Presented at the 1997 American Water Resources Association Montana Section Meeting

Hydrogeology and Ground-Water Chemistry of the Kalispell Valley, Northwestern Montana

John I. LaFave
Montana Ground-Water Assessment Program
Montana Bureau of Mines and Geology
1300 West Park St.
Butte, MT 59701
496-4306 (v), 496-4451 (fax)
johnl@mbmgsun.mtech.edu

Ground-water resources of the Kalispell valley in northwest Montana are being evaluated as part of the Montana Ground-Water Characterization Program. In 1996, water-level measurements were obtained from about 380 wells, and 80 wells were sampled for major ions, nitrate and trace metals. In addition, selected wells were sampled for tritium and radon. Most of the data were collected from the deep and intermediate aquifers within the valley fill and from the Precambrian bedrock aquifer which surrounds the basin.

Ground-water flow is generally away from the valley margins toward the axis of the basin and then south toward Flathead Lake. In many places hydraulic heads in the intermediate aquifers, which are localized units of sand and gravel within the glaciolacustrine or till confining beds, are close to those in the deep aquifer. This suggests a fair degree of hydraulic connection between the deep and intermediate aquifers within the valley fill. Potentiometric surface mapping also suggests that the Precambrian bedrock aquifer is hydraulically connected to the deep aquifer.

In 1996, seasonal ground-water fluctuations of about 10 feet were common in the deep sand and gravel and Precambrian bedrock aquifers. However, one well, completed in an intermediate aquifer near the northern margin of the valley, exhibited more than 50 ft of ground-water fluctuation. Water-level data, obtained to date, show that the 1997 spring runoff was a major ground-water recharge event.

The geology does not appear to be a significant control on ground-water chemistry. Water from all sampled aquifers is a Ca-Mg-HCO_3 type, characterized by low total dissolved solids (< 500 mg/L). Nitrate concentrations ranged from non-detectable to 8.2 mg/L as N; the average was less than 3.0 mg/L as N. Geology does appear to control the radon concentrations in ground water. In the deep and intermediate sand and gravel aquifers, the radon concentrations in 22 samples ranged from 160 to 1,870 pCi/L with an average concentration of 688 pCi/L (median = 630 pCi/L). In the Precambrian bedrock aquifer, the radon concentrations in 14 samples ranged from 800 to 8,360 pCi/L, with average of 1,872 pCi/L (median = 1,298 pCi/L). The EPA has proposed a maximum contaminant level for radon of 300 pCi/L for public water supplies.

Only three out eight samples from the deep sand and gravel aquifer contained detectable tritium. Two of the samples with detectable tritium had concentrations less than 2.0 tritium units (TU); the other, which was from a well along the northern margin of the valley, had a concentration of 15.9 TU. The results from the tritium sampling indicate that the deep sand and gravel aquifer is dominated by water recharged before 1953 (pre bomb), suggesting that the glaciolacustrine and till confining beds provide reasonable geologic protection to the aquifer.