

Fresh Water – Salt Water Boundary in the Carbonate Aquifer, South of Winnipeg, Manitoba

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Summary

The carbonate aquifer is the primary source of water supply in the area south of Winnipeg to the international border. In this aquifer the water quality varies between the saline groundwater to the west and fresh groundwater to the east. The transition generally occurs proximal to the Red River from central Winnipeg south to Ste. Agathe then lies to the east of the Rat River to the U.S. border. The boundary has been known to exist since at least 1934 (Johnston) and concerns have been raised about movement of the saline water since 1960's (Charron). A principal concern is the potential for over-development of the fresh-water portion of the aquifer that would result in the eastward migration of saline waters. To assess this risk, Manitoba Sustainable Development, Groundwater Management Section (currently Agriculture and Resource Development) carried out a well water sampling program to measure water salinity indicators and assess the boundary location in the fall of 2017. Five east-west transects were selectively sampled between Winnipeg and Kleefeld, MB.

The current program measured total dissolved solids (TDS), electrical conductivity (EC) and chloride values as salinity indicators. Where possible, wells that had been previously sampled as part of early programs were re-sampled in 2017 to provide in-well comparisons. The current results were compared to and found to be similar to the historical trends in the study area. A comparison of EC concentrations in wells sampled in the 2017 to previous years results of the same wells indicates that the salt water front has not migrated to the east into fresh groundwater areas. The provincial monitoring wells in the study area which have more documented results also show a similar result. Water quality monitoring at these stations show that the EC content of groundwater in the carbonate aquifer has been relatively stable over almost five decades. However, there still remains a concern that the future groundwater development could change the water quality and have an undesirable influence on the position of the boundary. Therefore, it is recommended that the monitoring of the boundary should be continued in the future.

References

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