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Results of specific-capacity test of well at Alaska Agricultural Experiment Station, Matanuska, Alaska September 1955

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Members of the U. S. Geological Survey made a pumping test at the Alaska Agricultural Experiment Station, near Matanuska, Alaska, September 12-17, 1955. The test was for the purpose of determining (1) the specific capacity of a test well drilled at the Experiment Station which is to be used by the Department of Agriculture for an experimental irrigation project, and (2) the hydrologic characteristics of the aquifer penetrated by the well. The well was pumped continuously for 5 days, and water-level measurements were made in it and in a nearby observation well during and after the period of pumping.

After the 5 days' pumping at an average of 142 gallons per minute (gpm) the observed drawdown of water level was about 64 feet in the pumped well and 14 feet in the observation well, 100 feet away. During the early part of the pumping the water level in the pumped well declined much more rapidly than that in the observation well; at that time the form of the cone of depression developing in the artesian-pressure surface was changing rapidly near the pumped well. Later, as this cone grew, its slope became relatively stabilized near its center; the rate of decline of the water level had become about equal in the two wells by the 5th day of pumping. It is to be expected that this equality of rate of decline would have continued if pumping had been prolonged further. The measured rate of drawdown in the observation well therefore can be used in extrapolating the drawdown in the pumped well beyond the 5-day test.

The extrapolated drawdown values in the pumped well are as follows:

5 days (observed	64 feet
10 "	68 "
20 "	73 "
30 "	77 "
60 "	84 "

It is assumed that 60 days is a fair estimate of the maximum period over which it would be necessary to pump continuously for the experimental irrigation project; this period is, therefore, used as a basis for further computations.

In order to calculate the pumping level that corresponds to a rate of pumping other than that used in the test, the specific capacity (a unit that relates discharge and drawdown) is used. A well that produces 142 gpm with 84 feet of drawdown has a specific capacity of 142/84 = 1.7 gpm per foot of drawdown. Calculation using the specific capacity shows that this well should produce 100 gpm for 60 days with a drawdown of 100/1.7 = 59 feet; pumping for 60 days at 50 gpm should lower the water level 50/1.7 = 29.5 feet. In order to calculate pumping levels the depth of the static water level (9 to 10 feet) should be added to the above figures. Thus, the pumping level would be about 39 feet below the land surface at a discharge rate of 50 gpm. At a pumping level of 30 feet the discharge rate would be about 36 gpm.

Pumping at rates lower than 142 gpm should give a specific capacity slightly higher than 1.7 gpm per foot of drawdown, and thus drawdowns slightly less than those cited above for the several pumping rates. However, the conservative value of the specific capacity is considered desirable because it provides a small safety factor.

Any prediction of future pumping levels is based on the assumption that sufficient water is available in the aquifer to supply the well and that the water-transmitting character of the aquifer farther away is essentially similar to that in the part of the aquifer sampled by the pumping test. This assumption appears to be reasonable.