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HYDROGEOLOGY AND GROUND-WATER CHEMISTRY OF THE KALISPELL VALLEY, NORTHWEST, MONTANA

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Ground-water chemistry, environmental isotopes and water-level measurements were used to characterize the hydrogeology of the deep (<100 feet) Pleistocene alluvium and Precambrian bedrock in the Kalispell Valley of northwest Montana. Approximately 250 wells were visited in the valley, which is located north of Flathead Lake, and drained by the Flathead River. Ground-water flow is generally away from the valley margins toward the axis of the basin and then south toward Flathead Lake. The water chemistry from the wells completed in the valley alluvium and the Precambrian bedrock along the valley margins is a Ca-Mg-HCO3 type, characterized by low total dissolved solids (generally < 500 mg/L). However, the distribution of dissolved solids shows a slightly atypical pattern with higher concentrations upgradient along the west and north margins of the valley (average = 465 mg/L), and lower concentrations along the east and southern margins (average = 355 mg/L). Ground water from 23 wells was analyzed for O-18, deuterium and tritium. The distribution of environmental isotopes shows a pattern similar to the dissolved solids concentrations. Ground water along the west 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, and has detectable tritium. The lower dissolved solids, the presence of tritium and heavier water suggests a more active flow system along the east side of the valley. Seasonal water-level fluctuations appear to be dependant upon the confining conditions of the aquifer and proximity to high capacity irrigation wells. Where the aquifer is confined water levels drop during the summer irrigation season and rise during the late fall and winter. Where the aquifer is unconfined water levels rise in the spring and early summer in response to spring runoff and drop during the late summer and winter months.