

Bedrock Aquifers - Map 5

Aquifers within consolidated geologic formations are called bedrock aquifers. Map 5 is based on Map 2 and shows geologic units that contain bedrock aquifers. The aquifers shown are within consolidated sedimentary rocks. Specifically, they are composed of siltstone, sandstone, and limestone. These geologic formations are found at various depths below the land surface, sometimes hundreds or even thousands of feet.

Bedrock aquifers are very important for water supply in central and eastern Montana. In general, water quality is best near recharge areas where the aquifers are close to the land surface. The factors that influence the water quality mentioned previously for surficial aquifers also apply to bedrock aquifers. However, one factor that strongly influences water quality in bedrock is the proximity to recharge zones. For example, a well that taps an aquifer near its recharge zone will yield water that has been in the aquifer for a relatively short time. As a result, the water has not had time to dissolve substantial amounts of soluble salts and minerals, so it remains fresh. The longer the water is in the aquifer, the more time it will have to dissolve salts and minerals. In general, the concentration of total dissolved solids increases with distance from the recharge zone.

Where the bedrock aquifers are close to the land surface in recharge zones, they can sometimes be tapped with shallow wells and, because of lower drilling costs, they may be as economical to use as surficial unconsolidated aquifers in the region. However, many bedrock aquifers dip away from their recharge areas and plunge into the subsurface. As a result, the cost of drilling a well into these aquifers increases substantially farther from the recharge zones. Bedrock aquifers are used in many parts of the state where the surficial unconsolidated aquifers are limited in thickness or absent. Tables 2, 3 and 4 lists general information on individual bedrock aquifers.

General Water Quality of Bedrock Aquifers - Map 6

Map 6 shows specific conductance data from wells completed in bedrock. These data represent samples from a number of bedrock aquifers of different ages. No attempt has been made to group the samples by aquifer. The map can be considered as a broad sampling of bedrock water quality. Water quality in a bedrock aquifer is typically more variable than water quality in an unconsolidated aquifer. Water quality is generally best near recharge areas. For example, Map 6 shows a cluster of wells with good quality water near Lewistown. The bulk of these wells tap geologic formations of Jurassic age exposed in the Judith Mountains to the north, and in the Moccasin Mountains to the south. These outcrops are recharge zones for the Jurassic formations, so the water quality is quite good. Farther away from the two mountain ranges water quality declines appreciably because the ground water has picked up dissolved solids from the rocks. As a result, the Jurassic formations are not widely used for water supply farther away from the recharge zone.