

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

Structure Contour Map

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.

RAPID CITY WEST QUADRANGLE (see map)

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

Inyan Kara Group:

Although portions of the Lakota Formation are exposed along the eastern edge of the Rapid City West Quadrangle, the upper surface of the Inyan Kara Group is not. Therefore, construction of a contour map is not possible for this unit here.

Minnelusa Formation (see map)

The Minnelusa Formation trends northerly through the western half of the Rapid City West quadrangle. Structure contours reveal that the upper contact of the unit, the east side, extends from the surface, at elevations of approximately 4,000 feet, to an elevation as low as 2,400 feet along the eastern margin of the quadrangle along the flood plain of Rapid Creek near "The Gap" This is a horizontal distance of about four miles.

In the northeast part of the quadrangle, the overall eastward dip of the formation is disrupted by three northerly trending anticlines, e.g., the fold from which the Cement Plant and Lien quarries remove the Minnekahta Limestone. This fold ends on the south at an east-trending fold and fault which extends eastward through "The Gap" along Rapid Creek. To the west, this fold curves to join the northerly trending Hudson Ranch Anticline. Two southeast-plunging anticlines in the southern portion of the quadrangle extend southward into the Rockerville Quadrangle.

Madison aquifer (Pahasapa Limestone): (see map)

The Pahasapa Limestone (Madison aquifer) is exposed along the western portion of the Rapid City West quadrangle. Structure contours reveal that the upper contact of the unit, the east side, extends from the surface, at elevations of approximately 4,200 feet, to an elevation as low

as 1,700 feet beneath the eastern margin of the quadrangle, a horizontal distance of about six miles.

The overall eastward dip of the formation is disrupted by five anticlines. Three trend northerly, e.g., the fold from which the Cement Plant and Lien quarries remove the Minnekahta Limestone. This fold ends on the south at an east-trending fold and fault which extends eastward through "The Gap" along Rapid Creek. Water feeding City Spring rises along the fault zone from the underlying Madison aquifer. To the west, the fold curves to join the northerly trending Hudson Ranch Anticline. Two southeast-plunging anticlines fold the Pahasapa in the southern portion of the quadrangle and extend southward into the Rockerville Quadrangle.

REFERENCES

- Fahrenbach, M. and Sawyer, J. F., 2001, Geologic Map of the Rapid City West Quadrangle, South Dakota, Geological Survey, South Dakota Department of Environment and Natural Resources, 7.5 Minute Geologic Quadrangle Map 3, 1:24,000 scale.
- Hargrave, R. G., 2005, Vulnerability of the Minnelusa Aquifer to Contamination in the Rapid City West Quadrangle, Pennington County, South Dakota: M. S. thesis, South Dakota School of Mines and Technology, 80 p.
- Hargrave, R. G. and Lisenbee, A. L., 2004, Geologic Map of the Blackhawk Quadrangle, Black Hills of South Dakota (1:24,000 scale): Geological Society of America, Denver Annual Meeting, November 7-10, 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.