized all the acidity and is producing approximately 115 tons per year of alkalinity. The iron and aluminum loads have been reduced by 5.54 and 0.6 tons per year, respectively.

In 2009 the partners completed a project at Site 9, also known as the Cox property. Before treatment, the water discharging from the portal had a pH of 4.8. Each year it was contributing 123 tons of acidity, 9 tons of aluminum and 34 tons iron. The discharge from the new passive treatment system has a pH of 7.1. It has neutralized all the acidity and is producing approximately 107 tons per year of alkalinity. The iron



Figure 3. Water flows through a passive treatment system at Site 8.

and aluminum loads have been reduced by 33.7 and 103.32 tons per year, respectively.

Partners have also reported an increased number and diversity of benthic macroinvertebrates in the Lambert Run mainstem. The treatment systems have helped to restore approximately 2.3 miles of Lambert Run's 4.4 miles of impaired stream. Partners are designing treatment projects at two additional mine drainage sites. Treating those sites should completely restore Lambert Run and make it eligible for removal from the state's list of impaired waters in the near future.

Partners and Funding

The following partners collaborated on the projects: WV DEP's Department of Water and Waste Management and Office of Surface Mining and Reclamation, West Virginia University's National Mine Land Reclamation Center and the Guardians of the West Fork.

A total of \$628,052 in U.S. Environmental Protection Agency CWA section 319 funding supported a variety of project-related expenses, including surveying, engineering and construction. WV DEP's Division of Water and Waste Management administered the funding. In all, partners leveraged \$622,103 in matching funds. The Office of Surface Mining's Watershed Cooperative Agreement Program supplied matching funds for three of the four projects. The final project (Site 9) had matching funds provided by a private company that was required to provide compensatory mitigation for stream and wetland impacts elsewhere within the West Fork Watershed.



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