

Nutrients and pesticides in ground water supplying domestic wells within the glacial aquifer system, northern United States

(Suggest doing fact sheet of same info for CO and NYNE because of the limited number of networks for each)

Target: Scientific Investigations Report

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Foreward

Introduction

In domestic supplies from ground water, two of the largest issues are nutrients and pesticides (Hamilton, 2004). Domestic wells are shallower than public supply wells and closer to possible points of contamination. A majority of domestic water supplies are in agricultural areas obtain water from shallow ground water. Pesticide detection frequency is much higher in agricultural land-use areas underlain by unconsolidated deposits (Kolpin and others, 1995).

A. Purpose and scope

Purpose: Determine frequency and occurrence of nutrients and selected pesticides in ground water from domestic supplies, and assess the relation between source and receptors within the glacial aquifer by comparing recharge water quality to domestic and public-water supply quality.

Scope: Water quality of domestic-supply, public-supply, and monitoring wells sampled by NAWQA in glacial aquifer system from 1991 to 2004. This includes 421 domestic water supplies, 115 public-water supplies, and 643 recharge monitoring wells.

B. Previous studies (IEPA, Puckett, Squillace, Nolan, Barbash, Gilliom, Kolpin, study unit reports)

Example: A study of nine Midwestern States showed 13% of the domestic supply wells had a detection of nitrate above 10mg/L and 0.2% of the domestic supply wells had an atrazine detection greater than 3 ug/L (Center of Disease Control, 1999)

Example: Nitrate concentrations have been increasing since 1940s in the glacial aquifer and have been above the 714 umol/L MCL at most sites since the mid-late 1960s. This increase has been accompanied by an increase in agricultural use of fertilizer (Puckett and Cowdery, 2002).

C. Study Area

1. **Glacial aquifer system**
 - a. **Confined/unconfined aquifer conditions**
 - b. **Other aquifer conditions and properties (permeability, soil characteristics)**
 2. **Land Use**
 3. **Pesticide application rates**
 4. **Water Use and state data collection**
 - a. **Domestic water use**
 - b. **Public water use**
- D. Methods and approach**
1. **NAWQA data collection, storage, and manipulation for regional aquifers**
 2. **Nonparametric statistics and logistic regression analysis**

Nutrients and Pesticides in Domestic Water Supplies

The data collected by NAWQA is the only nationally consistent water-quality analysis for domestic supplies. Domestic wells within the glacial framework were located in four physiographic areas; wells are in buried valleys or in layers/lenses of glacial deposits; and wells are screened below coarse and fine-grained surficial deposits. The intrinsic susceptibility and natural vulnerability of the aquifer is reflected in the water quality measured in these locations. In addition to the 445 domestic supplies, there were 100 public supplies and 1,115 land-use monitoring wells sampled for nutrients and pesticides. Generally the land-use wells are shallow and reflect recently recharged ground water that has been affected by sources from surrounding land use. The domestic wells are somewhat deeper in the glacial deposits and are the shallowest drinking water receptors of this recently recharged water. The public-water supplies are generally the deepest of the wells in the glacial aquifer, and are the most distant receptor of influences from land-use sources.

- A. Nutrients and pesticides within glacial framework**
- B. Comparison to other sources and receptors**
 1. **Nutrients--source to receptor in the glacial aquifer**
 - a. **Shallow monitoring wells and land use**
 - b. **Public supply wells and water use**
 2. **Pesticides--source to receptor in the glacial aquifer**
 - a. **Shallow monitoring wells and land use**
 - b. **Public supply wells and water use**

Summary
References