Description of aquifer test for the Brown's well, Indian Hills General Improvement District.

A single-well step-drawdown test was conducted by Humboldt Drilling and Pump Company, Inc., of Winnemucca, Nevada. The well is located at 39º 3' 21"N, 119º 46' 53"W, and is completed in the basin-fill aquifer of Carson Valley, Nevada. Copies of time-drawdown and pump data were obtained from files of Resource Concepts, Inc.(RCI), the engineering firm in charge of the water-supply system for the Indian Hills General Improvement District (Brian Randall, RCI, written commun. 2005). Results of the aquifer test will be used in the development of a numerical ground-water flow model in Carson Valley, project # 9705-BPS01. Specifically, the estimated transmissivity will be used to develop a relation between transmissivity and specific yield. The relation will then be used with data from driller's logs to develop a preliminary distribution of transmissivity for the valley.

The pump rate for the test varied from 700, 1,000, 1,500, and 2,000 GPM for periods of 3 hours on 04/05/96. Water levels were measured with and electric sounder, and the method of flow-rate measurement, location of discharge of pumped water, and pre-test water-level trends are not known. The well was developed about 4 hours on 04/04/06 until about 7PM the day prior to the step-drawdown test. The test pump was set in a 10-inch liner installed to a depth of 370 ft and perforated from 100 to 370 ft. The liner was installed into the original 16-inch casing perforated from 100 to 294 ft.

Time-drawdown data were analyzed using an Excel spreadsheet program (Halford and Kuniansky, 2002). The step-drawdown data were analyzed by plotting the drawdown (s) divided by the discharge at each step (Q_{NSTEP}):

s/Q_{NSTEP} , against the summation of the log of elapsed time (t_i) since the beginning of each step multiplied by the change in discharge at the beginning of the step (Q_i), divided by the discharge of that step (Q_{NSTEP}):

$^{NSTEP}\Sigma_{i=1} (\mathrm{Log}(\Delta t_i)\Delta Q_i)/Q_{NSTEP}$, from Lee (1982).

Transmissivity (T) is estimated with a straight line fitted to the plots for each step and calculated by the equation:

$T = (2.3/4\pi)\ (1/m')$, where m' is the slope of the fitted line (Halford and Kuniansky, 2002, p. 24).
Results of the analysis provide estimates of the hydraulic conductivity of the annular space between the well casing and face of the well bore ($K_{annular}$), and Skin, a term that combines the effects differences in hydraulic conductivity between the formation and the annulus, and the effective diameter of well bore damage (Halford and Kuniansky, 2002, p. 24).

Results of the test indicate a hydraulic conductivity and transmissivity of 40 ft/day and 20,000 ft^2/day, respectively.

References Cited

Halford K.J., and Kuniansky, E.L. 2002, Documentation of spreadsheets for the analysis of aquifer pumping and slug test data: U.S. Geological Survey Open-File Report 02-197, 54 p.

Lee, John, 1982, Well testing: Society of Petroleum Engineers of AIME: New York, 159 p.