

Description of aquifer test for Hatchery #3 well.

A single-well step-drawdown test was conducted by M. Mifflin of the Desert Research Institute and N. Sievertson of the U.S. Fish and Wildlife Service. The well is located at 38° 53' 38"N, 119° 41' 57.5"W, and is completed in the basin-fill aquifer of Carson Valley, Nevada. Copies of time-drawdown and pump data were obtained from USGS historic files for the Carson Valley Hydrographic Area. 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 460, 580, 820, 970, 1,200, and 1,500 to 1,600 GPM for periods 1 to 2 hours on 12/14/63. Flow rates greater than about 1,200 GPM after 6PM appear uncertain and these data were not used in the analysis. Water-levels were measured with an electric tape and flow-rate measurements were made with a rated orifice plate, accurate to flow rates of 1,200 GPM. A correction for measurements made with the electric tape was applied from comparisons with a steel tape made after the test. Data sheets show that flow rates were variable during each step. The location of discharge of pumped water, and pre-test water-level trends are not known.

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}):

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

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

$$T = (2.3/4\pi) (1/m'), \text{ where } m' \text{ is the slope of the fitted line (Halford and Kuniansky, 2002, p. 24).}$$

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 10 ft/day and 7,000 ft²/day, respectively.

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.