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AVAILABILITY OF GROUND WATER FOR MUNICIPAL SUPPLY AT WOODVILLE,
ST. CROIX COUNTY, WISCONSIN

by

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Availability of Ground Water for Municipal Supply at Woodville,

St. Croix County, Wisconsin

by Perry G. Olcott

This report was prepared at the request of the State of Wisconsin Department of Local Affairs and Services, Division of State Economic Development for inclusion in a comprehensive planning report for the Village of Woodville, St. Croix County, Wisconsin. Information was taken from the files of the Wisconsin Geological and Natural History Survey.

Topography and drainage

Woodville is located on an undulating upland plain developed on the Prairie du Chien Dolomite. Surface elevations range from 1100 to 1250 feet above mean sea level. The area has a thin covering of clayey glacial drift, generally from 25 to 50 feet thick. Surface drainage is largely by intermittent streams which form the headwaters of the Eau Galle River. The village is in the Chippewa River Basin and is located about 1 1/2 miles east of the western topographic divide of the basin.

Geology and water-bearing characteristics

Ground-water availability depends chiefly on the character and thickness of water-bearing rocks. Although the geology of the Woodville area has not been mapped in detail, some generalizations can be made from well log, outcrop, and topographic information gathered from adjacent areas.

The bedrock surface consists predominantly of Prairie du Chien Dolomite

(a magnesium rich limestone). The St. Peter Sandstone, which overlies the dolomite, also is present in irregular patches at the bedrock surface in the area. The thickness of the two formations totals 200 to 225 feet but the thickness of each formation varies inversely with the other and one unit may be present to the exclusion of the other. Limited data indicate that the Prairie du Chien Dolomite is about 200 to 225 feet thick at Woodville and the St. Peter Sandstone is missing.

Underlying the Prairie du Chien Group in descending order are the Trempealeau Formation, Franconia Sandstone, and Dresbach Group. The Trempealeau Formation, consisting of sandstone and calcareous siltstone, is about 130 to 150 feet thick. The Franconia Sandstone is about 90 to 110 feet thick and consists of sandstone with some shale. The Dresbach Group is estimated to be 500 to 1000 feet thick and is comprised of two sandstone units separated by a calcareous shaly sandstone unit. The Dresbach Group rests on crystalline rocks which do not yield water. Bedrock formations dip southwestward at about 35 to 40 feet per mile.

The Dresbach Group in much of Wisconsin is the major water producing rock unit. The unit should produce large quantities of good quality water in Woodville. However, no wells in the area penetrate the Dresbach Group at the present time because adequate supplies of water have been obtained from shallower formations. Little is known about the Dresbach Group in the Woodville area.

The Franconia Sandstone generally yields only moderate to small amounts of water.

The Trempealeau Formation and Prairie du Chien Group are penetrated by five high capacity wells in Baldwin located about four miles west of Woodville. A sample log of the Baldwin Village Well #2 is attached. The wells, which range from 300 to 400 feet deep, yield exceptionally large quantities of water compared to similar

wells in those formations in the remainder of the state. The high yields may result from extensive solution channeling in the Prairie du Chien Dolomite which tends to make the rock very permeable and causes it to yield large quantities of water to wells. A permeable dolomite of this type, especially when covered by thin glacial drift, is subject to contamination from the land surface. Contaminants are not filtered out as water moves through the large openings in the rock.

Because Woodville is in nearly the same geologic setting as Baldwin, it appears that 500 gallons per minute or more of water can be obtained from a well penetrating the Trempealeau Formation and Prairie du Chien Dolomite. Higher yields probably can be obtained by deepening the well to penetrate the Dresbach Sandstone.

Quality of ground water

Ground water in the Woodville area is hard and may contain iron but otherwise is of good chemical quality. Analysis of water from a 210 foot municipal well at Woodville is listed below.

Iron (Fe)	.65	Alkalinity as CaCO ₃	173
Manganese (Mn)	.04	Bicarbonate (HCO ₃)	211
Calcium (Ca)	46	Sulfate (SO ₄)	16
Magnesium (Mg)	22	Chloride (Cl)	6.5
Sodium (Na)	4.2	Fluoride (Fl)	.1
Hardness (Ca & Mg as ppm CaCO ₃)	208	Nitrite (NO ₂)	.01
Non-carbonate hardness	35	Nitrate (NO ₃)	14
Dissolved solids	267	pH	7.9

(Analysis by Wis. State Laboratory of Hygiene, July 1966; all values except pH in parts per million)

Ground-water contamination may be a problem in the Woodville area because of the thin glacial drift and permeable dolomite bedrock. Contamination may enter a well by moving long distances through fractures and solution channels in the rock from its entry near the land surface. Adequate well construction, including a deep casing and careful grouting of the casing may prevent this problem.

Conclusions

Abundant ground water is available in the Woodville area from the Prairie du Chien Dolomite and Trempealeau Formation and/or deeper sandstone formations. Wells penetrating the Prairie du Chien and Trempealeau will be about 300 to 400 feet deep and yield up to 500 gallons per minute or more.

Chemical quality of the water generally is good with the exception of hardness and possible iron.

The potential for contamination of ground water is great in the Woodville area because thin glacial cover overlies dolomite bedrock. Proper well construction may prevent contaminated water from entering the well.