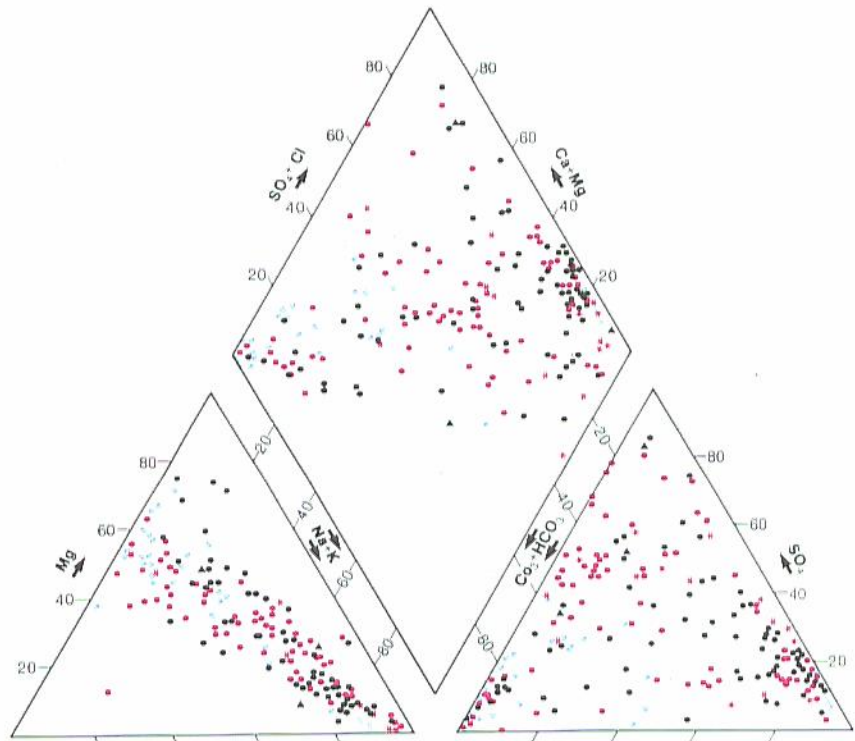


LEGEND

- WATER SAMPLE FROM PALEOZOIC ROCK AQUIFERS
- WATER SAMPLE FROM JURASSIC ROCK AQUIFERS
- WATER SAMPLE FROM CRETACEOUS ROCK AQUIFERS
- WATER SAMPLE FROM QUATERNARY AQUIFERS
- WATER SAMPLE FROM UNKNOWN OR OTHER AQUIFERS
- WATER SAMPLE FROM SPRING
- TOTAL DISSOLVED SOLIDS AND CHLORIDE CONCENTRATIONS (mg/L)
- AREAS OF ELEVATED SOIL SALINITY

CHEMICAL COMPOSITION OF GROUNDWATER (percent equivalents per million)



- PALEOZOIC ROCK AQUIFERS
- ORDOVICIAN/SILURIAN ROCKS
- DEVONIAN ROCKS
- JURASSIC ROCK AQUIFERS
- CRETACEOUS ROCK AQUIFERS
- QUATERNARY AQUIFERS
- SPRING

GROUNDWATER GEOCHEMISTRY

East of Lake Manitoba groundwaters are generally fresh (total dissolved solids less than 1000 mg/L) in overburden and bedrock aquifers. Total dissolved solids contents typically range from 400 mg/L to 650 mg/L. Most groundwaters are Mg - Ca - HCO<sub>3</sub> types with sodium and sulphate locally becoming significant ionic constituents. This groundwater type is typical of meteoric water recharge undergoing geochemical development in carbonate dominated geological terrain. The area near Gypsumville is anomalous to this general trend. In this area total dissolved solids contents range up to 4550 mg/L. Groundwaters are typically Na-SO<sub>4</sub> or Ca-SO<sub>4</sub> types reflecting geochemical development in a complex geological terrain with abundant gypsum.

