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

Depth-to-Aquifer Maps

Depth-to-Aquifer Map

The depth-to-aquifer maps presented here 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.

Drill depth is dependent upon both topography and any folds of the aquifer surface. Drill depths are greater along ridges and anticlines and less in adjacent valleys and synclines. At relatively lower elevations, e.g. along Little Elk Creek, the aquifers deliver artesian flow.

Madison aquifer (Pahasapa Limestone): (see map)

The Madison aquifer can be penetrated in drill holes located across most of the quadrangle. In general, the surface of the aquifer increases in depth toward to the east, away from the recharge area in the extreme southwest, and reaches a **maximum of about 3,300 feet at the northeast corner of the map area.** Along the **crest of the Piedmont anticline**, in the central part of the quadrangle, drilling depths are **approximately 1,600-1,700 feet.**

Before reaching the Madison, a well drilled in most of this quadrangle area would penetrate the Minnelusa aquifer. Near the recharge area, where the drilling depths are not great, the uppermost portion of the aquifer may be above the local water table, however.

Minnelusa Formation (see map)

The Minnelusa aquifer can be encountered in drill holes located across much of the map area, extending from the "Red Valley" along Interstate 90 to the northeast corner of the map area. In general, the upper surface of the aquifer increases in depth to the northeast and reaches a **maximum of about 2,800 feet** below the surface at the northeast margin of the area. The local depth is dependent upon both topography and folds of the aquifer surface, however. Drill depths are greater along ridges and less in adjacent valleys. In addition, along the crest of the Piedmont anticline in the central part of the quadrangle, drilling depths are approximately **900-1,000 feet.**

Throughout the quadrangle, water wells in the Minnelusa Formation have an artesian head. In the lower elevations of Boxelder Creek and Little Elk Creek drainages the wells flow to the surface.

Inyan Kara Group: (see map)

In the northeast quarter of the quadrangle, the Inyan Kara is the first aquifer to be penetrated by a bore hole drilling for water. The depth to the top of this aquifer increases in a continuous fashion from the east side of the recharge area to the northeast margin of the map. As shown by color bands on the map, the **greatest depth is approximately 1,200** feet at a ridge in the east center of the quadrangle.

References

- Francisco, E. M., 2008, Susceptibility and Vulnerability of the Inyan Kara Aquifer in the Blackhawk Quadrangle: unpub. M. S. thesis, South Dakota School of Mines and Technology, 81 p.
- Lisenbee, A. L. and Hargrave, R., 2001, Geologic Map of the Blackhawk Quadrangle, South Dakota, Geological Survey, South Dakota Department of Environment and Natural Resources, 7.5 Minute Geologic Quadrangle Map 5, 1,24,000 scale.