

Updated 10-19-2015

## HYDROLOGIC ATLAS OF THE BLACK HILLS, PENNINGTON COUNTY, SOUTH DAKOTA

### ROCKERVILLE QUADRANGLE

#### Depth-to-Aquifer Maps

##### *Depth-to-Aquifer Map*

The depth-to-aquifer maps use a color spectrum to indicate the approximate depths expected for drilling at any location underlain by the aquifer. Each color represents a depth range of 100 feet. Accuracy is expected to be within 50 feet closer to the recharge area and could be greater to the east where the depths are greater and there are fewer water wells to use as control points.

The maps are constructed in a Geographic Informational System (GIS) program by subtracting the structure contour values for the top of the aquifer from the surface topographic contour lines.

##### Madison aquifer (Pahasapa Limestone): (see map)

As shown on the accompanying map, the Madison Aquifer can be encountered in drill holes located across the eastern one-half of the quadrangle. In general, the surface of the aquifer increases in depth to the east to a **maximum of about 1,700 feet** along the ridge at the eastern edge of the quadrangle and about **1000 feet** beneath the flood plain of Spring Creek at the quadrangle's east edge. Drill depths to the aquifer are less along the crests of several southeast-plunging anticlinal (Figure 1).

Before reaching the Madison east of the recharge area a well drilled in this area would penetrate the Minnelusa aquifer. In the recharge area, drilling depths are not great, but the uppermost portion of the aquifer may be above the local water table.

##### Minnelusa Formation (see map)

As shown on the accompanying Depth-to-Aquifer map, the Minnelusa Aquifer can be encountered in drill holes located within the eastern one-quarter of the quadrangle. In general, the surface of the aquifer increases in depth to the east and is a **maximum of about 1,000 feet** below the surface along the ridge at the eastern edge of the area: Along the flood plain of Spring Creek, near the eastern margin of the map area, the depth to the aquifer is **600 to 700 feet**.

The local depth for any aquifer is dependent upon both topography and folds of the aquifer surface. Drill depths are greater along ridges and less in adjacent valleys. Several southeast plunging anticlines are present and drill depths are less there than in adjacent areas.

##### Inyan Kara Group (see map)

Only a small area along the southeastern corner of this quadrangle comprises the recharge area of the Inyan Kara Group (Lakota Formation only). This area is above the water table and not unsuitable for drilling to this aquifer.

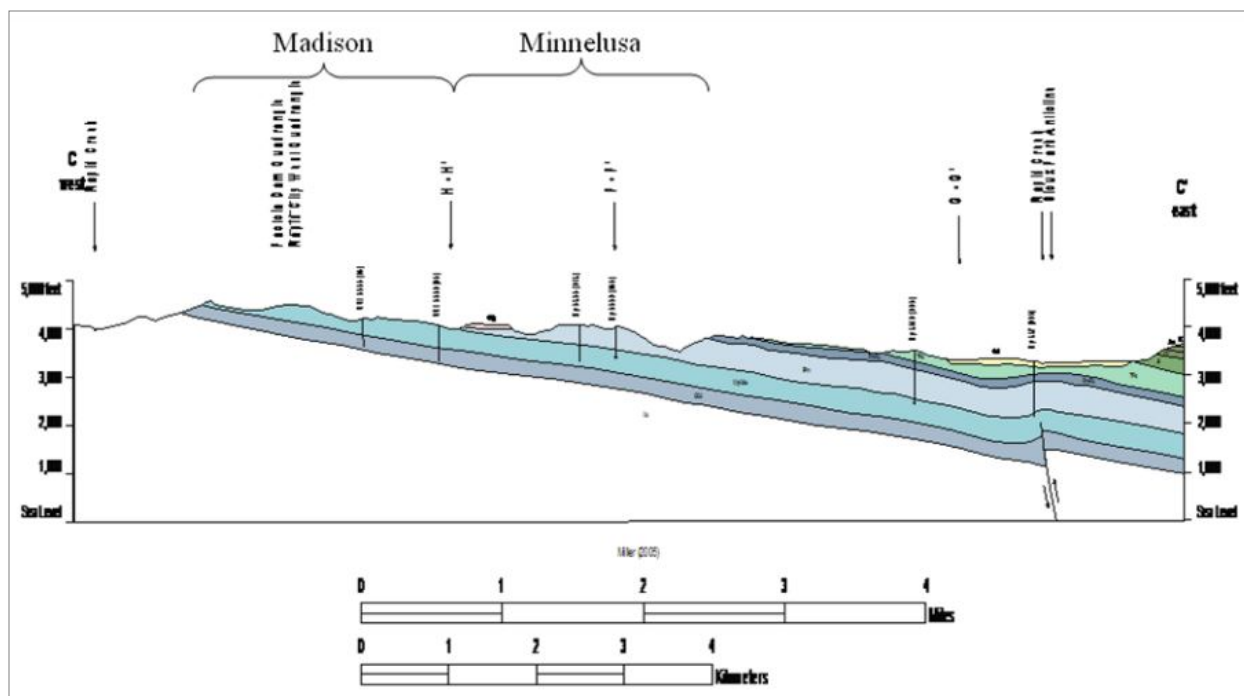


Figure 1. West to east cross section illustrating recharge areas for the Madison and Minnelusa aquifers in the Rockerville Quadrangle and the increasing depths necessary to reach these aquifers to the east. Also, note that the drilling depth is less along the crest of the anticlinal fold as compared to the adjacent areas.

## BIBLIOGRAPHY

- Hargrave, R. G, 2005, Vulnerability of the Minnelusa Aquifer to Contamination in the Rapid City West Quadrangle, Pennington County, South Dakota: unpub. M. S. thesis, South Dakota School of Mines and Technology, 80 p.
- Lester, J. L., 2004, Geology of the Rockerville Quadrangle, South Dakota and Fracture Study of the Northern Half of the Quadrangle: unpub. M. S. thesis, South Dakota School of Mines and Technology, 221 p.
- Miller, S. L, 2005, Influence of Geologic Structure and Stratigraphy on Ground-Water Flow Paths in the Karstic Madison Aquifer in the Rapid City Area, South Dakota: Ph.D. dissertation, South Dakota School of Mines and Technology, 191 p.