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

### RAPID CITY WEST QUADRANGLE

#### **Aquifer Vulnerability Maps**

##### ***Aquifer Vulnerability:***

Basically, vulnerability "...is the tendency or likelihood that pollutants may reach the water supply" (Hargrave, 2005) and includes human influences in the introduction of pollutants into aquifers. See the lower left corner of the aquifer vulnerability maps for information regarding the rating system used here.

Factors considered include on-site waste water treatment facilities, roads, agricultural and industrial facilities, etc. (there is little of this activity in the recharge areas of the quadrangle, however).

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

The recharge area for the Madison aquifer crosses the southwestern and west-central part of the quadrangle, with a width of less than one and one-half miles. Most of this five square mile area lies within the Black Hills National Forest and, as a result of the lack of urban or industrial development, is assigned a **low** vulnerability rating there.

A number of on-site waste water treatment facilities are present within the recharge area adjacent to Rapid Creek. The density of housing there (note red dots on map) is in the range of 10-40 per square mile and the area is assigned a rating of **moderate** vulnerability. In addition, a 100-meter buffer along roads is assigned values of **high or very high** along South Dakota Highway 44 and along Sheridan Lake Road.

##### **Minnelusa Formation (see map)**

The recharge area for the Minnelusa aquifer extends north-south through the central part of the quadrangle with a width varying from one and one-half to two and one-half miles. The total recharge area is approximately 20 square miles. All of this land is privately owned. Home sites (and the associated on-site waste water disposal units) and roads are common across parts of the recharge area.

Approximately seven square miles have no development and are assigned a rating of **low** vulnerability. North and south of Rapid Creek, small areas have concentrations of on-site waste water units in the range of 10 to 40 per square mile and are assigned a rating of **moderate** vulnerability. Two areas of development adjacent to Nemo Road in the northwestern part of the quadrangle, having concentration of such units in the range of 40-80 per square mile, are assigned a **high** vulnerability rating. For part of the recharge area adjacent to Sheridan Lake Road (Figure 1), the density of home sites is in the range of several hundred per square mile. The area is assigned a **high** rating.

A 100-meter buffer along roads is assigned values ranging from **low**, on dirt roads with lesser traffic to **high or very high** along South Dakota Highway 44, Sheridan Lake Road, and Nemo Road.



Figure 1. Aerial view (to east) of housing development on the Minnelusa aquifer recharge area near Sheridan Lake Road in the southwestern part of the Rapid City West Quadrangle. Each home has an on-site waste water disposal unit.

### Inyan Kara Group

Only a small area along the eastern margin of this quadrangle comprises the recharge area of the Inyan Kara Group (Fall River Formation only). The average vulnerability of this rock unit is interpreted as **low** to the north of Rapid Creek and **moderate** to the south of the creek due to urbanization there.

### **REFERENCES**

- 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.
- 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.