

**Title:** **Research and Data Analysis of Groundwater Contamination From Municipal Rapid Infiltration Land Disposal Systems (Study No. 50)**

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**Objectives:** To determine the design and operational variables that affect compliance with groundwater standards at municipal facilities that dispose of secondary treated effluents to land, or rapid infiltration (RI) systems. To examine the potential for monitoring groundwater at RI systems for coliform bacteria and to perform an initial survey of the extent of contamination of groundwater by coliform bacteria at RI systems.

**Background/Need:** There are 131 municipalities in Wisconsin that use RI systems for the final disposal of municipal treated sewage. Wisconsin regulates municipalities that dispose of treated sewage to RI systems through discharge permits. The permits set forth monitoring requirements for each municipality. The results of this monitoring are used to determine if a given municipality is complying with regulations.

**Methods:** The research began with a literature review of treatment plants using land disposal for final discharge of treated effluent. Data from influent and effluent monitoring and groundwater sampling and compliance surveys were then analyzed to determine if correlations existed between operation/design variables and groundwater data. A monitoring program of influent and effluent at selected RI systems was performed to supplement the existing data. The second part of the research included a computerized reference search of available data on coliform monitoring of groundwater and a preliminary survey of coliform bacteria contamination of groundwater at RI systems.

**Results:** 60% of the municipalities using RI systems sampled during the study had elevated levels of total dissolved solids (TDS), chlorides or nitrates in monitoring wells. The nitrogen component of effluents sampled during the research consisted of ammonia and nitrate. Pretreatment resulted in 32% nitrogen removal during winter with an increase to 69% in spring. Soil samples collected near monitoring wells contained sufficient total coliform bacteria and fecal streptococcus bacteria to contaminate sampling equipment. Coliform bacteria were detected in a majority of the groundwater samples collected.

**Conclusions:** The usefulness of groundwater data is suspect due to the inherent variabilities associated with groundwater sampling. RI systems with average influent concentrations of total nitrogen will not comply with groundwater regulations at all points in the groundwater.

**Recommendations/Implications:** Monitoring requirements need to be redefined for RI systems. Monitoring of the influent and effluent of RI systems for parameters other than biological oxygen demand and suspended solids may be required at RI systems if the efficiency of pretreatment and the potential for groundwater contamination at RI systems is to be determined.

**Availability of Report:** This report is available for viewing and loan at:  
  
The Water Resources Center  
1975 Willow Drive  
Madison, WI 53706  
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Publication 050882

**Key Words:** Ammonium-nitrate, bacteria, chloride, nitrate-nitrogen, rapid infiltration systems, total dissolved solids, wastewater.

**Funding:** The Wisconsin Department of Natural Resources provided funding for this project through the Groundwater Management Practice Monitoring Program which receives appropriations from the Groundwater Account.