

CAMBRIA AMD TASK FORCE
PASSIVE TREATMENT SYSTEM EVALUATION
ROCKY RIDGE SOUTH

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PROJECT NO: AMD 31(6959)101.1
PROJECT NAME: ROCKY RIDGE SOUTH (JOLLER)
PROJECT LOCATION: TODD TOWNSHIP, HUNTINGDON COUNTY
RECEIVING STREAM: Unnamed tributary to Roaring Run to Sideling Hill Creek to Aughwick Creek to the Juniata River

PROJECT GOALS:

- Improved water quality in 4.5 miles of Roaring Run and Sideling Hill Creek
- Sideling Hill Creek is stocked upstream of Roaring Run
- Improved recreational potential

PROJECT INFORMATION:

- Project design was started by Scott Johnson and was completed by Dan Sammarco.
- The reclamation project consisted of two areas, A & B. Area A was on the south side of State Route (S.R.) 0994 and consisted of constructing a deep mine seal with a mine drain; a passive treatment system for the associated acid mine drainage discharge; and reclamation of an old tippel site. Area B was located on the north side of S.R. 0994 and consisted of approximately 22.4 acres of surface mine reclamation.
- The reclamation project was completed on land owned primarily by the PA Game Commission (PGC).
- The passive treatment system layout was slightly modified in construction by BAMR staff Jim Leake, Denny Steele and Dan Sammarco to suit field conditions.
- Construction engineer: Denny Steele
- Inspector supervisor: Allen Pletcher
- Project inspector: Jim Leake
- Construction completed: 1998
- Contractor: E. M. Brown, Inc.
- Final construction cost of \$731,563.88 for both Areas A and B. Total construction costs associated with the passive treatment system were \$587,956.28.

PROJECT DESIGN INFORMATION:

- The passive treatment system consists of three (3) wetlands or SAPS units and three (3) ponds.
- Design life of twenty (20) years with a design flow rate of 150 gallons per minute (gpm)
- Influent pH ranges from 2.9 to 3.3
- Influent flow ranges from 9 to 425 gpm
- Influent acidity concentration ranges from 140 to 290 mg/l
- Influent iron concentration ranges from 8 to 87 mg/l
- Influent aluminum concentration ranges from 8 to 19 mg/l

PROJECT DESCRIPTION:

- A treatment system schematic is shown in Appendixes A and B.

- The AMD discharge from the sealed deep mine entry is collected in Pond No. 1. The raw AMD discharge is sampled at the end of the mine drain pipe (a 15 inch diameter smooth lined corrugated polyethylene (SLCPE) pipe).
- Pond 1 outflow is conveyed by Pipe No. 1 (a 15 inch diameter SLCPE pipe) approximately 390 linear feet to an eight feet diameter manhole. The manhole divides the raw AMD flow between SAP 1A and SAP 1B via Pipe No. 2 and Pipe No. 3 (eight inch (8") diameter Schedule 40 PVC pipes) and also has an emergency overflow to prevent overloading the SAPS units.
- The influent flow to the SAPS units can be measured at the outlet end of Pipe No. 2 and Pipe No. 3. Total system inflow consists of adding the flow from Pipe No.'s 2 and 3 and any overflow from the manhole.
- SAP 1A and SAP 1B both drain into Pond 2 via six inch diameter perforated Schedule 40 PVC pipes that feed into eight inch diameter Schedule 40 PVC drain pipes with in-line flow control structures. The SAPS discharge flows can be measured and sampled at the outlet ends of the drain pipes.
- The emergency spillway for Pond 2 discharges into SAP 3. SAP3 inflow is sampled at the emergency spillway for Pond 2.
- SAP 3 drains into Abandoned Wetland No. 3 via six inch diameter perforated Schedule 40 PVC pipes that feed into an eight inch diameter Schedule 40 PVC drain pipe with an in-line flow control structure. SAP 3 discharge flow can be measured and sampled at the outlet end of the drain pipe.
- Abandoned Wetland No. 3 collects mine drainage from up to three different areas: treated AMD from SAP 3; any raw AMD overflow from the manhole; and the raw AMD discharge from the second deep mined area discovered during construction.
- Abandoned Wetland No. 3 discharges into a rip-rap channel to Pond 3. The treatment system discharge flow can be measured and sampled at the outlet end of the riser pipe spillway in Pond 3.

