STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

EARL WARREN, Governor

C. H. PURCELL, Director of Public Works

EDWARD HYATT, State Engineer

REPORT ON
WATERMASTER SERVICE

IN

SURPRISE VALLEY WATERMASTER SERVICE AREA
Modoc County, California

1947 SEASON

Sacramento, California

January 19, 1948

Mr. Gordon Zander
Principal Hydraulic Engineer
Sacramento, California

Dear Sir:

Herewith is submitted the annual report covering watermaster service within the Surprise Valley Watermaster Service Area, Modoc County, California, during the 1947 season.

The report presents a general description of the work and a discussion of the results obtained. Records of precipitation, run-off and other pertinent data are included.

Respectfully submitted,

/s/ HARRISON SMITHERUM
Harrison Smitherum
Supervising Hydraulic Engineer

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INTRODUCTION

Watermaster service was continued in the Surprise Valley Watermaster Service Area during the 1947 season in accordance with sections 4000 to 4360, inclusive, of the Water Code. The service was commenced for the season on March 19, 1947, and was terminated on September 30, 1947.

T. I. Rausch administered the distribution of water from the streams within the service area during the 1947 season. Harrison Smitherum, Supervising Watermaster, directed the work in the field.

WATER SUPPLY

Precipitation

Table 1 gives the monthly and seasonal precipitation at Cedarville for the 1940-41, 1941-42, 1942-43, 1943-44, 1944-45, 1945-46 and 1946-47 seasons, and the mean monthly and seasonal precipitation at that station for the period of record, 1894 to 1947, as compiled from records of the United States Weather Bureau. The table also shows a comparison between the 1946-1947 precipitation and the 1894-1947 mean. The seasonal precipitation for 1946-47 was 71 per cent of the mean.

Table 2 contains the results of snow surveys made annually at the four courses in the Upper Pit River watershed. Considering the two snow courses on the Warner Range, namely Eagle Peak and Cedar Pass, the water content of the snow was 32.7 per cent and 47.2 per cent respectively of their deduced normals. The mean of these two figures is 39.9 per cent. The deduced normal water content for the entire

season on Eagle Peak and Cedar Pass is 19.6 inches and 21.8 inches, respectively.

Stream Flow

Measuring stations, equipped with water stages recorders, were maintained on the streams within the Surprise Valley Watermaster Service Area as listed below. The streams are listed geographically in order from north to south. As nearly as is practicable, each station is located above all diversions on the particular stream. On Pine Creek the measurements were made by means of two 4-foot Parshall Measuring Flumes installed at the point where the stream divides into the north and south channels. The other stations were rated by means of current meter measurements taken at various stages of the streams throughout the period of watermaster service. The records of discharge for the several streams within the area are presented in Tables 3 to 15, inclusive, at the end of this report. The adequacy of the water supply to fill the requirements of the various streams is discussed for each stream under the chapter heading "Distribution of Water."

Mill Creek above diversions
Soldier Creek above diversions
Pine Creek above North and South Channels
Cedar Creek above diversions
North Deep Creek above diversions
South Deep Creek below Espil Ditch
Owl Creek below Allen-Arreche Ditch
Rader Creek above Parshall Flume Division Structure
Eagle Creek one-half mile below mouth of canyon
Emerson Creek above diversions

DISTRIBUTION OF WATER

Distribution of water on the various streams within the service area was in accordance with the allotments and priorities set forth in the respective decrees. The flows available for distribution

were determined from the measured discharge at the recorder stations. A summary of the results accomplished and of any difficulties encountered on each separate stream is given below.

Mill Creek

The regulation of diversions from Mill Creek was made in accordance with the allotments and priorities set forth in the decree in the case of Warrens vs. Wisner, No. 3024, Superior Court, Modoc County, dated December 19, 1931. The amount of water available for distribution was determined from the flow at the measuring station above all diversions. The record of daily discharge at this station for the 1947 season is submitted in Table 3, at the end of this report.

First priority water was available in full throughout the season. Second priority rights received allotments until the latter part of July, while third priority water was exhausted the middle of June.

On Rutherford Creek, second priority water was available until the 1st of August, while 1st priority water diminished to 50 per cent during September.

Soldier Creek

The regulation of diversions from Soldier Creek was made in accordance with the provisions of the decree in the case of San Francisco Cattle Loan Co. vs. Crampton, No. 2405, Superior Court, Modoc County dated November 28, 1926, and licenses issued by the Department of Public Works subsequent to said decree. The amount of water available for distribution was determined from the flow at the measuring station on Soldier Creek above all diversions. The record of daily discharge at this station for the 1947 season is submitted in Table 4 at the end of this report.

