Hydrogeochemical evolution and arsenic mobilization in confined aquifers formed within glaciomarine sediments

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The hydrogeochemical evolution and arsenic mobilization mechanisms in groundwater occurring in confined aquifers formed within glaciomarine sediments in the Lower Fraser Valley, British Columbia, are addressed. Methodology includes analysis of chemical and isotopic composition of groundwater, and mineralogical and chemical analysis of sediment samples sourced from core. Groundwater in confined aquifers is Na-HCO₃ or Na-Cl type, basic and reduced; whereas groundwater in unconfined aquifers is Ca-Mg-HCO₃ type, near neutral and oxidized. The chemistry of groundwater in confined aquifers is controlled by cation exchange, dissolution of carbonate minerals, silicate mineral weathering, and mixing with saline connate water suggesting freshening conditions. Arsenic release occurs as groundwater flows through glaciomarine sediments; its mobility is favoured by basic pH and reducing groundwater conditions. Possible arsenic release mechanisms are iron oxides reduction and sulphides oxidation. A method of spatially representing likelihood of arsenic occurrence in groundwater based on geochemical interpretation and available data is presented.