Operation & Maintenance Recommendations for the Rock Run Passive Treatment Systems Chest Creek Watershed, Cambria County

Technical Report Provided by Hedin Environmental through the Trout Unlimited AMD Technical Assistance Program

November 17, 2010

Background

The Chest Creek Watershed Alliance requested assistance through Trout Unlimited's AMD Technical Assistance Program regarding the operation and maintenance requirements for the Rock Run Recreation Area passive treatment systems. On November 9, 2010 a meeting occurred at the Rock Run Recreation Area in order to discuss the long-term operation and maintenance requirements of passive treatment systems located at the facility. Trout Unlimited's technical assistance contractor, Hedin Environmental, provided recommendations to the DEP (Malcolm Crittenden, Cambria District Mining Office) and the current treatment system operator (Bill Gongaware, GES, Inc.). As a final deliverable of the technical assistance project, the recommendations made verbally at this meeting are presented in this document.

All systems at the site are constructed in a similar manner following similar design criteria. As a result the major maintenance recommendations are also similar. Basic tasks common to all systems are described below. Tasks are grouped based on the recommended timeframe of their implementation. Table 1 summarizes the necessary tasks for each site.

Immediate Tasks – Implement as soon as possible

1) Clean out sediment traps and collection trenches (periodic activity, as needed) - Sediment is deleteriously affecting flow of AMD into the Pond 4 and Pond 23 systems. The accumulated sediment should be removed from sediment traps to restore their function.

2) Lower the water level in the VFPs (one-time activity) - Lowering the water level in the vertical flow ponds (VFPs) will reduce the amount of water in the VFPs, which will decrease the time necessary to drain the limestone beds empty. Adjustment of the water level can be made by adding or removing boards from each VFP's water level control structure. Water levels should be at or just below the limestone surface.

3) Flush to empty (ongoing activity, every other month) - Flushing the systems to empty will improve performance by evacuating all void spaces within the limestone beds. This temporarily eliminates short circuiting and results in improved performance. Based on the low metals loading rates, flushing the VFPs to empty every other month is considered sufficient to boost performance. Manual flushing can be facilitated by the addition of slide gate valves to the existing inline water level control structures. The valve replaces the bottom board in each VFP and is fitted with a handle extension that allows the valve

to be actuated by hand. Flushing can be automated through the installation of the AgriDrain Smart Drainage System (SDS). The SDS uses a solar powered actuator to open and close the flush valve at a programmed interval. One SDS would be necessary for each VFP. The cost per SDS is approximately $2,000 plus installation.

Short Term Tasks – Implement in the next 12 months

1) Influent flow distribution (one-time activity) - Influent flow should be distributed via perforated pipe over the greatest area possible. A perforated pipe resting at the edge of the limestone (on ground) with upturned elbows at each end (one to accept flow from the influent pipe and the other to flood the pipe and provide overflow) is sufficient. This action is most important for the Pond P VFPs.

2) Monitoring and performance evaluation (ongoing) - Performance improvements should be quantified through monitoring and comparison to pre-implementation performance. Adjustment to the flush interval can be made based on the findings. More frequent flushing, but not more than once per week, is likely to boost performance.

3) Removal of accumulated solids (periodic activity, every 5-10 years) - Solids that have accumulated on top of the limestone layer should be removed. One option for removal of the solids is to use a pump and fire hose to mobilize the solids while the system discharges through the flush pipes. The goal is to move the solids to the edges of the limestone bed while keeping any solids that move downward into the bed suspended so that they can be removed by the flushing pipes. The Pond P VFPs are in most urgent need for solids removal. Solids removal at Gaber Brown and Pond 4 is less urgent.

Medium Term Tasks – implement in next 1-5 years

1) Clean limestone (periodic activity, every 6-8 years) - If system performance declines in spite of the implementation of all immediate and short term tasks, then cleaning of the limestone must be performed. With proper execution, the limestone can be cleaned for less than $10/ton, which is much less expensive than replacing the limestone with new aggregate. Removal of accumulated metals scale from the surface of the limestone will restore its reactivity. Cleaning can be accomplished by mechanically agitating the limestone. Care must be taken to ensure that the solids that are removed do not simply accumulate in a different part of the limestone bed. The cleaning of fouled limestone aggregate is a new activity and standard practices have not yet been developed. A flexible process where the contractor can modify solids removal processes is recommended.

Long Term Tasks – implement in next 5-10 years

1) Add limestone (periodic activity, every 12-16 years) - Limestone that is lost via dissolution should be periodically replaced. New limestone should be added as part of a limestone cleaning event. After the limestone is cleaned, add limestone to the top of the existing limestone surface. Once new limestone is added, adjust the water level so that it

is at or just below the top of the limestone layer. Consider selecting AASHTO #5 limestone when adding new limestone. This gradation is very uniform and performs very well. Avoid mixing smaller new limestone with larger existing limestone (AASHTO #1). At Pond P, existing limestone from VFP1 could be placed in VFPs 2a and 2b, thereby allowing VFP1 to be refilled entirely with AASHTO #5 without mixing stone sizes.

Table 1. Maintenance tasks and urgency

Site	Clean out sediment traps and collection trenches	Lower water level	Flush to empty	Influent flow distribution	Monitoring and performance evaluation	Remove accumulated solids	Clean Limestone	Add limestone
Gaber Brown	Low	High	High	Medium	High	Medium	Medium	Low
Pond P	Low	High	High	High	High	Medium	Medium	Medium
Pond 4	High	High	High	Medium	High	Medium	Medium	Low
Pond 23	High	Low	Low	Low	Medium	Low	Low	Low

Definitions: High = immediate action; Medium = perform after evaluating effectiveness of high priority tasks; Low = continue to monitor and address problem as needed