PROJECT OPERATION, MAINTENANCE AND REPLACEMENT (OM&R) INFORMATION:

- System water sampling and flushing was initially performed by BAMR during the first several years of operation and was later turned over to the Huntingdon County Conservation District.
- Insufficient oversight by BAMR resulted in significant sampling data gaps and uncertainty as to whether flushing was performed on a consistent basis.
- Flow data is available only for a small number of the sampling dates.
- Sampling (monitoring) point locations are shown in Appendixes A, B and C.
- Monitoring point IDs are shown in Appendixes D and E.
- In 2000, BAMR BD Project No. BD 2445 was undertaken to fix leaks in Pond No. 2. Between April 3, 2000 and May 5, 2000, the BAMR BD crew worked 12 days at a cost of \$9,553.45.
- Between May 23, 2000 and August 23, 2000, the BAMR BD crew worked 11 days doing remedial work on the site and installed an eight inch (8") dewatering pipe and gate valve on Pond No. 2 at a cost of \$10,805.16.
- Between August 3, 2006 and September 25, 2006, the BAMR BD crew worked two (2) days doing remedial work to fix a leak in Pond No. 1 and clean pipes at a cost of \$1,539.18.
- In July 2003, P. J. Shah prepared a draft agreement for an Operation, Maintenance and Replacement (OM&R) Plan for this site that outlined the sharing of OM&R responsibilities between BAMR, the PGC and the Huntingdon County Conservation District (HCCD) but it was never signed and adopted by the various parties.
- In November 2005, a \$32,529.28 grant was awarded to the Huntingdon County Conservation District (HCCD) from the PA DEP BAMR Ten-Percent (10%) Set Aside Program and Growing Greener funds for a consultant study of this treatment system. The study was done

by Paul C. Rizzo Associates, Inc. in collaboration with Damariscotta and the report was finalized in July 2007. A copy of the consultant report can be found on the OM&R server site for Rocky Ridge South.

WATERSHED RESTORATION INFORMATION:

- This project was constructed to treat what was believed to be the sole source of AMD pollution in Roaring Run and Sideling Hill Creek. If successful, it could restore 4.5 miles of Roaring Run and improve water quality in Sideling Hill Creek.
- A 165 feet long open limestone channel and three settling ponds were constructed by the PA Game Commission on State Game Lands No. 121 approximately one-half mile downstream of the discharge from BAMR's passive treatment system to further treat the discharge before it enters Roaring Run.
- Funding Partners:
 1. PA DEP BAMR Ten-Percent (10%) Set Aside Program (Areas A and B)
 2. PA Game Commission (open limestone channel and settling ponds)
 3. Huntingdon County Conservation District (O&M sampling and flushing work and a Grant for the consultant study)

PROPERTY OWNER INFORMATION:

- File records indicate that the property is primarily owned by the Pennsylvania Game Commission with a very small portion owned by the East Broadtop Railroad and Coal Company.
- The Consent for Right of Entry agreements obtained for this project are standard construction easements for building the treatment system and are more than ten (10) years old.

SYSTEM PERFORMANCE EVALUATION:

- Site Inspection: July 10, 2008
- Completed By: Jeffrey J. Westrick; Rich Beam; Ken Bobak; Denny Steele; and summer intern, Amanda Brown.
- Field Observations:
 1. The end of the mine drain pipe discharging into the collection basin (Pond No. 1) was underwater.
 2. The trash rack on the riser pipe spillway for Pond No. 1 was clogged with debris.
 3. Flow into SAP 1A was measured at 24 gpm. Flow out of SAP 1A was measured at 18 gpm.
 4. Flow into SAP 1B was measured at 34 gpm. Flow out of SAP 1B was 0 gpm.
 5. Flow into SAP 3 was estimated at 18 gpm. Flow out of SAP 3 was 0 gpm.
 6. The rock-lined channel leading from abandoned Wetland No. 3 to Pond 3 had iron precipitate built up in it.
 7. The steep embankment leading from abandoned Wetland No. 3 to Pond No. 3 had erosion gullies present probably due to high flow events and the channel clogging mentioned above.
 8. The riser pipe on Pond No. 3 was broken allowing water to discharge from the bottom of the pond rather than the top. Flow out of Pond No. 3 was measured at 6 gpm.
- A file review provided the following information:
 9. The passive treatment system was constructed on a reclaimed surface mine site and a deep mine tipple area.
 10. Pond No. 1 and Pond No. 3 were the only impoundments of the six (6) water impounding structures that were specified to be constructed with an impervious soil lining.

