

Final Report

Field Evaluation of the Fate of Wastewater Components from Septic Systems

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Problem and Research Objectives:

Community subdivisions and rural areas are often characterized by a single community well or individual water wells and individual septic sanitary systems. The proximity of the water supply to the community's septic tank leach fields creates a concern that contaminants may be transported from the waste disposal system to the water supply aquifer. Of particular concern is the fate of nitrogen compounds, such as ammonia and nitrates, and the fate of microorganisms, particularly pathogens.

In recent years, septic system modifications have been proposed to include reactive zones to minimize nitrate contamination of ground waters. The study is expected to furnish an evaluation of the effectiveness of septic system reactive zones in controlling bacterial and nutrient contamination (nitrogen compounds) from leach fields. This study is already being supported through federal 319 funds, and this project only provides supplemental funding to address development of an additional monitored field site representative of the rural ranchette area in the vicinity of either Cheyenne or Laramie, Wyoming.

Methodology:

A modified leach field design utilizing a reactive barrier will be installed in Cheyenne or Laramie at a new homesite in addition to the approved standard leach field design. The well sampling system will be designed to permit vadose zone as well as saturated zone sampling and allow comparison of the treatment efficiency of side by side systems. Three boreholes will be drilled at each site to install the access tubes. The boreholes will be located in the drainfield or just surrounding the drainfield. At least three depths will be monitored using a nested sample probe. Wastewater flowrates will be measured and samples will be analyzed for DO, pH, nitrite and nitrate, ammonia, TKN, BOD₅ and fecal coliforms.

Principal findings and significance (Progress Report):

The modified leach field design based on local soils is being developed from column studies conducted through a federal 319 grant which is currently underway. The installation has been delayed until the summer of 2002 based on the results of the column studies. Site design may also be revised in response to the results of a Nebraska reactive barrier field study due out in July 2002. Homeowners who are in areas considered to be at risk and representative of existing rural ranchette development in Wyoming have been identified. Homeowner incentives for participation in the program and legal implications of those incentives are currently being considered in coordination with the Wyoming Department of Environmental Quality.

Student Support and Training:

Two undergraduate students received training on this project.

Project Publication:

Bedessem, Marjorie E., Thomas V. Edgar, and Robert Roll, 2005. Nitrogen Removal in Laboratory Model Leachfields with Organic-Rich Layers, *J. Environmental Quality*, 34: 936-942.