SYMPOSIUM ABSTRACTS

GROUNDWATER FLOW IN THE SULLIVAN FLATS BASIN NEAR NIARADA, FLATHEAD INDIAN RESERVATION, MONTANA

by
David W. Briar
U.S. Geological Survey
Helena, Montana 59626

Previous investigations have assumed that ground water flow from the 6000 acre Sullivan Flats basin provides significant contributions to the Little Bitterroot aquifer in the northwestern one-quarter of the Flathead Indian Reservation. As early as 1917, investigators concluded that the ancestral surface water outflow from Flathead Lake moved through the Sullivan Flats basin and deposited sand and gravel in the basin and in the Little Bitterroot River valley to the south. These extremely transmissive Pleistocene sand and gravel deposits, which form the Sullivan Flats aquifer in the basin, overlie bedrock and are confined by as much as 300 feet of overlying lake-bed deposits of silt and clay. Seismic and test-well exploration during the present study indicated that the irregular geometry of the aquifer is the result of scour and fill by glacial ice that occupied the basin and is not the result of fluvial erosion and deposition by an ancestral Flathead River. In addition, aquifer tests confirm that the aquifer is discontinuous at the lowest point in the basin near Niarada, thereby preventing direct ground water recharge to the Little Bitterroot aquifer to the south.

Steady-state and transient seasonal flow in the Sullivan Flats aquifer was simulated after successful calibration and verification of a three-dimensional finite-difference flow model. Large local differences in transmissivity were inferred from calibration of the model to the contoured potentiometric surface in the basin. These differences further attest to an ice-marginal depositional history in the basin. On the basis of the results of simulation, recharge to the basin is assumed to be through alluvial deposits of Cromwell Creek (50 percent), upper Sullivan Creek (33 percent), Big Draw (16 percent), and other sources (1 percent); discharge from the basin is by surface flow from Sullivan Spring (94 percent) and other springs and one well (6 percent). According to results of the model, simulated additional ground water withdrawals in the basin would lower the potentiometric head and result in a substantial decrease in discharge from Sullivan Spring.