

Ferris Passive Treatment System
SRI O&M TAG Project #45 Request #1
OSM PTS ID: PA-108

Requesting Organization: Pennsylvania Game Commission & SRWC
Receiving Stream: Slippery Rock Creek
Watershed: Slippery Rock Creek
Municipality/County: Venango Township, Butler County
Latitude/Longitude: 41°6'8"N / 79°51'31"W

In 1997, the Ferris passive treatment system complex was installed by the Pennsylvania Department of Environmental Protection Knox District Mining Office (PA DEP Knox) to address four abandoned mine discharges emanating from an old deep mine in the coal mining ghost town of Ferris. The complex is often viewed as two separate systems and referred to as the SR85/86 (aka VK) and the SR87/88 (aka JP) systems. Water monitoring conducted during the 2015 snapshot revealed that water was completely bypassing the SR85/86 portion of the treatment system via the emergency spillway and no water was flowing through the Vertical Flow Pond. This indicated that the treatment media and/or the underdrain was plugged. As a result of the snapshot event, the SRWC requested assistance to conduct maintenance at the site.

In February 2017, BioMost Inc. (BMI) mobilized equipment to the site with the intention of backflushing the underdrain and stirring the treatment media to improve permeability. Before the media could be stirred, the AMD needed to be diverted away from the system and the first VFP (VK1) needed to be drained. A flush pipe was located within the forebay and found to be closed or blocked on the inlet side. An emergency overflow pipe was located within VK1, but it was also plugged. The overflow pipe was cleared using a power snake, which dropped the water level in the pond approximately two feet. The treatment media was backflushed using a 3" pump for approximately 20 minutes during each of three separate attempts to try to clear blockages in the pipe and open up flow paths within the media to the underdrain. This resulted in a minimal increase in flow through the underdrain pipe. During the backflushing attempts, an upwelling of water from the berm between Wetland 1 and VK1 was observed, indicating a break in the VK1 flush/drain pipe. The drain pipe was excavated, revealing a crack in the coupler, which was replaced and backfilled before another round of flushing attempts.

After further backflushing attempts proved unsuccessful in reestablishing flow through the system, a decision was made to try to expose the underdrain pipes and examine the treatment media to help determine the next course of action. To do this, a temporary berm was constructed between the forebay and VK1 to prevent water from flowing into VK1 while the pond was drained and pumped over the course of multiple days. Once VK1 drained, an excavator was used to examine the quality of the treatment media within the pond. As shown in the photos below, the media was separated into two layers. The top layer was highly degraded with no structure while the lower layer was highly compacted. After determining the media had little viability in continuing to provide treatment, a significant amount of the top layer of media was removed from the pond using a 6" shredder pump. The lower layer of media was then removed to examine the underdrain and bedding stone. This

revealed that the bedding stone was cemented together with a 4" perforated underdrain pipe that had no flow exiting the pipe. The pipe was then backflushed and bubbling was observed from the area connected to the treatment media, but afterwards, flow was still not exiting the flush pipe. The media was determined to be beyond rehabilitation and that a redesign and rebuild of VK1 with new treatment media will be necessary to regain treatment within the component.

A decision was then made to try to direct the AMD into VK2, which was a limestone only Vertical Flow Pond, in order to provide partial treatment until the system could be rebuilt. A pipe was installed between VK1 and VK2 to allow water to flow across VK1 into VK2 without flowing through the VK1 media. Stop logs regulating water level within VK2 were removed to help determine the permeability of the stone within the pond. A layer of sediment approximately 6-8" thick was discovered on top of the limestone which was removed using a 6" shredder pump. Once the sediment was removed, the limestone was stirred.

The water is now going through VK2 and is being partially treated. Monitoring conducted post-maintenance measured pH to be 4.8 indicating an improvement, but is obviously not sufficiently treating the water. The VK system will need to undergo rehabilitation. As the scope of work will be beyond SRI's O&M TAG and WPCAMR's Quick Response programs, grant funding will need to be sought to complete the work.



Top Left: Water was backing up and overtopping the forebay indicating the treatment media and/or underdrain were plugged.

Right: During backflushing, water began to upwell from the berm. A broken flush pipe for VK1 was found to be the source of the water.

Bottom Left: The VK1 flush pipe was repaired.



Above: As the underdrain was not functioning, VK1 was pumped to gain access to the media.
Bottom Left: The top layer of VK1 media was highly degraded with no structure.
Bottom Right: The lower layer of VK1 was highly compacted with minimal permeability.





Top Left: VK2 was drained revealing 6-8" of sediment on top of the limestone which was removed.
Top Right: Once the sediment was removed, the limestone was inspected and then cleaned.
Bottom: VK2 after limestone cleaning and new pipe conveying the AMD from VK1.