

Report for 2004NY51B: Assessing nitrate-nitrogen in surface and groundwater in eastern Wyoming County, NY

There are no reported publications resulting from this project.

Report Follows

Title: Assessing Nitrate-Nitrogen in Surface and Groundwater in Eastern Wyoming County New York

Problem & Research Objectives:

High nitrate-nitrogen (NO₃-N) concentrations in groundwater supplying private drinking water supplies are a concern to Wyoming County residents. A county-wide sampling of private drinking water supplies carried out in 1988-1989 found NO₃-N concentrations ranging from <0.1 to 40 mg L⁻¹, with 23 of 206 samples exceeding the 10 mg L⁻¹ maximum contaminant level (MCL) established by the Safe Drinking Water Act (Hurd, 1989). The majority of samples exceeding the MCL occurred at or near farm sites in Eastern Wyoming County where intensive agriculture (dairy farming) is the major land use. Farmers and other rural residents in the area remain concerned about nitrates, and are interested in determining whether the implementation of nutrient management plans (NMP) is having an effect on reducing or curtailing nitrate levels. This information will also help in the development of a revised Nitrogen Leaching Index (NLI) for New York state. A recently formed state-wide groundwater working group is also interested in this study to address groundwater contamination concerns from agriculture.

The goal of this case study project is to determine the trend in NO₃-N concentrations in groundwater and to utilize the information in state/regional nutrient management/water quality educational programs. Approximately fifteen groundwater sites are being monitored in Eastern Wyoming County, near locations where a significant number of sites exceeded the MCL for NO₃-N during previous testing. A similar number of surface water sites are also being monitored. Specific project objectives are: 1) To monitor surface and groundwater supplies for NO₃-N concentrations, 2) To collate and compare new sample data with previous sampling results, 3) To conduct detailed site evaluations and well pump tests, and 4) To develop and carry out educational sessions to disseminate the information.

Methodology and Progress:

Project Objective 1: In cooperation with Wyoming County collaborators, surface and groundwater supplies have been identified for further testing. Approximately fifteen sites have been selected for routine surface water sampling (small streams and drain tile outlets). Also, about fifteen groundwater supplies used for drinking water (wells and springs) were selected for follow-up sampling, based on the previous 1988-1989 study. The surface water is being grab sampled at about four week intervals. Some of the groundwater supplies are also being sampled at four week intervals, and others are being sampled at times coinciding with the time of the year the previous groundwater sampling had been done. Water samples are transported in coolers to the Cornell Nutrient Analysis Laboratory for analysis. The water samples are routinely analyzed for NO₃+NO₂-N, NH₄-N and PO₄-P. Some of the surface and groundwater samples are also being analyzed for other major cations and anions (Al, C, Ca, Cl, Fe, K, Mg, Mn, Na, and SO₄-S). Any other information which can be obtained, such as previous sampling data, well and water-level depths, surface flows and pumping rates, well driller logs, adjacent land use, and near-by on-site waste management systems, is also being documented.

Project Objective 2: Water sampling data from previous studies and other monitoring is being identified and collected for review. This has included any other private sampling results made available, other Wyoming County DOH test results, and the Letchworth State Park Water Quality Monitoring Program (Rabideau, 2003). These data are being used along with the sampling data being collected under Objective 1 for comparative and trend analysis purposes.

Project Objective 3: Ground elevations and equilibrium water levels for many of the wells have been determined to establish the potentiometric surface and direction of groundwater flow. Elevations and distances along the watercourses being surface sampled have also been obtained. There has been

difficulty obtaining landowner cooperation to conduct well pumping tests and obtain more intensive data. Many of the wells are in constant use and have chlorine injected directly into the well, so physical and temporal access to wells is extremely limited

Project Objective 4: Several meetings have been held with Wyoming County collaborators and with a local group of producers and their certified crop advisors. Two educational meetings were specifically targeted to farmers in the sampling study area. Due to the locally complicated and contentious nature of producer/community relations in terms of groundwater in the past, producers participation has not been uniform and it is difficult to obtain wide-spread cooperation and consensus from the case study participants if and how to share project results. Some educational resource materials were prepared for the meetings and shared with project participants to illustrate the nature of the groundwater problem, how dairy activities could potentially be contributing and to discuss some potential courses of action for addressing the problem of nitrate contamination of groundwater.

Principal Findings & Significance: The groundwater pattern(s) in the area appear to be complex and follow a more regional influence, rather than being associated with the more identifiable boundaries of the surface watersheds. Sampling of tile drained fields and many of the surface watercourses have found nitrate-N concentrations which exceed the drinking water standard of 10 mg L⁻¹ though such discharges do not directly violate any laws. The predominant discharge in several of these small surface watersheds appears to be tile drain discharges. A few of the groundwater wells that are being sampled have consistently high nitrate-N values, but other nearby wells have very low nitrate levels.

References:

Hurd, T.M., 1989. Nitrate levels in private drinking water supplies of Wyoming County, unpublished report of Wyoming County Department of Environmental Health, August, 23, 1989, 12 pp.

Rabideau, A.J., 2003. Letchworth State Park Water Quality Monitoring Program. See: (http://www.eng.buffalo.edu/ees/research/water_quality.htm).

Student Support:

To be identified for fall semester (2005)

Notable Achievements: (if any)

The preliminary project efforts and water sampling data have been of great interest to the Wyoming County collaborators and some farmer participants, who have used the information to secure additional NY state environmental bond act funds to address pollution concerns on the dairy farms.