11. A second AMD discharge from a deep mined area at a lower elevation than the original "Joller" discharge was discovered during construction of Wetland No. 3 and required the relocation of Pond No. 2 and Wetland No. 3 (SAP 3).
 12. A review of the WPA mine maps at the BAMR office showed an old Martin mine in the Fulton (Clarion) seam was located in the vicinity of abandoned Wetland No. 3 in-line with the old railroad bed shown on BAMR's project mapping.
 13. A compacted clay lining was added to the three (3) SAPS units and Pond No. 2 during construction with Change Order No.1.
 14. The construction engineer's project warranty inspection report noted leakage in Ponds No. 2 and No. 3 and Wetland No. 3 and indicated that the leaks were repaired by the contractor with bentonite clay.
 15. The BAMR BD crew completed three (3) BD projects from 2000 to 2006 to fix leaks in the system.
 16. The Huntingdon County Conservation District was given a grant to study the passive treatment system. The resulting consultant study noted significant leakage and limestone coating problems and recommended a total system rehabilitation with clay liners.
- A follow-up site inspection was done on September 30, 2008 by Jeff Westrick, Rich Beam, Ken Bobak and Pat Ferko with the following additional observations:
 17. The raw water inflow to the system at Pond No. 1 was estimated at 15 to 20 gpm.
 18. The water level in SAP2 had dropped considerably; exposing the compost layer to the air.
 19. Several collapsed or sealed deep mine entries with small seeps were found in the wooded area directly downslope of the treatment system. A numbered concrete monument was found next to two of the entries possibly indicating that they were WPA mine seals.
 20. Several other small seep areas were also found downslope of the treatment system.
 21. The system discharge was estimated at only several gpm and quickly disappeared into the rocky hillside adjacent to a large talus area. The talus area extended down the entire side of the mountain ridge to just above State Route (S.R.) 3019 and the State Game Lands No. 121 treatment area.
 22. An AMD flow of approximately 20 gpm emerged out of the bottom of the talus area just upslope of S.R. 3019 and had a field pH of 2.9.
 - Water Quality Trends and System Performance:
 1. After 2001, data collection for this site is poor and incomplete making it impossible to do a meaningful system analysis. Thirty-two (32) sample dates are shown over nine years from 1/31/1999 to 12/20/2007. On some of these sampling dates, various sampling points of the system were not sampled. During this same time period (from 1999 to 2007), only six (6) flow measurements and two (2) estimated flows of the system influent are recorded from 3/15/2000 to 8/14/2003 on a system that had leakage problems from the start. The last recorded system influent flow measurement was more than seven (7) years ago on 8/22/2001.
 2. Influent water quality appears to have improved over time since the reclamation of Area B and construction of the mine seal (see Appendixes H and I).
 3. System performance appears to have decreased after 2001-2002 time frame but without flow measurements, one has no way of knowing how much of the system influent is being lost. The system effluent being sampled may consist entirely of the lower mine discharge that is not being treated. The system effluent pH has decreased from a high of 7.7 on 5/23/2000 down to 3.1 on 12/20/2007.

