

# THE USE OF MINE DRAINAGE SOLIDS FOR THE CONTROL OF PHOSPHOROUS POLLUTION FROM DAIRY MANURE MANAGEMENT<sup>1</sup>

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**Abstract:** Dairy manure contains high concentrations of water soluble phosphate that can be a significant water pollution problem. Fe, Al, and Ca minerals readily react with phosphate to form less soluble solids. Mine drainage treatment creates Fe, Al, and Ca solids that have established phosphate complexation capabilities. We are investigating the use of various coal mine drainage treatment solids for P-control in dairy manure management. Three mine drainage materials were tested: 1) a passively precipitated alkaline iron solid; 2) a passively precipitated acidic iron solid; and 3) an alkaline lime treatment sludge. Laboratory testing established that all three solids decreased soluble P in dairy manure. The amount of P removal was related to the total concentration of Fe, Al, and Ca in the solids. The lime sludge, which had a high Ca component, performed best. The P-removal performance was best for manure with 200-400 mg/L soluble P. The solids had little effect on P for manures with less than 100 mg/L soluble P. Field tests were conducted where 300-1,000 lb of mine drainage solids were added to ~6,000 gallon batches of dairy manure and spread onto corn fields. The impact on soluble P in the field tests was similar to the results obtained in laboratory trials. Growth of corn in the test fields was monitored. No indication of P-deficiency was found. The cost to utilize mine drainage solids for P control by the methods developed in this project are approximately \$9 per pound decrease in soluble P. Expanded testing on additional dairy farms is planned for 2010.

**Additional Keywords:** phosphate pollution, manure, mine drainage

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