GEOLOGICAL SURVEY OF CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS

PRELIMINARY SERIES

SHEET 21 1/2 (East Half)

LEGEND

Well location (with elevation of well-water in feet above mean sea-level) . . . • 134

Piezometric contour in feet above mean sea-level (defined, approximate) 50

Arrow indicating direction of ground-water flow . . . . . →

Flowing artesian well . . . . . • FA

Geology by P. A. Carr, 1961

Cartography by the Geological Survey of Canada, 1962

Roads, hard surface, all weather 11

Roads, loose surface, all weather . . . . . .

Roads, loose surface, dry weather . . . . . .

Cart track . . . . . .

Trail or portage . . . . . .

Railway . . . . . .

County boundary . . . . . .

Parish boundary . . . . . .

Building . . . . . .

Post Office . . . . . P

Intermittent stream . . . . . .

Marsh . . . . . .

Foreshore flats . . . . . .

Lighthouse . . . . . .

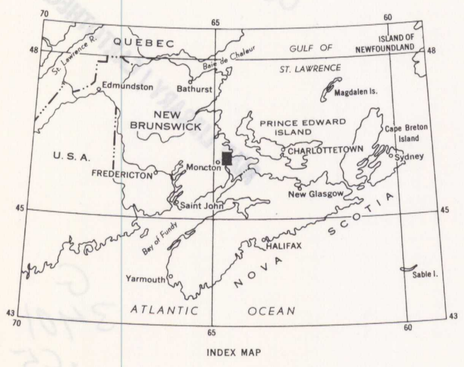
Contours (interval 50 feet) 100

Height in feet above mean sea-level 232

Base-map prepared by the Surveys and Mapping Branch, 1952

Approximate magnetic declination, 23° 19′ West, decreasing 2′.5 annually

Air photographs covering this area may be obtained through the National Air Photographic Library, Topographical Survey, Ottawa



INDEX MAP

DESCRIPTIVE NOTES

Potable water can be obtained from the bedrock by drilling almost anywhere in this area. The average depth of a well in the bedrock is 72 feet, and the average yield is 6 gallons per minute. In the overlying Pleistocene clay, ground water is under water-table conditions, and in general the clay yields less than the bedrock. Most of the wells producing ground water from the bedrock are of the non-flowing artesian type. The temperature of the ground water ranges from 42 to 46° F. Annual precipitation in this region is about 41 inches, of which one third is snowfall.

Movement of ground water through the bedrock is mainly along fractures and bedding planes. Bedrock is mainly flat-lying Pennsylvanian conglomerates, sandstones, siltstones, and shales of the Pictou Group. Between Memramcook and Calhoun, however, a small area of pre-Pennsylvanian rocks occurs. The most common rock of the Pictou Group is a medium- to coarse-grained arkosic sandstone.

The quality of the ground water is generally fairly uniform. Average values of principal components of ground water, as determined by chemical analyses, are the following: hardness 86 ppm (as calcium carbonate), iron 0.23 ppm, chloride 29 ppm, and pH 7.2. These values suggest that the ground water, although hard, is chemically satisfactory for domestic use. The water from two wells drilled to depths of about 150 feet at Meadow Brook and Memramcook East has a chloride content of approximately 1,100 ppm. This high chloride content could be caused by circulation of ground water through beds of salt.

The piezometric level is the elevation of the water level in a well penetrating a confined aquifer, and the piezometric surface of a confined aquifer is the imaginary surface that coincides everywhere with the head of the water in the aquifer. Contours shown on the map depict the shape and slope of the piezometric surface. The direction of ground-water movement is down the hydraulic gradient at right angles to these contours, as indicated by the arrows.

From the piezometric map, the depth to water at any point can be determined by subtracting the value of the piezometric level from the topographic elevation. Thus it is possible to determine from such a map whether a deep-well or a shallow-well pump will be required before well construction at any point is commenced. Flowing artesian wells will occur where the piezometric surface is above the topographic surface. In the map-area there are at least 57 flowing artesian wells, having a range of flow from 0.3 to 8.3 gallons per minute.

Pumping tests were conducted on wells in rocks of the Pictou Group. Although these rocks are outside the map-area, they are similar in hydrologic characteristics to the Pictou rocks in this area. Low coefficients of transmissibility were obtained from tests on these rocks, which indicate that high-capacity wells yielding up to 600 gallons per minute are not to be expected. The highest-capacity well in this area is the Shediac town well—an 8-inch-diameter well which is 200 feet deep and produces about 100 gallons per minute.

Near Harrisville there is a cone of depression within the 150-foot contour. This is caused by the withdrawal rate exceeding the rate of recharge of the aquifer, and as a result, ground water is being pumped from storage. The direction of flow is towards the centre of this cone of depression. Increase in the withdrawal rate will result in the cone of depression extending farther outward, lowering the water levels of the wells in the surrounding area.

At several places along the coastline near Shediac the zero piezometric contour line extends inland, indicating that the water levels in the wells within this contour line are below sea-level. Two wells within this contour line and adjacent to Scoudouc River have chloride contents of 217 and 169 ppm respectively. These relatively high chloride contents could represent the upper part of the fresh water - salt water zone of mixing, having increasing salinity seaward. If consumption is substantially increased the existing equilibrium will be disturbed, and the fresh water - salt water zone of mixing will move inland, resulting in increased salinity in wells. Thus, in this area, wells would become contaminated.

A rise of the water level in a well indicates recharge to the aquifer. Conversely, a decline of the water level indicates discharge from the aquifer. Thus the rate at which the piezometric surface rises or declines depends on the rate at which the underground supply is withdrawn or replenished. The water levels of seven unused wells were recorded weekly during June, July, and August, 1961 to obtain the summer change of the piezometric surface. During this period the maximum change was a decrease of 3 feet 8 inches. This small change suggests that, except in areas of heavy pumping, changes in piezometric level are slow. Thus, before the effect of the summer draft on the piezometric surface can be realized, fall recharge probably will have occurred.

The piezometric surface adjacent to the saline, tidal Petitcodiac River within the map-area is at a higher elevation than the river. Thus contamination of adjacent aquifers by salt-water intrusion from the river is not possible at the present rate of consumption.

At Dieppe, however, the piezometric level of an observation well that is 480 feet from the river and drilled to a depth of 130 feet, fluctuates with the tidal bore on Petitcodiac River, but lags about half an hour behind it.

Carr, P. A.: Ground Water Resources of the Moncton Map-area, New Brunswick, 21 I/2 West Half; Geol. Surv., Canada, Paper 61-14 (1961).

Norman, G. W. H.: Moncton Sheet; Geol. Surv., Canada, Map 646A, descr. notes (1941).

PUBLISHED, 1962
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MAP 24-1961

GROUND-WATER PIEZOMETRIC CONTOURS

MONCTON

(EAST HALF)

NEW BRUNSWICK

Scale: One Inch to One Mile = 1/63,360

Miles

1 1/2 0 1 2 3

MAP 24-1961
MONCTON
NEW BRUNSWICK
SHEET 21 1/2 (East Half)