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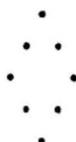
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GROUND-WATER CONDITIONS IN WHISKY FLAT, MINERAL COUNTY, NEVADA
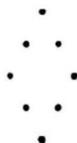
By T. E. Eakin and T. W. Robinson

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GROUND-WATER CONDITIONS IN WHISKY FLAT, MINERAL COUNTY, NEVADA

By T. E. Eakin and T. W. Robinson
Ground Water Branch
U. S. Geological Survey

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As a part of the State-wide cooperative program between the Office of the State Engineer of Nevada and the U. S. Geological Survey, the Ground Water Branch of the Geological Survey made a reconnaissance study of ground-water conditions in Whisky Flat, Mineral County, Nevada.

Whisky Flat is a valley area lying approximately 12 miles south of Hawthorne, Nevada. Topographically it is part of a narrow high-level alcove that extends about 22 miles south of Walker Lake. A constriction about midway separates this valley into two parts; the southern part is known as Whisky Flat. It is leaf-shaped, with a length of about 10 miles and a width at the widest part of about 6 miles, which decreases to about $1\frac{1}{4}$ miles at the constriction. The valley slopes north from Whisky Flat to Walker Lake. There are no perennial streams in the valley, but surficial features indicate that drainage northward in Whisky Flat would occur in years of heavy precipitation. At the narrowest part of the constriction the normally dry channel way is about 250 feet wide. Whisky Spring is at the upstream end of this constriction near the northeast corner of sec. 20, T. 6 N., R. 31 E.

The Whisky Flat mining district [1] is at the south end of the valley on the north slope of the Excelsior Mountains. The district was first worked in 1882 for copper ores rich in silver and carrying a little gold. The Excelsior Mountain Copper Co. was active from 1907 to 1914.

[1] Lincoln, F. C., Mining districts and mineral resources of Nevada, p. 157, Nevada Newsletter Pub. Co., 1923.

Some gold ore was shipped in 1915 from the Tango claim, which is in the Sulphide district 3½ miles east of Whisky Spring. According to report, scheelite occurs with the gold. There apparently was no mining in the two districts in 1949. The somewhat unusual name for this area, according to some reports, has been attributed to Mark Twain who, on seeing numerous empty bottles in the vicinity, christened it Whisky Flat.

The graded road that connects with Hawthorne extends the full length of the valley along the west side. Another road leaves the valley in the southeastern part and connects with U. S. Highway 95 several miles south of Mina. Other parts of the valley are accessible by means of trails. There apparently were no permanent residents in the valley when the valley was visited in November 1949 and January 1950.

As shown on the U. S. Geological Survey topographic map of the Hawthorne quadrangle, Nevada-California, the south part of the Wassuk Range together with its southern extension, the Anchorite Hills, form the west boundary of Whisky Flat. The Excelsior Mountains extend north and east from the Anchorite Hills to close the south and east side of the valley. Unnamed hills extend northward from the Excelsior Mountains to form the boundary along the northeast side of the valley.

The alluviated part of Whisky Flat extends southward from Whisky Spring for about 8 miles and averages about 4 miles in width. The lowland part of the valley slopes northward at an average gradient of about 30 feet per mile.

The altitude of Whisky Spring is about 5,500 feet above mean sea level, and the floor of the valley rises to about 6,300 feet at the contact of bedrock and alluvial fill at the south end of the valley. The crest altitude of the mountains surrounding Whisky Flat may average

2/ Op. cit., pp. 155-156.

somewhat less than 8,000 feet. Powell Mountain in the southern part of the Wassuk Range has an altitude of 9,545 feet, and is the highest point in the mountains surrounding Whisky Flat.

The bedrock in the mountains consists principally of Jurassic granitic intrusives and Tertiary volcanic rocks. On the whole, these rocks are of considerably lower permeability than the relatively unconsolidated valley fill beneath Whisky Flat.

The drainage basin upstream from whisky Spring is about 175 square miles. Long-time precipitation records indicate an average annual precipitation of less than 4 inches at Hawthorne and Mina. The floor of Whisky Flat is at least 1,000 feet higher than the two stations and, therefore, probably receives a somewhat greater amount of precipitation. The crest of the mountains surrounding Whisky Flat probably does not receive more than 15 inches of precipitation annually.

