Richards Passive Treatment System
SRI O&M TAG Project #36 Request #1
OSM PTS ID: PA-29

Requesting Organization:	Blacklick Creek Watershed Association
Receiving Stream:	South Branch Two Lick Creek
Watershed:	Blacklick Creek
Municipality/County:	Cherryhill Twp., Indiana Co.
Latitude/Longitude:	40° 39’ 49" N/78° 58' 54" W

The Richards Passive Treatment system complex was designed by VAPCO Engineering and constructed in 1999 to treat an abandoned mine discharge from the sealed Egypt Mine, which was discharging to the South Branch Two Lick Creek. An inlet structure collects the mine drainage flowing out of the underground mine, which is then conveyed by pipe under SR-403 and split between two passive systems known as Richards 1 and Richards 2. Richards 1 contains a Vertical Flow Reactor (VFR) (aka Vertical Flow Pond) followed by a settling pond. Richards 2 consists of two VFRs (2A and 2B) which both discharge into a settling pond and wetland complex. There is also a flush pond for VFR 2A and 2B. Sometimes the Richards treatment system has been considered as 3 separate passive systems known as Richards 1, Richards 2A, and Richards 2B.

In January 2015, SRI was contacted by StreamTeam and Blacklick Creek Watershed Association (BCWA) seeking assistance to address several problems at the Richards system. They reported that a portion of the AMD was bypassing the system indicating that either the intake or conveyance pipe was either partially plugged or compromised. There was concern that the flow splitter was broken and needed to be replaced as water was not flowing to all of the treatment components. The BCWA also thought that a valve related to the flow splitter box was broken. In addition, a build up vegetation and sediment at the settling pond inlet from VFR1 was causing difficulty in collecting samples.

BioMost, Inc performed a site inspection in June 2015 to assess the issues. Because there were no as-builts available, a lot of time was taken to figure out the piping/flow splitter system. Eventually it was realized that the valves and the flow splitter system did work, but needed to be properly adjusted. Once the system inlet box was found, it was drained to reveal a 12” inlet pipe which conveyed flow under SR-403 to the flow splitter system. Unfortunately, the pipe was clogged with iron precipitates. A portion of this material was removed with a shovel. A power snake was then used to clear additional blockages near the inlet of the pipe for approximately 80 additional feet.

Shortly after the blockage was cleared, water began to back up within the 12” pipe, indicating that an issue was occurring further into the pipe than the power snake was able to reach. After further investigation, the inlet pipes to VFP2A and VFP2B were found to be connected to a section of corrugated pipe which extended the pipes into the ponds. These sections were also found to be clogged with iron precipitate. Once the corrugated pipes were removed from the end of the pond inlet pipes, water from the raw discharge was able to flow freely into VFP2A and VFP2B. This solved the primary issues with flow from the raw discharge reaching the VFPs. Vegetation was removed from around the VFP1 pipe to ease sampling. The VFR flush valves were exercised.

In December 2015, BMI returned to the site to check on the system to see if additional maintenance was needed. Additional work was completed including removing more sludge from the intake and exercising flush pipes. During the investigation, a seep that was previously not noted was found. In January 2016, the "new" seep located within the emergency overflow channel between VFP2A and VFP1 along with Richards discharge, was sampled to see if they were related. Results from the lab analysis are provided in the table below indicating that the two sample points are quite similar. It is uncertain at this time, whether the seep is from the mine pool or leaking from somewhere in the system

SAMPLE Point	LAB	ALK.	ACIDITY	IRON	MANG.	ALUM.	SO4
	PH	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Richards Raw	3.13	ND	108.50	8.25	1.34	14.16	330.1
Unnamed Discharge	3.15	ND	113.85	8.71	1.37	13.95	346.2

In addition to work performed on site, an updated site schematic was created and uploaded to Datashed to reflect current site conditions and new insights about the treatment system.

Stream Restoration Inc. and BioMost, Inc. would like to thank the Blacklick Creek Watershed Association for their volunteer time and support in maintaining the Richards passive treatment system. Funding for technical assistance and maintenance was provided by the PA DEP's Growing Greener grant programs and in-kind services by project partners.

At the Richards Passive Treatment complex, the intake and conveyance pipe had become plugged (Top Left) causing most of the water to flow through a culvert and bypass the treatment system (Top Right). Additional plugged pipes from the flow splitter prevented water from getting to two of the VFR ponds (Center Left). An overgrowth of vegetation was causing difficulties for StreamTeam to sample, which needed to be removed (Center Right). After vegetation removal occurred, valve boxes were able to be located (Bottom Left).

Water within the drop inlet box had to be pumped in order to access and clean the box (Top Left). The conveyance pipe to the treatment system was plugged (Top Right) as well as the piping from the flow splitter box to two of the VFRs. These were cleaned out using a power snake (Center Left). Debris that had accumulated with the mine discharge pipe was also removed (Center Right). Seeps from the leaking Settling Pond and potential other sources flow into South Branch Two Lick Creek (Bottom Left).