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Hydrogeology of the Kalispell and Mission Valleys, Northwest Montana

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The Kalispell (upper Flathead River Valley) and Mission (lower Flathead River Valley) Valleys occupy an intermontane basin and are separated by Flathead Lake. Each valley is framed by Precambrian bedrock and drained by the Flathead River. The basin-fill deposits within the valleys are as much as several thousand feet thick and contain aquifers that are important sources of water. The hydrogeology of the “deep” aquifers (>100 feet below surface) in the Kalispell and Mission valleys are being evaluated as part of the Montana Ground-Water Characterization Program.

In the Kalispell Valley, ground water generally moves away from the valley margins toward the axis of the basin and then south toward Flathead Lake. The ground-water chemistry is a Ca-Mg-HCO₃ type having total dissolved solids generally < 500 mg/L. The distribution of dissolved solids, however, is atypical because higher concentrations occur upgradient along the west and north margins of the valley, and lower concentrations along the eastern and southern margins. The distribution of environmental isotopes shows a similar pattern. Ground water along the western and northern margins is generally lighter in O-18 and deuterium and devoid of tritium, while along the east side of the valley, ground water is heavier in O-18 and deuterium but has detectable tritium. The isotopic data show that water along the east side was recharged more recently than that to the west and north. The lower dissolved-solids contents and the isotopic data suggest a more active flow system along the east side of the valley.

In the Mission Valley, ground water generally flows from the Mission Mountains on the east to the Flathead River which bounds the valley on the west, and toward Flathead Lake to the north. Measurements of ground-water temperature and ground-water quality show that the water evolves along its flow path from a fresh (dissolved solids ~ 220 mg/L), cool (temp. ~ 10°C), Ca-Mg-HCO₃ type water along the Mission Mountain front, to a somewhat more saline (dissolved solids ~ 575 mg/L), warm (temp. ~ 13.5°C), Na-Ca-Mg-HCO₃ type water along the Flathead River.