UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

DATA ON GROUND-WATER RESOURCES OF THE SPRING MOUNTAINS AREA, TOIYABE NATIONAL FOREST, NEVADA

By William D. Nichols and Louise E. Davis

Open-File Report 79-1638

Prepared in cooperation with
the U.S. Forest Service

Carson City, Nevada
1979

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CONVERSION FACTORS

For those readers who may prefer to use metric units rather than inch-pound units, the conversion factors for terms in this report are listed below:

Inch-pound units	Multiply by	Metric
inch (in)	2.54	millimeter (mm)
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
gallon per minute (gal/min)	0.06309	liter per second (L/s)

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ABSTRACT

This report lists data on ground-water levels for 16 wells and discharge for 18 springs in the Spring Mountain area of the Toiyabe National Forest. Water levels in wells ranged from 325 to 519 feet below land surface. The highest spring discharge listed is 107 gallons per minute. In addition, data on the chemical quality of the water from selected wells and springs are listed.

INTRODUCTION

Purpose and Scope of the Report

The Spring Mountains area of the Toiyabe National Forest (pl. 1), which is about 30 miles west of Las Vegas, Nev., in the Spring Mountains, includes numerous private inholdings. Use of the water resources of this area of the Spring Mountains is increasing because of increased use of public lands and development of private lands. Concern has been expressed by the U.S. Forest Service as to the impact of recreational use and private residential development on the water resources of the forest.

At the request of the Forest Service, the Geological Survey collected hydrologic data for the Spring Mountains area of the Toiyabe National Forest. The purpose of this data collection was to provide a hydrologic data base for a future assessment of the impacts of water-resource development. In this regard, data-collection activities included canvassing wells and springs, measuring ground-water levels and spring discharge, and obtaining data on the chemical quality of well and spring water.

Hydrogeologic Setting

The Spring Mountains are flanked on all sides by an apron of clastic sediments, which are composed of rock waste eroded from the range and deposited on the mountain flanks and in the canyons. The apron is made up of numerous coalescing alluvial fans that head up high in the range. The materials that make up the alluvial fans consist of poorly sorted gravel, sand, silt, clay, and caliche; the coarser materials being in marked predominance.

Water for recreational and residential use comes from wells and springs. Ground water in Kyle and Lee Canyons, which are the principal areas of recreational and residential development in the Spring Mountains, occurs in clastic sediments that fill the canyon bottoms and in the underlying carbonate rocks. Most wells draw water from the clastic sediments.

Most of the mountain springs occur along fault zones. Other springs occur along contacts between clastic sediments and carbonate rocks. Discharge from most of the mountain springs fluctuates considerably. Many of the springs go dry in the late summer or fall and start flowing again during the spring snowmelt of the following year. Some springs flow as a result of added recharge during local storms.

Numbering System for Wells and Springs

The numbering system used in this report is based on an index of hydrographic areas in Nevada (Rush, 1968) and on the rectangular subdivision of the public lands referenced to the Mount Diablo base line and meridian. Each number consists of five units separated by spaces. The first unit is the hydrographic area number. The second unit is the township, preceded by an S to indicate location south of the base line. The third unit is the range preceded by an E to indicate location east of the meridian. The fourth unit consists of the section number. Quarter sections are designated in the fifth segment counterclockwise "A" through "D", beginning with "A" for the northeast quarter section. Additional letters "A" through "D" are also assigned in counterclockwise sequence to further subdivide the quarter sections into 40- or 10-acre tracts. The letters are followed by a number indicating the order in which the well was recorded in that particular tract. For example, well 212 S19 E56 27AAA1 is in Las Vegas Valley (hydrographic area 212). It is the first well recorded in the NE¼NE¼NE¼ sec. 27, T. 19 S., R. 56 E., of the Mount Diablo base line and meridian.

HYDROLOGIC DATA FOR WELLS AND SPRINGS

Field work for the data listed in this report was done during August 1978. As part of that field work, 16 wells were canvassed. Data for those wells are listed in table 1, which shows that water levels ranged from 32.5 to 519 feet below land surface.

In addition to wells that were visited, 18 springs were canvassed during the field period. Data for these springs are listed in table 2. The spring discharges listed in table 2 are as high as 107 gal/min (gallons per minute), but some springs were dry when visited.

Water-quality data were obtained for seven wells and nine springs. These data are listed in table 3, which shows that dissolved solids ranged from 125 to 309 milligrams per liter.

TABLE 1.--Well data

Use: D, domestic; PS, public supply.

