

Description of aquifer tests for the North Clapham well.

Single-well step-drawdown and constant-rate tests of the well were conducted by Carson Pump of Carson City. The well is located at 39° 2' 18.8"N, 119° 44' 0.4"W, and is completed in the basin-fill aquifer of Carson Valley, Nevada. Copies of the time-drawdown and pump data were obtained from files of the Douglas County, Community Development Department, Engineering Division (Carl Ruschmeyer, 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.

Rates for the step-drawdown test were varied from 150, to 300, and 450 GPM, measured with a totalizing meter, for periods of about 3 hours on 9/10/96. The pump rate for the constant-rate test was 375 GPM for a period of 24 hours from 9/11/96 to 9/12/96. The static water level prior to the constant-rate test was 1.5 ft lower than prior to the step-drawdown test, indicating the well had not completely recovered from the step-drawdown test on the previous day. The methods of water-level measurement and pre-test water-level trends are not known. Pumped water was discharged through a 400 ft hose to a nearby ditch. Carson Pump noted entrained air in the discharge, indicating the upper portions of the well screen were exposed during testing. The well was reported completed on sometime in 1978, and it is assumed the well was in use during the 18-year period prior to testing.

Time-drawdown data were analyzed using an Excel spreadsheet program (Halford and Kuniansky, 2002) and the Cooper-Jacob analysis for the constant rate test. 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}):

$\sum_{i=1}^{\text{NSTEP}} (\text{Log}(\Delta t_i) \Delta Q_i) / Q_{\text{NSTEP}}$, 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).

The analysis of the step-drawdown test resulted in estimates of hydraulic conductivity and transmissivity, respectively, of 13 ft/day and 3,500 ft²/day. The analysis of the constant-rate test resulted in estimates of hydraulic conductivity and transmissivity, respectively, of 5 ft/day and 1,000 ft²/day. It is uncertain which value may be more reasonable.

References Cited

Halford K.J., and Kuniatsky, 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.