

Updated 10-19-2015

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

### Structure Contour Maps

#### **Structure Contour Map:**

A map showing, by means of contour lines of equal elevation, the shape of the surface of a selected rock layer (contact) beneath the Earth's surface.

The sedimentary formations within the Rockerville Quadrangle are affected by a regional tilt (dip) of eight to ten degrees to the east. This dip is interpreted, however, by folds (anticlines and synclines) in which the west limbs dip to the west as much as 30° (Figure 1).

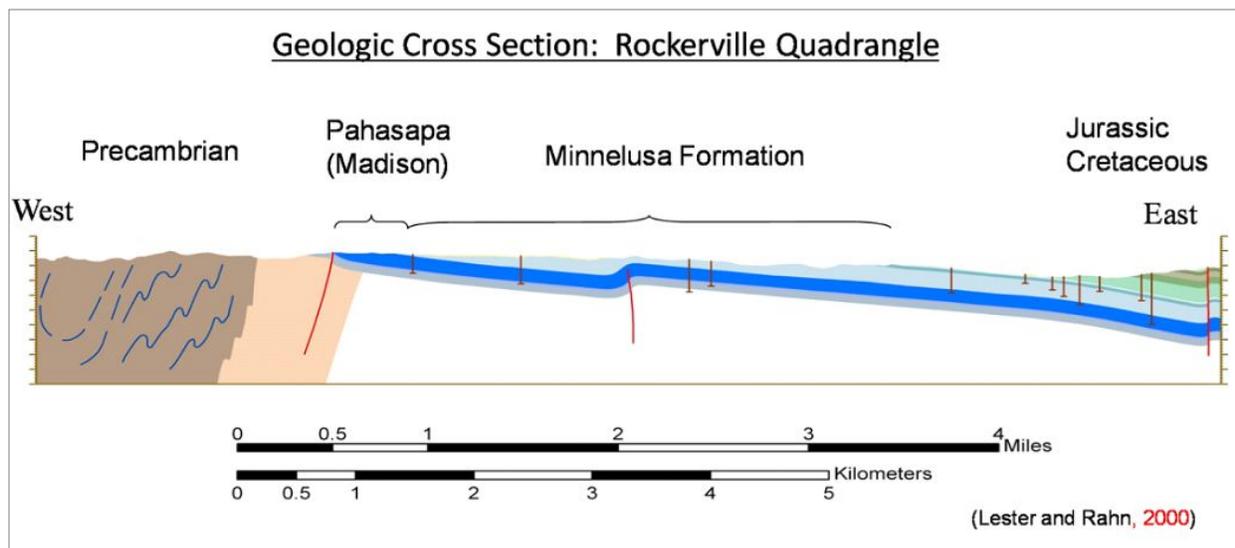


Figure 1. Cross section illustrating the gentle east dip of strata in the Rockerville Quadrangle. Dark blue = Madison aquifer overlain by Minnelusa aquifer (adapted from Lester and Rahn, 2000).

In addition to the overall eastward dip, four large folds and two smaller ones affect the surface. The folds display parallel anticlinal-synclinal axes, which are located along sharp bends in the contour lines. The largest anticline bifurcates about two miles south of the north margin of the quadrangle, forming two southeast plunging folds: both extend to the eastern edge of the quadrangle and beyond. Dips in the west limb of the northern segment are as much as 40° to the southwest. Crystal Cave lies along the crestal portion of the anticline where it crosses a small canyon. The northeastern-most fold plunges south-southeast. Three other fold pairs plunge generally to the southeast. All four folds extend beyond the east or south margins of the quadrangle. Three smaller folds in the southern portion of the quadrangle plunge southeast and two of these extend beyond the boundary of the quadrangle.

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

The Pahasapa Limestone (Madison aquifer) is exposed in a northerly trend through the west-central portion of the quadrangle (Figure 1). Structure contours reveal that the upper contact of the unit, located along the east side of the recharge area, extends from the surface, at elevations of approximately 4,200 feet, to an elevation as low as 2,300 feet along the eastern margin of the quadrangle, across a horizontal distance of about four miles.

**Minnelusa Formation: (see map)**

The Minnelusa Formation trends northerly through the central portion of the quadrangle. Structure contours reveal that the upper contact of the unit, located along the east side of the recharge area, extends from the surface, at elevations of approximately 4,200 feet, to an elevation as low as 2,800 feet along the eastern margin of the quadrangle, a horizontal distance of about three and one-half miles.

**Inyan Kara Group: (see map)**

Although portions of the Lakota Formation are exposed along the eastern margin of the Rockerville Quadrangle, the upper surface of the Inyan Kara Group on, which the contours are located, is not. Therefore, construction of a contour map is not possible for this unit here.

**REFERENCES**

- Lester, J. L. and Rahn, P.H., 2001, Geologic Map of the Rockerville Quadrangle, South Dakota, Geological Survey, South Dakota Department of Environment and Natural Resources, 7.5 Minute Geologic Quadrangle Map 1, 1,24,000 scale.
- Lester, J. L., 2004, Geology of the Rockerville Quadrangle, South Dakota and Fracture Study of the Northern Half of the Quadrangle: 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.