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

**Aquifer Vulnerability Map**

***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.

**Precambrian aquifer (undifferentiated):**

Ground water in the area of the Silver City quadrangle is contained either in fractured Precambrian crystalline rocks, e.g., schist, quartzite and metabasalt, or in shallow sand and gravel deposits along streams. The amount of water available from the Precambrian rocks in any selected area is the result of the number of such fractures and the size of the openings produced by them. Any preferred trends or inclinations of fractures may result in a preferred movement direction of the ground water: such features must be determined on a site-by-site basis.

Due to the complexities noted above, a quantitative method for determining *aquifer susceptibility* (ability of the rock to hold water) within crystalline rocks has not been established or chosen by our group. As a result, the following discussion of *aquifer vulnerability* represents a qualitative assessment based upon factors considered as having the potential to affect the quality of ground water in the area.

***Septic Systems:***

As shown on the vulnerability map, vulnerability varies by location and the type of risk factor. Large areas within the National Forest (approximately 48 square miles) are undeveloped and are assigned a rating of **low** vulnerability.

Six Areas of potential concern (see circular colored areas on the map) contain clusters of home-sites with concentrations greater than 40 sites per square mile. These areas (a total of approximately four square miles) are assigned a **high** vulnerability rating.

***Roads***

One hundred meter (330 feet)-wide buffer zones along roads are assigned vulnerability ratings because vehicles, e.g., gasoline and propane trucks, and others carrying chemicals, may travel along them. The ratings vary from **low**, for dirt roads with lesser traffic, to **high** along U.S. Highway 385, which locally crosses a flood plain.

### *Agricultural uses*

Cattle grazing occurs on some portions of the recharge area during the summer, but major feed lots, etc. are lacking. Farms, which might apply chemicals, are not currently active within the recharge area.

### **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.