

Laurel Run #1 Passive Treatment System
SRI O&M TAG Project # 29 Request #1
OSM PTS ID: PA-191

Requesting Organization: Blacklick Creek Watershed Association (in-kind partner)
Receiving Stream: Laurel Run (Blacklick Creek Watershed)
Watershed: Laurel Run→Blacklick Creek→Conemaugh River→
Kiskiminetas River→Allegheny River→Ohio River
Municipality/County: Center Township, Indiana County
Latitude/Longitude: 40°30'29.6496"N / 79°06'46.4112"W
Construction Year: 2001

In 2001, the Laurel Run #1 Passive Treatment System was constructed to treat an abandoned underground mine discharge in Center Township, Indiana County, PA. The treatment system is located on PA State Gamelands #276 while the discharge is located on private property. The original passive system was designed by BioMost, Inc., (BMI) and consisted of a collection system, a long conveyance pipe with cleanouts, two Vertical Flow Ponds (VFPs) with layered treatment media and two-tiered underdrain systems, a flush pond, and an aerobic wetland. The Blacklick Creek Watershed Association (BCWA) and Kiski-Conemaugh Stream Team have monitored and maintained the system since installation.

On November 12, 2012, Cliff Denholm met with Dennis Remy of the BCWA to conduct a site investigation as part of the Kiski-Conemaugh Basin Treatment System O&M Assessment Project. During the site investigation, the collection system and/or the conveyance pipe was observed to be partially clogged as a portion of the flow was bypassing the collection system even during low-flow conditions. Dennis indicated that the BCWA felt that the treatment media of the VFP may also be plugged and in need of replacement. Noted during the visit was that Amerikohl Mining Incorporated had submitted a surface mining permit that included removal of the existing collection system which had been installed at a drift entry to capture the drainage. Further, the water would be diverted from the system during mining with additional permanent passive treatment components built to complement the existing system as part of the permit requirements. BCWA felt that this would be an ideal time to rehabilitate the existing system if needed. Water quality data was reviewed and is available on *Datashed.org*. Overall, the available monitoring data indicated that the system was effectively treating the mine drainage flowing through the system. The primary problem observed at the site was the quantity of water bypassing the system which, based on the location, was likely due to the compromised collection system. As Amerikohl intended to interrupt and treat the AMD during mining in the near future and to install a new collection system and VFP as part of the reclamation plan, a decision was made to wait until mining had begun.

In July 2013, Stream Restoration Incorporated (SRI) was contacted by the BCWA for technical assistance to rehabilitate, where needed, the existing system as Amerikohl had begun their mining operation. On August 22, 2013, Dennis Remy of the BCWA met onsite with Bryan Page and Ryan Mahony of BMI. Dennis was extremely helpful to work with and provided useful insight about the system throughout the day. During the site visit, pH, alkalinity, temperature, and flow was measured, where feasible, for each system component. Based on these field measurements, VFP West upper level tier of pipes were discharging water that was not treated to the level anticipated. Each of the other VFP outlet pipes, however, appeared to be

functioning as designed. Due to the plugging issue, the system intake pipe was power-snaked to verify whether clogging of the conveyance pipe or the collection system was the issue. It was discovered that there was little iron accumulation in the pipe conveying the raw water to the system indicating the obstruction to influent flow was within the collection system. The flush pond outlet valve boxes were located and the valves were opened, but with difficulty and the ponds were then allowed to drain.

On August 30, 2013, Tim Danehy and Ryan Mahony of BMI met with Dennis Remy of BCWA, Adam Cotchen of the Indiana County Conservation District, Tom Kovalchuk of Amerikohl Mining Incorporated and George Chakot of PA DEP to discuss Amerikohl's plans for the system, which included construction of a new collection and distribution system and converting a sediment basin installed to handle surface water runoff for their mining operation into a third VFP. After the meeting, the treatment media of the existing VFPs were inspected. Test pits were dug in the media. While the compost and limestone appeared to be in generally good condition, there were numerous voids within the thin compost layer where water was observed to flow into the limestone indicating short-circuiting. Following the meeting, BMI provided written comments (See attached.) to the project partners about the CME Engineering proposed design of new components as well as maintenance considerations for the existing system.

