

**RICHARDS AMD PASSIVE TREATMENT PROJECT (PHASE II)**  
(ME #350537)  
Cherryhill Township, Indiana County

**BLACKLICK CREEK WATERSHED ASSOCIATION**

**FINAL REPORT**

June, 2003

This report covers the installation and/or construction of acid mine drainage (AMD) collection and passive treatment facilities that supplement the previous system installed under Phase I, which provided treatment to only a portion of the total AMD discharge to Two Lick Creek at a location southeast of Clymer, Pennsylvania.

Construction of the Phase II facilities started on March 11, 2002, with site clearing and initial rough grading. On site materials consisted of weathered mine spoils with areas of burned out spoil being uncovered. Site ground water was encountered at elevations of approximately 1250' or lower.

The Phase II facilities installed include:

1. AMD source collection (catch basin and 8" & 12" PVC pipelines).
2. AMD conveyance under highway utilizing 16" steel cased boring and 12" PVC pipe including 6" & 8" PVC splits with valves (3) to the new VFR units and to existing (Phase I) unit.
3. Two (2) Vertical Flow Reactors (VFR) passive treatment units (impoundments).
4. Sludge Holding Basin with valved riser (PVC) outlet.
5. VFR inlet/outlet piping with control valves (3) and underdrains with valves (2).
6. Constructed Wetlands with (inlet) settling section and discharge outlet structure.

All facilities have been installed and are accepted as complete. Design average flow rate to each VFR is 75 gpm (based on a detention time of 15 hours). The system has been hydraulically tested at flow rates in excess of 100 gpm to each VFR simultaneously for a short period of time with acceptable performance.

Facility installation began with excavation for the Sludge Holding Basin. A "spring" source of low pH, iron containing water was unearthed (April, 2002) at a location near the north end of the basin with old mine timbers forming a box drain (see attached sample results). This unexpected source of water was too low in elevation to be gravity fed to the planned treatment facilities, and it was considered to be detriment to the Sludge Holding Basin's intended use and embankment stability given its location. It was decided to collect and regulate this source of flow by installing a gravel drain (french drain) with perforated pipe to a valved (4" PVC valve) outlet. This will allow monitoring of the flow and regulation of the flow. In addition, the bottom of the Sludge Holding Basin was raised 2 ft. in elevation (to el. ±1247') so as not to be lower than the spring flow elevation.

Overall, the Sludge Holding Basin was installed as designed, with respect to size, location, and configuration, except for the above noted changes. Installed basin has top inside dimensions of approximately 60' x 180' providing 250,000 gallons of capacity at a functional water elevation of 1254'. Additional sludge holding capacity can be provided by extending the top of riser stand pipe as more than two (2) ft. of freeboard has been provided in the basin.

The Sludge Holding Basins, including revegetation of constructed embankments, was completed in May/June, 2002.

The Constructed Wetlands were then developed beginning in April, 2002, by shallow excavation (2-3 ft.) of site accumulated mine spoils and silted areas. Excavated material was spread on the perimeter embankment (old railroad spur) along the eastern edge to provide a soil layer for later revegetation. Wetland area configuration was modified to provide a more irregular shoreline, varying water depths, and a rerouted water flow path from the original design. This was done to create a closer natural wetland settling and a degree of diversity. The settling section was shortened by 40 ft. to accommodate the modified flow path. Irregular features include two (2) small islands with original trees and an earthen causeway (an original site feature).

Excavation for the wetlands uncovered several sources of degraded quality groundwater discharges. One is an old corehole (see sample results - 7/08/02) under artesian pressure. Two other iron stained seeps, one in the settling section and one in from the fill embankment area on the north wetland shoreline were prominent. A bed of limestone gravel (4-5 ton each) was placed at each groundwater source to offset future acidity content impacts.

The wetlands were provided with a small amount of aquatic vegetation to serve as start or seed plantings. A total Constructed Wetland area of approximately 1.5 acres has been constructed with completion including revegetation having occurred in July, 2002. The wetlands final outlet channel was completed prior to the onset of winter conditions in December, 2002.

The identical VFR's were installed at an overall elevation one (1') foot higher than the original design. This was necessary to match the higher Sludge Holding Basin elevations, to minimize interception of site groundwater levels, and to minimize excavation volumes which became problematic from an on-site disposal standpoint. As such, the VFR top embankment elevations were raised providing volume for excess fill material and additional freeboard in the VFR's.

