

Acidic Stream Mitigation by Limestone Sand Addition. David L. Brant¹, Anthony J. Marich Jr.², Keith L. Largent³ (1-WVU National Research Center for Coal and Energy, Morgantown, WV, 2-PA Department of Environmental Protection, Markleton, PA, 3-Somerset Conservation District, Somerset, PA).

Abstract: The Town Line Run watershed comprises an area of 3,600 wooded acres. The tributaries feeding the stream consist of sandstone springs that do not contribute alkalinity to the watershed, leaving the stream susceptible to acid precipitation. This has a negative affect on Iser's Run, a native brook trout fishery above the confluence with Town Line Run. The objective in stream liming is to improve water chemistry by increasing pH, alkalinity, and reducing acidity, aluminum, and iron. Introducing crushed limestone directly into a stream from a dump truck is an inexpensive but temporary solution to accomplish this objective. In this type of liming operation, a bed of limestone is spread down the stream channel by the momentum of the stream from the introduction point, rather than manually. Water moving across this bed dissolves the limestone, increasing the pH, alkalinity, and calcium while decreasing the acidity, iron, and aluminum concentrations of the water. The size of the limestone particles is important for this purpose because particles that are too small (<150 microns) will be carried away, while particles that are too large (>1000 microns) will remain at the introduction point. Our study placed 80 tons of sand-sized limestone (85% calcite) in the stream channel at a single point. Water samples were collected monthly at the following sites (1) directly upstream of the addition site, (2) 100 yards downstream of the site, and (3) 2500 yards downstream of the site. Other sample locations include (4) upstream and (5) downstream of the Town Line Run-Iser's Run confluence and the Casselman River upstream (6) and downstream (7) of Town Line Run. The samples were analyzed for pH, Specific conductivity, Alkalinity, Acidity, Iron, Manganese, Aluminum, and Sulfate. The first liming produced a pH of 6.6 that slowly declined to the baseline pH of 4.8 after 10 months. The alkalinity increased to 10 mg/l CaCO₃ eq. and also decreased to 6.0 mg/l CaCO₃ eq. after 10 months. The acidity was eliminated after the addition and gradually increased to 12.6 mg/l CaCO₃ eq. in the same time period. The second addition of 180 tons of the same limestone yielded similar initial results. The pH increased to 6.5, the alkalinity increased to 18.6 mg/l CaCO₃ eq., and the acidity was eliminated. In general, this low cost (<\$2,000.00) project demonstrated that a single point application of limestone can increase the water quality of marginal acid sensitive streams for a limited time period. Careful selection of limestone particle size and amount of limestone can reduce the addition interval to annual or bi-annual additions.

Additional Key Words: Acid Rain, Lime-sand.