After mining was completed and vegetation established, Amerikohl began converting the sediment basin to the new VFP in the summer of 2014. In addition to the new VFP, a new collection and distribution system was also installed including a concrete box with adjustable pipes to help control flow into the VFPs. In September 2014, with the help of Amerikohl providing an excavator and operator, the sixteen ball valves that flush the VFPs, were excavated and replaced with Valterra-type valves as BCWA volunteers were having difficulty operating the valves due to rusting. Upon excavation, two of the four valve boxes were also discovered to need replacement. Previously installed pipe was utilized and connected to the new valves where feasible. Upon backfilling, the valve boxes were reinstalled and all valves were closed to begin refilling the VFPs.

Once the valves were replaced, the VFP media was stirred to maintain uniform flow and increase permeability. A small excavator and skid-loader were used to stir the media. Both machines started at one end of the VFP and worked toward the other end in order to prevent compaction of the freshly stirred media. The media was stirred to a depth of approximately 2 to 3 ft. Where "short circuiting" was observed with water flowing directly into the limestone aggregate layer, the piping was found to be 1 to 2 feet below the surface of the media. Precautions were made to not damage the piping in this area; however, some sections of the pipe were possibly compromised. If poor water quality is observed from a specific upper tier outlet pipe, SRI recommends increasing the elevation of that particular peri-pipe to increase residence time within the VFP. Capping of those pipes may also be an option.

On November 25, 2014, Cliff Denholm conducted a post-construction site inspection. Field water monitoring indicated the treatment system was working very well during the low flow conditions. One of the valve box lids was observed to be broken and was replaced. Future water monitoring is needed especially during the late winter and early spring of 2015 to determine if any additional work is needed, which would be conducted under a new request.

The project team thanks Blacklick Creek Watershed Association for all of their efforts including support and assistance as well as Amerikhol Mining Incorporated for including upgrades to the system as part of their permit conditions and donating time and equipment to help with the valve replacement process. Funding for technical assistance and maintenance was provided by the PA DEP's Growing Greener and the Foundation for Pennsylvania Watersheds grant programs and in-kind services by project partners.

Additional Recommendations & Considerations:

- Continue to conduct site visits and water quality testing on at least a quarterly basis. Include field parameters of pH and flow at a minimum. Alkalinity is also recommended.
- Flow to the various Vertical Flow Ponds can be adjusted as needed by changing the height of the moveable pipes within the concrete distribution box (See photo below.) by turning the elbows. In addition, boards can be added or removed within the grooves of the concrete box to increase the volume of water before bypassing the system.
- Reevaluate the passive system in 2015 after high flow water quality data are acquired.
- Raise the upper tier VFP effluent peri-pipes to discharge only under high flow conditions. Capping may be necessary if raising the pipes does not resolve the issue.



The existing underground collection system had become plugged; therefore, at times, a large portion of the abandoned mine drainage was upwelling to the surface and bypassing the Laurel Run #1 Passive Treatment System (*top left*). Drain valves were opened with difficulty to flush the system (*right*). The corroded valves were later replaced (*bottom left*).



After replacing the valves, a skid-loader and small excavator were used to stir the upper 2 to 3 feet of the treatment media of the existing Vertical Flow Ponds to increase permeability and promote better utilization of the treatment media. Compare the photo prior to stirring the media (*top left*) with the photo taken after the stirring operation (*top right*). As part of the surface mine permit conditions, Amerikohl converted a settling basin to a third Vertical Flow Pond (*bottom left*) to provide greater treatment capacity especially during high flow periods. Amerikohl also installed a new collection and distribution system that included a concrete flow splitter box (*bottom right*) in which flow can be controlled to the three VFPs by simply lowering or raising the pipes via a Fernco and elbow.