

LAUREL RUN WATERSHED INITIATIVE

HARBISON WALKER RESTORATION AREA
MINE DRAINAGE ABATEMENT

PHASE I: DISCHARGES 12, 13, 14
OHIOPYLE STATE PARK, STEWART TOWNSHIP, FAYETTE COUNTY, PA

submitted to

Pennsylvania Department of Environmental Protection
Bureau of Mining and Reclamation

EXECUTIVE SUMMARY

A public-private partnership was created to address the pollution problems from an old, 120-acre, surface clay and coal mine on lands now within one of the premier recreational facilities within the Commonwealth, Ohiopyle State Park. Both untreated and conventionally treated discharges were impacting a high-quality cold water fishery. The cost to passively abate all discharges was estimated to be \$1 ½ million.

Through funding from the PA Department of Environmental Protection, Bureau of Mining and Reclamation, under the Watershed Restoration and Partnership Act, the first phase of the comprehensive abatement plan has been completed which includes support from the PA Department of Conservation and Natural Resources in the continued operation and maintenance of the systems.

Because of the committed effort from all participants, the construction of the Phase I passive treatment system was successfully completed within five weeks, six months ahead of the contract deadline. By pooling resources, the project was also completed within budget, even with the addition of two passive components.

With a design life of 25+ years, the seven-component passive system neutralizes an estimated 31,000 lbs/year or over 15 tons annually of acidity in three discharges and the unnamed receiving stream. In addition, about 9,000 lbs/year or over 4 tons annually of metals are captured in the settling ponds and 1/4-acre aerobic wetlands.

Utilizing plants removed from settling ponds associated with the former active treatment plant on the Phase II area, volunteers from Pressley Ridge School successfully vegetated the Phase I constructed wetland. The enthusiasm of the students in the “hands-on” educational experience was reported in a local newspaper. Due to this positive response, faculty participants have asked that the students be included in the future Phase II wetland planting.

Due to the overwhelming success of the public-private partnership effort, Phase II restoration has been recently funded through the Commonwealth’s Growing Greener Initiative. Upon Phase II completion, all known perennial discharges at this site will have been abated with measurable improvement in the high-quality cold water fishery.

SELECTED HIGHLIGHTS

Background

- There are seven pollutive discharges that issue on property now within Ohio State Park that degrade Laurel Run, a high-quality cold water fishery. This property was formerly surface mined for clay and coal. (Within Ohio State Park boundaries, Laurel Run flows about ½-mile into Meadow Run which flows about 1 ½ miles into the Youghiogheny River. All are high-quality cold water fisheries.)
- As part of the comprehensive restoration plan for the site developed through a public-private partnership initiative, the project was divided into two phases. Phase I included abatement of discharges 12, 13 and construction of a collection system for 14. Phase II included abatement of discharges A/C, B1, B3, tributary C, and 14.
- Phase I discharges 12 and 13 were flowing untreated to Laurel Run.
- Phase II discharges B1 and A/C were being treated conventionally. Discharges B3, 14, and tributary C were not being treated.
- Acidic discharges 12 and 13 with high iron content had the following characteristics: 10 gpm, 4.2 pH, no alkalinity, 348 mg/L acidity, 186 mg/L iron, 26 mg/L manganese, 1 mg/L aluminum.
- Acidic discharge 14 with moderate iron content had the following characteristics: 12 gpm, 3.0 pH, no alkalinity, 227 mg/L acidity, 42 mg/L iron, 18 mg/L manganese, 2 mg/L aluminum.
- On 7/22/99, the partnership effort submitted a proposal to the Commonwealth under the Watershed Rehabilitation Partnership Act to install a five-component passive system to treat discharges 12 and 13 and to install an anoxic collection system for discharge 14 at a cost of \$261,294.
- On 9/15/99, the Pennsylvania Department of Environmental Protection, Bureau of Mining and Reclamation approved the proposal.

Phase I Passive Treatment System Construction for Discharges 12 and 13

- By 10/11/99, 3 ½ weeks after proposal approval, site preparation began.
- By 10/13/99, the Anoxic Collection System to combine the diffuse flow was completed.
- Construction was delayed one week, from 10/13/99 to 10/20/99, in order to sample and to evaluate the characteristics of the drainage intercepted by the Anoxic Collection System for final design considerations.