The ground-water reservoir is recharged by runoff from precipitation in the adjacent mountains, and is discharged by transpiration and evaporation, spring and well discharge, and underflow. The water-table slope, and hence ground-water movement, probably conforms in general to the slope of the land surface but in a very subdued manner.

During the course of the field work four wells were visited in the valley. A record of these wells follows:

1. Owner, unknown. In NW¼ sec. 28, T. 6 N., R. 31 E.
   A dug well, 5 by 15 feet square, 40 feet deep, with
   wood cribbing. No equipment. Depth to water,
   39.70 feet below top of 8- by 8-inch timber, which
   is 2 feet above land surface, January 19, 1950.

2. Owner, Wm. Merchant. In NE¼NE¼ sec. 33, T. 6 N.,
   R. 31 E. A drilled well, 6-inch diameter, 92 feet
   deep (reported 125 feet deep), and reportedly per-
   forated between 105 and 125 feet opposite gravel (?).
   Equipped with cylinder pump and windmill. Depth to
   water below top of casing, which is 0.95 foot above
   land surface:
   35.74 feet, May 11, 1948
   35.79 feet, Nov. 28, 1949

3. Owner, Wm. Merchant. In NW¼NW¼ sec. 33, T. 6 N.,
   R. 31 E. A drilled well, 8-inch diameter, 69 feet
   deep (reported 115 feet deep). No equipment.
   Depth to water below top of casing at land surface:
        42.30 feet, May 11, 1948
        42.26 feet, Nov. 28, 1949
        42.28 feet, Jan. 19, 1950

4. Owner, U. S. Bureau of Land Management. In SE¼NW¼
   sec. 19, T. 5 N., R. 31 E. Drilled in January 1941,
   6-inch diameter, 345 feet deep. Equipped with
   cylinder pump and windmill. Depth to water is
   greater than 300 feet.

The northward slope of the water table to Whisky Spring along the valley axis may be about 10 feet per mile. This gradient is approximately indicated by measurements of depth to water in two wells (2 miles south of Whisky Spring) owned by Wm. Merchant, and one well (7 miles south of whisky Spring) owned by the Bureau of Land Management. The measurements, in turn, were related to land-surface altitudes obtained approximately from the Hawthorne quadrangle topographic map.

Evaluation of the amount of ground water available for development in Whisky Flat may best be based upon an estimate of ground-water discharge. Discharge from the three used wells in the valley probably is not more than 5 acre-feet per year for stock and domestic use, and perhaps for minor garden irrigation. The rate of discharge of Whisky Spring has been estimated at about 25 gallons per minute and, therefore, the annual discharge may be approximately 40 acre-feet. Discharge by transpiration and evaporation may occur over an area of about 750 acres. Of this, perhaps 700 acres is covered by a moderate density of greasewood with lesser amounts of rabbit brush, and about 50 acres has a moderate cover of salt grass with some rabbit brush. The depth to water in the greasewood area may average somewhat less than 30 feet below land surface, and that of the salt grass area, 5 to 10 feet. From these, it may be assumed that about 140 acre-feet per year is discharged from the greasewood area, and about 40 acre-feet per year is discharged from the salt grass area.

Underflow through the channel-fill deposits out of Whisky Flat is controlled by the cross-sectional area, the permeability, and the water-table gradient. North of Whisky Spring, the channel-fill is about 200 feet wide and perhaps 50 feet deep, the water-table gradient is on the order of 300 feet per mile, and permeability is believed to be moderate to low. It is not likely, therefore, that more than about 80 acre-feet per year leaves the valley as underflow in the channel-fill deposits. Underflow from the valley may occur to some extent through the older rocks. However, there is no way to evaluate this factor with present information, but it is not likely to be a large volume.

Preliminary information indicates an annual discharge of about 300 acre-feet from the ground-water reservoir underlying Whisky Flat. Under full development probably not more than three-quarters of the total discharge could be recovered by wells.

The existing wells in the valley have been used principally for stock-water purposes. When visited in November 1949 and January 1950 only two wells were in use. These were equipped with lift pumps operated by windmills. Because of the low rate of discharge from the wells (less than 5 gallons per minute on the average), and lack of information on the material penetrated by the wells, there are no data on which to base an estimate of the capacity of the wells, or of the water-yielding capacity of the water-bearing deposits. To determine this factor properly, a pumping test should be made on existing wells, or test wells should be drilled to determine the depth and thickness of water-bearing zones.