- Project Success:
 1. The second deep mine discharge encountered during construction of Wetland No. 3 enters the system after the three (3) SAPS units and gets minimal treatment before being discharged.
 2. The aforementioned consultant report stated that the system has significant leakage problems and metals accumulation within the limestone. It also stated that the entire inflow to the system was being lost to leakage.
 3. The Task Force evaluation also found the total loss of influent flow by the end of SAP 3 during the relatively low flow period of the evaluation.
 4. There has been inconsistent system sampling since 2001.
 5. At the recommendation of the Cambria AMD Task Force, a macroinvertebrate survey of Roaring Run and Sideling Hill Creek was completed on August 25, 2008 by Kay Spyker and other BAMR staff to assess the current impact of the AMD discharge from this site. The findings of the stream survey show that the AMD discharge causes some degradation to Roaring Run and Sideling Hill Creek but neither one is considered impaired at this time based on the Department's assessment methods.

TASK FORCE RECOMMENDATIONS:

- The Consent for Right of Entry agreements obtained for this project are standard construction easements for building the treatment system and are more than ten (10) years old. The O&M Section should track the easement status for all the AMD passive treatment system sites and periodically refresh the ownership data and keep the easements current.
- System water sampling needs to be performed consistently and at regular time intervals to provide for reliable system analysis.
- Accurate flow data needs to be collected at the same time as system water sampling to provide for reliable system analysis.
- Water sampling data needs to be recorded in one (1) central location and reviewed on a regular basis by the O&M Section to monitor system performance.
- Flow measurements, sample collection and data recording should be done by one (1) or two (2) people in the O&M Section to ensure reliability and accountability.
- As-Built Drawings need to be completed and recorded to show changes made to system components during construction. The As-Built Drawings also need to show the piping systems and critical system elevations.
- A continuous flow recorder should be installed at any future site during project development to provide more accurate flow data to the project designer and could be reused over and over.
- A continuous flow recorder should be designed and built into the treatment system to provide more accurate and reliable flow data for system analysis by the O&M Section.
- All Right of Entry agreements; As-Built Drawings, sampling location points and descriptions, SIS IDs, sampling data and analysis, OM&R operations, system changes, dates, costs, etc. for each treatment system need to be recorded in one (1) central location by the O&M Section.
- Any changes made during OM&R operations to the piping systems, valves, cleanouts, water levels, etc. need to be added to the original As-Built Drawings and recorded as revised As-Built with dates.
- Proper site assessment for building passive treatment systems needs to include some analysis of soil conditions to be encountered. The original design for this site only specified an impervious soil liner for Pond No. 1 and Pond No. 3. No liner was specified for the three (3) SAPS units and Pond No. 2. The clay lining for the SAPS and Pond No. 2 (that was added during construction) has proven to be insufficient. When building ponds and SAPS units in disturbed strip mine spoil areas, synthetic liners are a must.

SCOPE OF WORK RECOMMENDED:

- The Drafting section needs to complete an official As-Built Drawing for this site and record it in the drafting and O&M computer files.
- Robindale Energy Services has filed a Notice of Intent to explore the coal reserves adjacent to this project site with the Bureau of District Mining Operations (DMO). The exploration period under this notice will expire on July 31, 2009. (See map attached as Appendix N).
- The Task Force is recommending that BAMR do no rehabilitation work at this site at this time pending the outcome of Robindale's potential remining plans.
- The O&M section should follow-up with DMO and Robindale Energy Services after the Notice of Intent to explore has expired.
- The Task Force further recommends that the system and stream monitoring points be sampled through the springtime high flow periods with flow measurements collected throughout the system. The results of this sampling may indicate the need for a follow-up stream survey in the springtime.

ATTACHMENTS:

- Appendix A: Treatment System Schematic (1 of 2)
- Appendix B: Treatment System Schematic (2 of 2)
- Appendix C: Sampling Points on State Game Lands No. 121
- Appendix D: Sampling Point IDs
- Appendix E: PA 6959 Monitoring Points
- Appendix F: Rocky Ridge South Location Map
- Appendix G: Influent Flow
- Appendix H: Influent Acidity and pH
- Appendix I: Influent Iron and Aluminum
- Appendix J: Influent pH vs. Effluent pH
- Appendix K: Influent Acidity vs. Effluent Acidity
- Appendix L: Influent Iron vs. Effluent Iron
- Appendix M: Influent Al vs. Effluent Al
- Appendix N: Joller Mine Site Exploration Notice Map
- Appendix O: Directions To The Project Site