Location	Name	Year drilled	Depth (feet)	Diameter (inches)	Use	Yield (gal/min) and drawdown (feet)	Land surface altitude (feet)	Water-level measurement	
								Depth (feet)	Date measured
212 S18 E56 35DCA	Summer Homes				D		8,010		
35ADD	Bigelow				D		7,920		
212 S19 E56 2DBB	Our Lady of Snows	1956	388	8	PS		8,240	190.0 187.5	11-15-56 8-23-78
10AAA	Lee's Crest				D		8,320		
10DDB	Youth Camp		400	8	D		8,680	164.5	8-22-78
15ABA	Lee Canyon Ski Lodge				D		8,680	259.5	8-23-78
26DBD	Echo No. 3					325/			
27AAA	Mary Jane Falls Campground				D		8,400	245.0	8-21-78
36BAB	Mt. Charleston Lodge No. 2	1961	377	8	PS		7,460	32.5	10-11-61
36BDB	Mt. Charleston Lodge	1962	155	16	PS		7,600	45.0	7- 9-62
212 S19 E57 7DAC	Deer Creek Picnic Area 1/			11	D		8,325	51.0	8-22-78
28CAA	Highway Dept.	1968	297	6	D		6,795	67.0	6- 9-68
28ADA	Kingston			8	D		5,660	384.5 518.9	8-21-78 3-11-79
31BAC	Rainbow No. 1				D	125/			
31BDA	Kramer				D			145.0	8-21-78
32BBA	U.S. Forest Service	1965	274	8	D		7,280	212.00 198.00	6-19-65 8-26-78

1. Well is about 3 feet from dry streambed.

TABLE 2.--Spring data

Number	U.S. Forest Service No.	Name	Approximate land-surface altitude (feet)	Date	Flow (gal/min)
212 S19 E56 4DBC	24	Scout Spring	9,100	8-26-78	--
212 S19 E56 14CAC	19	Cave Spring No. 1	10,000	8-20-78	--
212 S19 E56 14CBA	22	Rock Spring	9,440	8-20-78	Dry
212 S19 E56 15BCB	17	Three Springs	9,080	8-19-78	Dry
212 S19 E56 15CDC	33	Two Springs	10,000	8-19-78	4-15
212 S19 E56 15DAB	18	Snowslide Spring	9,500	8-23-78	--
212 S19 E56 25ABD	5	Stanley B (upper) Spring	8,310	8-18-78	.65
212 S19 E56 25ADB	6	Stanley B (lower) Spring	8,075	8-18-78	2.7-8
212 S19 E56 25DBC	7	Hillside Spring	7,960	8-26-78	Dry
212 S19 E56 35DAB	9	Rainbow Spring	8,570	8-24-78	E 25
212 S19 E56 35DBA	--	Unnamed	8,900	8-24-78	E 5-10
212 S19 E56 35DBB	8	West Spring	9,200	8-24-78	E 30
212 S19 E56 36CCD	10	East Spring No. 1	7,940	8-24-78	--
212 S19 E57 7CDD	23	Deer Creek Spring	8,520	8-22-78	1.07
212 S19 E57 30ACB	4	Fletcher Spring	7,580	8-23-78	25
212 S20 E56 1ABB	12	Twin Falls Spring	9,105	8-25-78	Trace
212 S20 E56 1ADC	11	Mazie Spring	9,130	8-25-78	E 15-20
212 S20 E56 1BBB	13	East Spring No. 2	9,120	8-24-78	25

E Estimated.