Installation of VFR-A was initiated in, May, 200~~2~~<sup>RLE</sup> and completed, including outlet piping/valves, by December, 200~~2~~<sup>RLE</sup>. VFR-B followed beginning in June/July, 2002, with completion (underdrains, limestone bed, and organic layer) (after the winter layover) in December, 2002.

The AMD collection facilities, including the catch basin, highway bore, and VFR inlet piping, was started in December, 2002. Additional work was required for AMD collection of flow from the old terra cotta pipe. Connection of this segment of raw AMD flow was completed in April, 2003, by installing a coupler and 8" PVC pipe extension to the 12" PVC prior to the highway crossing.

As of the end of January, 2003, all passive treatment facilities were essentially complete and incubation of the VFR's was initiated by filling with AMD water and maintaining a small inlet flow rate excess (5-10 gpm) through the system.

Final grading and revegetation of all project areas was completed in May, 2003. As of June, 2003, revegetative growth has been established and incubation of the VFR's is ongoing.

A summary of the more significant modifications to the original site facility design of the Richards Phase II project include:

1. Installation of "french drain" with outlet piping and 4" PVC valve for spring flow at Sludge Holding Basin.
2. Increase of Sludge Holding basin bottom elevation by 2 ft. (to el. 1247').
3. Reconfiguration of constructed wetlands areas to provide irregular features and varying depths.
4. Increase of VFR elevations by one (1') foot (to bottom elevation 1252' and water elevation 1260').
5. Higher final site elevations to accommodate excess earth material fills.
6. Additional 8" PVC inlet pipe and 8" PVC bypass piping (overflow) as part of the Raw AMD Collection/conveyance/inlet facilities.
7. Elimination of 12" valve at inlet piping to VFR's.
8. Elimination of ditch line for highway (PennDOT) drainage to settling section of wetlands (original 12" culvert retained).

A revised ("as built") project design drawing is attached with this report.

It is recommended that:

1. Inflow rate adjustments to the VFR's be gradually increased (and equalized) until all AMD flow is being treated (with 25-30 gpm going to the Phase I unit).
2. Additional periodic sampling of the wetlands outlet and of each VFR's discharge (with simultaneous raw AMD sampling) be conducted upon final incubation and at the various VFR inflow rates (to be measured at the VFR outlet pipes).
3. The Phase I (existing) VFR should be rebuilt to provide an average design capacity of at least 75 gpm thereby reducing the hydraulic loading to the Phase II VFR's to the average design of 75 gpm each and/or preventing bypassing of a portion of the raw AMD flow.

In addition to the abatement of the pollutional effects to Two Lick Creek from the acid mine drainage and dissolved metals of the deep mine discharge, this project has also restored a highly visible five (5) acre area of abandoned mined land (adjacent to a prominently traveled state highway) which was previously characterized by mine spoils with burned coal refuse areas. An additional benefit, which has already been established at this project area, is the use as wildlife habitat by aquatic species and water fowl.

Prepared by:  
VAPCO ENGINEERING

  
\_\_\_\_\_  
James F. Marino, P.E.

Date: \_\_\_\_\_

Submitted by:  
BLACKLICK CREEK WATERSHED ASSOCIATION

\_\_\_\_\_  
Robert Eppley, President

Date: \_\_\_\_\_



# WATER QUALITY REPORT

LAB NO: 4-61417-2

DATE RECEIVED

SAMPLED BY: JM

DATE SAMPLED: 4/8/2002

CLIENT: Blacklick Creek Water Authority

SOURCE: Richards II: Seep

Field pH:

FLOW RATE: *cfs or gal/min*

Temperature: °C

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|                             |                      |
|-----------------------------|----------------------|
| LAB pH.....                 | 4.25                 |
| SPECIFIC CONDUCTANCE.....   | 869 <i>micromhos</i> |
| ALKALINITY (to pH 4.5)..... | 0.0 <i>mg/l</i>      |
| ACIDITY (to pH 8.3).....    | 133.2 <i>mg/l</i>    |
| IRON.....                   | 35.05 <i>mg/l</i>    |
| MANGANESE.....              | 2.61 <i>mg/l</i>     |
| SULFATES.....               | 401.6 <i>mg/l</i>    |
| SUSPENDED SOLIDS.....       | 22 <i>mg/l</i>       |
| ALUMINUM.....               | 5.14 <i>mg/l</i>     |
| TOTAL DISSOLVED SOLIDS..... | <i>mg/l</i>          |

