

Assessing the benefits of at source vs. in stream AMD treatment: Implications for managing water liabilities under WVDEP's Bond Forfeiture Program

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Approximately 3.4 stream miles in the Muddy Creek drainage are impaired by acid mine drainage (AMD). The majority of the acid load comes from the Martin Creek subwatershed, including Fickey Run and Glade Run. According to the Lower Cheat River Watershed Based Plan (WBP), Fickey Run is impaired by two abandoned mine land (AML) and two bond forfeiture sites, while Glade Run is impaired by five AML and five bond forfeiture sites. Both Fickey Run and Glade Run flow into Martin Creek, which receives AMD from two AML sites before it joins Muddy Creek 3.2 miles above its confluence with the Cheat River. Approximately 0.7 miles above Martin Creek, Muddy Creek receives AMD from several AML sources originating from the Dream Mountain Ranch. Muddy Creek supports a quality cold water fishery upstream of Dream Mountain.

The West Virginia Department of Environmental Protection's Office of Special Reclamation (OSR) has 9 bond forfeiture sites within the Muddy Creek drainage that require water treatment. OSR currently has 9 active treatment sites, one passive treatment system, and 3 treatment systems yet to be constructed. Although a majority of the treatment sites were constructed between 2004 and 2006, OSR has been treating AMD in this drainage as early as 1995 when the State inherited the T&T Fuels deep mine following a devastating mine blowout. To date the OSR has spent over \$3.4 million in construction costs including modifications to the T&T treatment site and approximately \$10 million in O&M cost, or roughly \$648,000 on an annual basis, and OSR now has 10 NPDES outlets.

Since the majority of the AMD comes from the Martin Creek subwatershed and the sources are primarily AML sites, the only possible outcome from the current NPDES permitting structure leaves OSR with discharging compliant water into "dead" streams. To remedy this, OSR is pursuing an NPDES-permitting structure that will allow for in-stream treatment in lieu of treating at-source.

An ongoing study being conducted by the WVU Water Research Institute (WVWRI) for the OSR should demonstrate significant cost savings and projected increased environmental benefit

by applying in-stream lime dosers at strategic locations within the stream system rather than using lime dosers to treat individual sources (Ziemkiewicz, 2006). By utilizing portable dosers and placing them at strategic locations within the Martin Creek watershed, WVWRI is identifying optimal locations for permanent installation of in-stream dosers (Figure 1). Water quality samples are being collected on a weekly basis at locations upstream of the dosers and at tributary mouths to monitor water quality conditions in response to the dosers.

The purpose of this study is to provide the OSR with data to guide future management decisions on the placement of dosers to treat Martin Creek at a watershed level. The project began in late October 2015. This presentation summarizes the first four months of water quality changes in Martin Creek and its tributaries as a result of in stream doser operations.

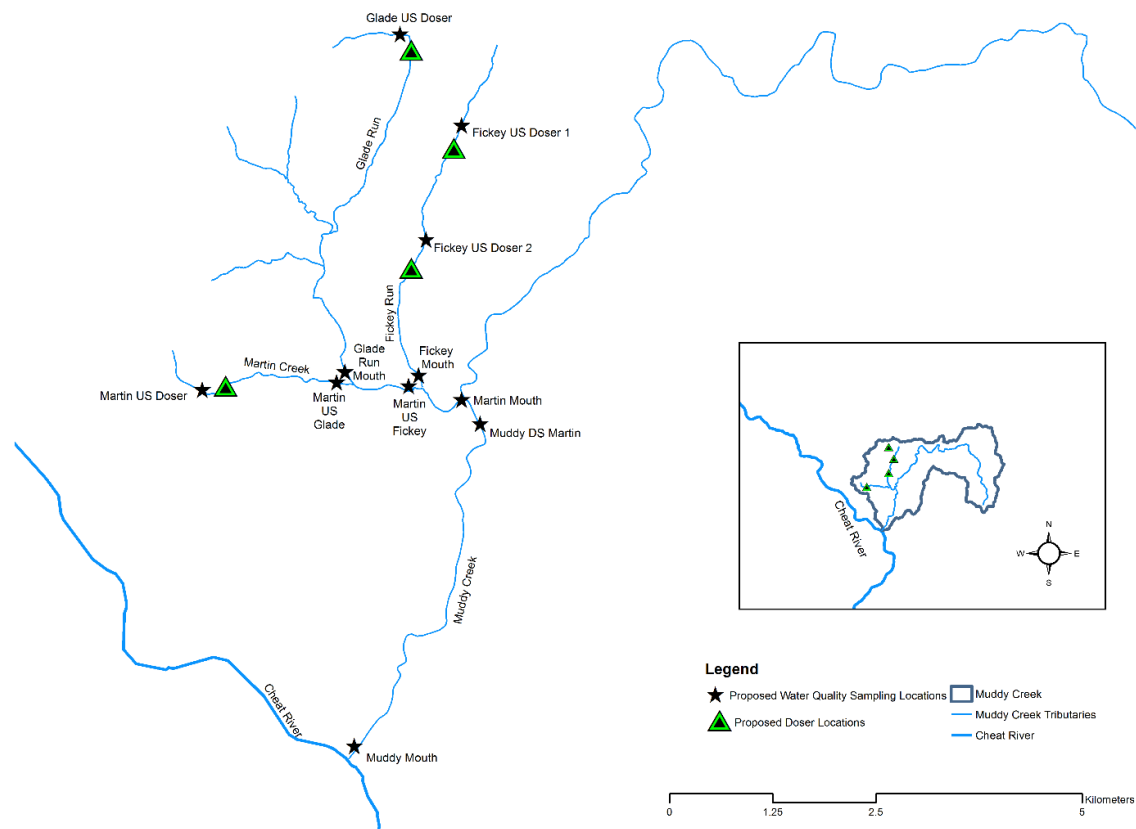


Figure 1. Doser configuration and sampling stations in the Martin Creek watershed. The inset shows its location relative to the Cheat River and Muddy Creek.