West of Lake Manitoba groundwater quality is generally poorer than east of the Lake and the geochemistry of the groundwaters becomes complex and variable. Total dissolved solids contents generally exceed 1000 mg/L in bedrock aquifers and exceed 10,000 mg/L in deeper or most western bedrock aquifers. The total dissolved solids content of overburden aquifer groundwaters generally exceeds 1000 mg/L except in those aquifers which receive recharge of meteoric waters. In these aquifers total dissolved solids values range from 400 - 1000 mg/L, for example in the sand and gravel aquifer south of Dauphin Lake. The complexity of groundwater geochemistry in areas west of Lake Manitoba is reflected in the wide scatter of data points on the Piper diagram above. In bedrock aquifers the brackish groundwaters are typically Na-Cl (SO<sub>4</sub>) types becoming Na-Cl types as the total dissolved solids increases to saline groundwater levels (10,000 mg/L). In overburden aquifers fresh groundwaters are generally Mg-Ca-HCO<sub>3</sub>-SO<sub>4</sub> types but trend towards Na-(Mg)-Cl-(SO<sub>4</sub>-HCO<sub>3</sub>) types as total dissolved solids increases.

Isotopic and geochemical studies indicate that the brackish to saline groundwaters found west of Lake Manitoba are composed of mixtures of "modern" fresh meteoric water recharge, Pleistocene epoch fresh waters and brines presently found in the deeper parts of the Williston Basin. The mixed brine - Pleistocene waters are presently being lost from the hydrogeologic system as regional groundwater discharge in the area east of the Manitoba Escarpment and west of Lake Manitoba. This area of discharge causes problems with increased soil salinity as indicated on the map.

SOURCES OF INFORMATION:

Manitoba Department of Natural Resources, 1986, Files of Chemical Analyses of Groundwater, Hydrotechnical Services, Water Resources Branch, Winnipeg

Mills, G.F. and R.E. Smith, 1981, Soils of the Ste. Rose du Lac Area, Soils Report No. 21, Manitoba Soil Survey.

Prepared by: R.N. Belcher, 1986

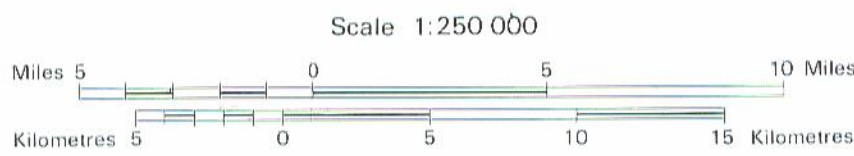
PROVINCE OF MANITOBA  
DEPARTMENT OF NATURAL RESOURCES  
WATER RESOURCES BRANCH

GROUNDWATER AVAILABILITY STUDY  
DAUPHIN LAKE AREA

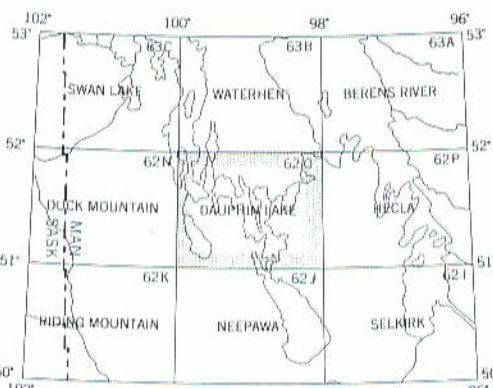
GROUNDWATER QUALITY  
FIGURE 8

MAP LEGEND

- Road
- Railway
- Town
- Village or Settlement
- Intermittent Lake and Stream
- Marsh or Swamp



Cartography by: Water Resources Branch,  
Manitoba, 1986/87.



Magnetic declination 1975 varies from 12° 05' easterly at centre of west edge to 10° 04' easterly at centre of east edge. Mean annual change decreasing 0.5° westerly.

Base Map by: Surveys and Mapping Branch, Department of Energy, Mines and Resources, Ottawa.