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*Lisa A. Milsop*

Authorized Signature

# MODULE 8.1A

## BACKGROUND/MONITORING REPORT

Mine Name: Richards II  
 Operator: Blacklick Creek Water Auth.  
 Permit No: RICHARDS  
 Township(s):  
 County(s):

Monitoring Point: Wtlds CH  
 Latitude:  
 Longitude:  
 Flow Measured By: Vapco Engineering:  
 Other (Specify):  
 Surface Elevation(MSL):  
 Laboratory: Consolidated Penn Laboratories

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

| Date Sampled                                 | Flow (gpm)<br>Static Water<br>Elevation | Field<br>pH | Lab<br>pH | Field<br>Temp<br>(C) | Alkalinity<br>(mg/L) | Acidity<br>(mg/L) | Iron<br>(mg/L) | Manganese<br>(mg/L) | Aluminum<br>(mg/L) | Sulfates<br>(mg/L) | Suspended<br>Solids<br>(mg/L) | Total<br>Dissolved<br>Solids<br>(mg/L) | Specific<br>Conductance<br>(micrmhos) | Type of Sample<br>Relation to Mine Site,<br>Treatment and Other<br>Comments.<br><br>Name of Sampler |
|--|---|-------------|-----------|----------------------|----------------------|-------------------|----------------|---------------------|--------------------|--------------------|-------------------------------|--|---------------------------------------|---|
| <i>Sample Description: Wetlands Corehole</i> |   |             |           |                      |                      |                   |                |                     |                    |                    |                               |  |                                       |   |
| 7/8/2002                                     | 10.0                                    | 5.5         | 5.35      |                      | 2.3                  | 171.3             | 61.12          | 2.40                | 2.25               | 464.9              |                               |  | 906                                   | JM  |

N/D indicates the particular test was Not Determined.

Metal results are for total metals unless otherwise specified.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that here are significant penalties for submitting false information, including the possibility of fine and imprisonment.

\_\_\_\_\_  
Signature of Permittee or Responsible Official

\_\_\_\_\_  
Date

# MODULE 8.1A

## BACKGROUND/MONITORING REPORT

Mine Name: Richards II  
 Operator: Blacklick Creek Water Auth.  
 Permit No: RICHARDS  
 Township(s):  
 County(s):

Monitoring Point: Wetlands  
 Latitude:  
 Longitude:  
 Flow Measured By: Vapco Engineering:  
 Other (Specify):  
 Surface Elevation(MSL):  
 Laboratory: Consolidated Penn Laboratories

INSTRUCTIONS: Use a separate sheet for each sample point and list results consecutively by date.

| Date Sampled                               | Flow (gpm)<br>Static Water<br>Elevation | Field<br>pH | Lab<br>pH | Field<br>Temp<br>(C) | Alkalinity<br>(mg/L) | Acidity<br>(mg/L) | Iron<br>(mg/L) | Manganese<br>(mg/L) | Aluminum<br>(mg/L) | Sulfates<br>(mg/L) | Suspended<br>Solids<br>(mg/L) | Total<br>Dissolved<br>Solids<br>(mg/L) | Specific<br>Conductance<br>(micrmhos) | Type of Sample<br>Relation to Mine Site,<br>Treatment and Other<br>Comments.<br><br>Name of Sampler |
|--|---|-------------|-----------|----------------------|----------------------|-------------------|----------------|---------------------|--------------------|--------------------|-------------------------------|--|---------------------------------------|---|
| <i>Sample Description: Wetlands Outlet</i> |   |             |           |                      |                      |                   |                |                     |                    |                    |                               |  |                                       |   |
| 12/20/2002                                 | 50-75                                   | 5.5         | 6.01      |                      | 20.5                 | 54.1              | 14.12          | 1.17                | 1.60               | 253.3              | 22                            |  | 649                                   | JM  |
| 2/24/2003                                  | 50.0                                    | 6.0         | 6.21      |                      | 50.4                 | 37.2              | 10.06          | 1.78                | 0.24               | 438.0              | 28                            | 786                                    | 1014                                  | JM  |

N/D indicates the particular test was Not Determined.

Metal results are for total metals unless otherwise specified.

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, Based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate, and complete. I am aware that here are significant penalties for submitting false information, including the possibility of fine and imprisonment.

\_\_\_\_\_  
Signature of Permittee or Responsible Official

\_\_\_\_\_  
Date