TABLE 3.--Chemical analyses of wells and springs

Location	Name	Date sampled	Temperature °F	Temperature °C	Milligrams per liter except as indicated: Calcium (Ca)	Magnesium (Mg)	Sodium (Na)	Potassium (K)	Sulfate (SO_4)	Chloride (Cl)	Fluoride (F)	Silica (SiO_2)	Boron (B) (ug/L)	Iron (Fe) (ug/L)	Alkalinity as $CaCO_3$	Hardness as $CaCO_3$	Dissolved solids, calculated	Specific conductance (micromhos per cm at 25°C)
Wells																		
212 S18 E56 35DCA	Summer Homes	*8-22-78	--	--	54	23	1.4	0.8	14	1.6	0.1	6.3	10	30	210	230	227	407
212 S19 E56 10AAA	Lee's Crest	8-22-78	50	10.0	46	31	1.9	.7	23	1.9	.1	7.9	50	20	220	240	245	442
212 S19 E56 15ABA	Lee Canyon Ski Lodge	8-23-78	46	8.0	47	14	.9	.4	9.9	1.4	.1	4.9	10	20	170	180	181	336
212 S19 E56 26DBD	Echo No. 3	8-21-78	47	8.5	57	10	1.0	.4	6.7	1.0	.1	5.4	40	20	170	180	184	342
212 S19 E56 36BDB	Mt. Charleston Lodge	*8-21-78	--	--	48	8.6	.8	.3	5.7	.8	.1	4.5	0	20	140	160	153	282
212 S19 E57 28CAA	Highway Dept.	*8-21-78	--	--	62	14	1.4	.5	12	1.7	.2	5.7	340	60	200	210	218	397
212 S19 E57 31BAC	Rainbow Spring No. 1	8-21-78	48	9.0	61	12	1.4	.6	7.7	4.8	.1	5.6	10	40	180	200	201	361
Springs																		
212 S19 E56 14CAC	Cave Spring No. 1	8-20-78	42	5.5	54	10	0.9	0.4	6.1	0.9	0.1	4.1	50	30	160	180	173	316
212 S19 E56 25ADB	Stanley B (lower) Spring	8-18-78	50	10.0	81	41	1.4	.4	14	2.5	--	7.1	--	20	--	370	--	--
212 S19 E56 35DAB	Rainbow Spring	8-24-78	41	5.0	53	7.4	.7	.3	5.1	.7	.1	4.1	0	20	150	160	161	299
212 S19 E56 35DBB	West Spring	8-24-78	42	5.5	56	8.9	.7	.3	5.9	3.7	.2	4.6	40	20	170	180	182	322
212 S19 E57 7CDD	Deer Creek Spring	8-11-78	46	8.0	60	19	1.2	.5	6.1	1.3	.1	5.7	0	20	220	230	226	411
212 S19 E57 30ACB	Fletcher Spring	8-23-78	53	11.5	84	24	2.5	.7	19	2.9	.1	7.7	140	10	280	310	309	548
212 S20 E56 1ADC	Mazie Spring	8-25-78	37	3.0	37	7.8	.7	.2	3.7	.7	.1	3.2	90	60	120	120	125	246
212 S20 E56 1BBB	East Spring No. 2	8-24-78	39	4.0	40	8.0	.9	.2	4.6	.8	.1	3.8	10	20	120	130	130	247

* Sampled at nearest tap.

DESCRIPTION OF SPRINGS

This section describes the springs visited between August 18 and 26, 1978. It is an attempt to describe as fully as possible the conditions at each spring at the time of visit, the spring discharge, how it was measured, and where it was measured with respect to the first appearance of water.

Location

212 S19 E56 4DBC Scout Spring

Visited site on August 26. Either could not locate site or spring was dry.

212 S19 E56 14CAC Cave Spring No. 1

Visited on August 20, at 1430 hours. The spring is mainly water dripping from the ceiling of a rock shelter-type cave. Water accumulates in a shallow irregular pool on the floor of the cave before flowing into and through the talus across the entrance to the cave. There are two main points where water issues along bedding planes high on the back wall of the rock cave. Water temperature at this point was 5.5°C. Discharge of this spring was impossible to measure because all water leaves the drip pool as underflow through the talus. Several collector pipes are buried in this material and intercept an unknown volume of the discharge. The flow re-emerges along the stream channel several hundred feet down the canyon. Attempts to measure discharge in this area were not successful because of heavy vegetation and large cobbles and boulders in the stream bed.

212 S19 E56 14CBA Rock Spring

Visited site on August 20. Spring was dry.

212 S19 E56 15BCB Three Springs

Visited site of this spring on August 19. Spring was dry.

212 S19 E56 15CDC Two Springs

Visited on August 19 about 1415 hours. Measured flow of 4 gal/min with 90° V-notch weir at concrete diversion outlet but below the 2-inch drain pipe. Significant flow occurred around and under the weir, and it is estimated that only about 60 percent of the discharge went over the weir. Another measurement of 15 gal/min, estimated to represent 80 percent of the flow, was made near the base of the falls by using the concrete channel as the stream channel. The temperature was 4°C. An extensive snowfield was still in the canyon, starting about 50 ft above the falls. Water was flowing in the stream channel from beneath the snow. The highest altitude at which discharge occurs was several hundred feet above the falls in an open area within the snowfield. The flow at this point was too small to measure; the temperature was 4°C.

212 S19 E56 15DAB Snowslide Spring

Did not visit, but observed streamflow through binoculars from ski lodge on August 23.

212 S19 E56 25ABD Stanley B (upper) Spring

Visited August 18 at about 1400 hours. The spring is a diffused seep gathering discharge along about 25 ft of the gulley floor, a rather steep, V-shaped channel. A flow of 0.65 gal/min was measured 40 ft below the beginning of the seep and about 15 ft above a concrete collector. The measurement was made with a gallon bottle and stopwatch. Water temperature was 9.0°C.

Location

212 S19 E56 25ADB Stanley B (lower) Spring

This spring was visited on August 18 at 1445 hours. There is no pronounced orifice; flow appears and increases along the narrow gravelly stream channel. A discharge of 2.7 gal/min was measured with gallon bottle and stopwatch about 15 ft downstream from the first appearance of water. A flow of 8 gal/min was measured about 75 ft farther downstream by using a small 90° V-notch weir. Water temperature was 10°C.