- The passive system consisted of the seven components in series:
 - Anoxic Collection System,
 - Anoxic Limestone Drain (670 tons limestone),
 - Settling Pond #1 with baffles,
 - Vertical Flow Pond (600 tons limestone overlain by compost/limestone mixture),
 - Settling Pond #2,
 - Aerobic Wetlands (planted by volunteers 7 months later),
 - Horizontal Flow Limestone Bed (500 tons).
- The regraded area (about 3 acres), much of which was predominantly barren due to the impacts of the acidic, iron-bearing, drainage, was covered with excess soil material from the excavation associated with the passive treatment system installation and revegetated using a grass mixture, recommended by the PA Department of Conservation and Natural Resources. The site was also limed, fertilized, and mulched. (The total affected area was less than 5 acres.)
- By 11/17/99, within 5 weeks of equipment mobilization, construction of the seven-component passive treatment system and land reclamation were complete.

Project Expansion

- Based on a consensus by the participants involved in the system design, two treatment components (Vertical Flow Pond and Settling Pond #2) were added in order to provide a significantly net alkaline final effluent with a low iron content that was capable of successfully treating discharge 14.
- The dye testing program, funded through a separate grant through the Commonwealth's "Reclaim PA" initiative, was expanded to include this passive treatment system. This was accomplished by the generosity of the participants without increasing the original budget or extending the deadline of either grant. Based on the dye testing, baffles were recently added to Sediment Pond #1 in order to decrease the iron solids in the influent to the Vertical Flow Pond.
- The monitoring program was expanded to include field testing of alkalinity. Comparison of the field and laboratory alkalinity measurements of Anoxic Limestone Drain effluent samples clearly depicts the effects of exposing anoxic water containing alkalinity and a high content of dissolved ferrous iron to oxygen.
- A database was created to efficiently manage water quality analyses. The database allows individuals to easily view, add, and update table data by using forms; find and retrieve specific monitoring points by using queries; and analyze or print data in a specific layout by using reports. The database is capable of several calculations, including mean values and loadings of all of the interested parameters.

Public Outreach/Environmental Education

- On 5/24/00, about 7 months after construction, the Aerobic Wetland was planted by about 25 volunteers. Most of the volunteers were from the Pressley Ridge School from Ohiopyle. Being well-received by the students, faculty participants from the Pressley Ridge School have asked the students be included in the future planting of the Phase II wetlands.
- Articles about the Phase I restoration project have been published in The Daily Courier (local newspaper), PA DEP "Update", and the PA DCNR "Resource".

Measurable Environmental Benefits

- Discharges 12 and 13 successfully passively treated within a limited area.

	<u>Raw</u>	<u>Treated</u>	<u>Loading Decrease(est.)</u>
• pH	4	7	
• alkalinity	2	145 mg/L	
• acidity	350	0 mg/L	15,300 lbs/yr
• total iron	186	3 mg/L	8,000 lbs/yr
• manganese	26	10 mg/L	700 lbs/yr

- Discharge 14 is successfully treated by combining with the net alkaline final effluent from the passive system installed for discharges 12 and 13.

	<u>Before</u>	<u>After</u>	<u>Loading Decrease(est.)</u>
• pH	3	7	
• alkalinity	0	85 mg/L	
• acidity	227	0 mg/L	11,900 lbs/yr
• total iron	42	2 mg/L	2,100 lbs/yr
• manganese	18	12 mg/L	300 lbs/yr

- Tributary C, which is the intermittent receiving stream for the discharges, is improved after the confluence with the combined discharge 12, 13, and 14 flow.

	<u>Before</u>	<u>After</u>	<u>Loading Decrease(est.)</u>
• pH	5	6	
• alkalinity	0	5 mg/L	
• acidity	23	13 mg/L	4,000 lbs/yr

- The total decrease in loading is an estimated 31,000 lbs/yr (>15 tons/yr) of acidity and 11,000 lbs/yr (>5 tons/yr) of metals.
- 1/4-acre of Aerobic Wetlands has been successfully constructed and vegetated.
- About 3 acres of formerly barren land has been successfully reclaimed.