A geochemical and geological examination of surface water and ground water quality in Kingston, Nova Scotia: preliminary results

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The geochemistry of ground and surface waters may vary considerably within a specific watershed and can be greatly influenced by land use practices and surficial geology. The town of Kingston is rapidly expanding, contains mixed urban-rural land use, increased housing density and, in the study area all residences have private wells. Concern has been raised over maintenance of water quality standards in light of these stresses.

To evaluate existing and potential water quality a surface and ground water sampling program was initiated in the spring of 1995; samples were also collected in the fall of 1995 to provide temporal and seasonal control. Investigations of land use practices and surficial geology were also initiated. Surficial sediments are mostly glacial in origin and consist of Lawrencetown till overlain, in places, by thick deposits of fine- to coarse-grained, poorly sorted sand. Most households are situated on, and derive their water from, this highly permeable sand. Post-glacial alluvial deposits are found in the major stream valleys of the watershed.

Water samples were analyzed for pH, dissolved oxygen (DO) and conductivity (COND), Na^+, K^+, Ca^{2+}, Mg^{2+}, Fe^{2+}, Cl^-, NO_3^{2-}, PO_4^{3-}. Surface water samples and isolated well water samples (those displaying depressed DO values) were tested for the presence of coliform. Although sample spacing was relatively dense there was a high degree of variability at adjacent or nearby sample stations. This variability is, in part, a result of the complex interplay between water source, depth and the geological conditions inherent in a particular water source. Three distinct geochemical zones were recognized in the study area on the basis of aberrant pH, DO and COND values; however, only at isolated sites did these values exceed provincial drinking water standards (DWS).

Preliminary results indicate a shift in concentration of specific ions from spring to fall. Most notable was a decrease in Cl^- concentration and an increase in Ca^{2+} concentrations. Data indicate that agricultural practices, road salting and natural iron in the bedrock and overlying sediment all adversely affect water quality at the study site. Anomalous and potentially unsafe pH values occurred at isolated locales and must be studied in further detail.