212 S19 E56 25DBC Hillside Spring

Visited on August 26. Located small seep on west-facing cliff at approximate map location of the spring. Searched several hundred yards up and down the stream but observed no flow.

212 S19 E56 35DAB Rainbow Spring

Visited on August 24 at about 1515 hours. There is no clear point of discharge; flow gradually increases along 50 to 70 ft of the stream channel, which is very steep and boulder strewn. Discharge could not be measured but was estimated to be about 25 gal/min. Temperature was 5°C; no snow was observed in the canyon.

212 S19 E56 35DBA Unnamed

This spring was observed on August 24. The discharge point lies in a steep and rugged section of the canyon. Flow was estimated to be 5 to 10 gal/min.

Location

212 S19 E56 35DBB West Spring

Visited on August 24 at about 1700 hours. This spring consists of a large number of small seeps emanating from the stream channel and the adjacent hillside. Very heavy broadleaf vegetation was growing throughout the channel and slope area, making channel definition nearly impossible. Flow could not be measured because of large cobbles and boulders, but it was estimated to be about 30 gal/min. Temperature was 5.5°C; no snow was observed in the area.

212 S19 E56 36CCD East Spring No. 1

Visited on August 24 at about 1230 hours. The site of the spring was approximately located and determined to be snowcovered. An extensive thickness of snow extended up and down the canyon for several hundred feet. It is believed that this is Mazie Spring.

212 S19 E57 7CDD Deer Creek Spring

Visited on August 22 at 1045 hours. This spring was located at the end of the paved road into the picnic area. It occurs as a number of points of discharge in the stream bed and banks near the point where the paved road crosses the stream channel. Discharge was measured with a 3-inch parshall flume approximately 200 ft downstream from the first appearance of water and below the last observed seep from the stream bank. The flow measured was 107 gal/min; the temperature was 8°C.

Location

212 S19 E57 30ACB Fletcher Spring

Visited on August 23 at 1420 hours. Several seeps along the banks of two converging drainages appear to combine to form Fletcher Spring. Discharge was measured about 75 ft below the highest seep, but above what appeared to be a collector drum in the stream channel. A 90° V-notch weir was used to measure a discharge of 25 gal/min. The temperature was 11.5°C.

212 S20 E56 1ABB Twin Falls Spring

Visited on August 25. Located probable site of spring, but only small seep was found near base of dry falls. Lower part of falls was undercut slightly and had been partly closed in with rock wall with a square concrete opening. Searched two falls higher all the way up to crossing of Mount Charleston trail, but found no other spring flow.

212 S20 E56 1ADC Mazie Spring

Visited this spring on August 25 at about 1400 hours. The spring is not located in Mazie Canyon but is identified as Mazie Spring by the U.S. Forest Service. This report follows their designation, but it is believed that the USFS East Spring in Mazie Canyon is the correct Mazie Spring and that the spring designated as Mazie Spring by the USFS is East Spring. The spring source was still snowcovered. Discharge was not readily measurable because of boulders and cobbles; it was estimated to be 15 to 20 gal/min. The temperature was 3°C.

Location

212 S20 E56 1BBB East Spring No. 2

Visited on August 24 at 1345 hours. Water was observed issuing from several points along the stream channel and banks. The highest point at which discharge occurs is about 70 ft upstream from the largest source and is on the east side of the canyon. The point of largest discharge is near the end of a "road" or pathway that comes up the west side of the canyon. This discharge flows in two directions--one down the canyon over a small waterfall about 20 ft high and the other towards the west along the "road." This easterly flow disappears into the gravel in a short distance. Flow down the stream channel was measured, with a 90° V-notch weir, at 10 gal/min. This flow was observed to be significantly increased at and below the falls, but both the falls area and stream course immediately below were inaccessible because of snow. The flow is estimated to have been four to five times greater than at the point of measurement. The discharge flowing west into the gravel was estimated to be about 15 gal/min. Water temperature at all points of discharge was 4°C. Snow still covered the canyon floor at least 1,000 ft up and down the canyon.

General Comments

The discharge at all and observed flowed in the stream channel for distances varying from 50 ft to three-fourths of a mile from the point of origin, before infiltrating back into the stream bed. The high

mountain springs usually flowed only a short distance down the steep drainages, from 50 ft to several hundred feet. Spring at lower altitudes near the canyon floor were observed to provide streamflow for as much as three-fourths of a mile.

A number of unnamed and unlocated springs and seeps were observed at many places in tributary canyons in the south wall of Kyle Canyon. Nearly all were above 9,000 ft.

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