All ditches on Soldier Creek with the exception of the Jones Ditch were opened in 1947, and all users exercised their full legal rights to the extent that water was available.

Rotation was practiced from March 19 until June 19 in accordance with the decree. The Daniels ranch at no time during the season diverted more than 1.00 c.f.s. from Soldier Creek, as the supply from Daniels Canyon and Simpson Canyon was ample to supply most of the Daniels ranch requirements.

At all times when flood water was available during the season, it was allowed to flow down the East Branch of Soldier Creek for use on the Patch Ranch. However, flood stages were usually of such short duration that, due to heavy channel losses, only a small percentage of this water actually reached the Patch Ranch. No water was available for the license rights during the 1947 season.

Diversion of full allotments was possible only for short intervals during the rotation periods of both the lower and upper users. Subsequent to June 19, the flow diminished steadily, and sedond priority rights were exhausted by the middle of August. Only 77 per cent of 1st priority rights were available at the end of September.

Pine Creek

The regulation of diversions from Pine Creek was made in accordance with the decree in the case of Gaustad vs. McCulley, No. 3391, Superior Court, Modoc County, dated December 7, 1936. The amount of water available for distribution was determined at the two Parshall Measuring Flumes on the north and south channels of Pine Creek. The record of daily discharge above all diversions for the 1947 season is submitted in Table 5.

The water supply of Pine Creek was sufficient to complete the first rotation by April 8. The second rotation was completed on May 3 on which date the flow diminished to 4.0 cubic feet per second and all the water was turned into the north channel for rotation between Harris and McCulley.

On May 13, the flow having diminished to 1.6 cubic feet per second, all water was turned into the Cressler Ditch for W. E. Hill. On May 18, the entire flow of the creek was turned to W. D. Ausman for the remainder of the season.

Approximately .06 cubic foot per second was diverted from Pine Creek to make up the deficiency in the first priority allotment of .08 cubic foot per second from the Royce Spring.

Cedar Creek

The regulation of diversions from Cedar Creek was made in accordance with the water rights defined in the cases of Hill vs. Acty, No. 2343, and Lichty vs. Cook, No. 1206, Superior Court, Modoc County, and agreement re. right of Jake Rechsteiner to divert water from Cedar Creek. Water diverted from Thoms Creek into Cedar Creek through the Cedar Pass Ditch, the rights to which are set forth in the North Fork Pit River Decree, No. 4074, Superior Court, Modoc County, dated December 14, 1939, and in the said Lichty vs. Cook decree, was also distributed to the rightful owners. The amounts of water available for distribution were determined from measurements taken at a Parshall Measuring Flume on the Cedar Pass Ditch, and at the measuring station on Cedar Creek above diversions. The record of daily discharge for 1947, at the Cedar Creek station which includes the water diverted from Thoms Creek, is submitted in Table 6.

Water was available only for first and second priority rights on Cedar Creek in 1947, with stock and garden water under the first priority right available at the McCulley Ranch until the latter part of September.

The Cedar Pass Ditch from Thones Creek was opened on the 22nd of April and operated until August 9th.

Deep Creek

The diversions from Deep Creek was regulated in accordance with the water rights defined in the decree in the case of Tyeryar vs. Benner, No. 3101, Superior Court, Modoc County, dated January 25, 1934. The amounts of water available were determined from measurements taken at the measuring stations on North and South Deep Creeks. The records of daily discharge for 1947 for North and South Deep Creek are shown in Tables 7 and 8 respectively. A summation of the discharges at these two stations has been tabulated in Table 9. Second priority water was exhausted on the 3rd of May with first priority water available until the 15th of August.

Owl Creek

The regulation of diversions from Owl Creek was made in accordance with the allotments and priorities set forth in the decree in the case of Cummins vs. Allen, No. 2410, Superior Court, Modoc County, dated April 29, 1929. The amount of water available for distribution was determined from measurements of the flow of Owl Creek taken at the measuring station below the Allen-Arreche Ditch. The record of daily discharge at this station is shown in Table 10.

In the latter part of May, water was available for all priorities. Through June, July and August the water supply steadily

diminished, and during August and September water was available for the Daussat and Berryessa Ranches only.

Rader Creek

The regulation of diversions from Rader Creek was made in accordance with the allotments and priorities set forth in the decree in the case of Powers vs. Woodruff, No. 3626, Superior Court, Modoc County, dated June 4, 1937. The amounts of water available for distribution were determined from measurements taken at the measuring station on Rader Creek above the Parshall Flume Division Structure. The record of daily discharge at this station for 1947 is submitted in Table 11. The summation of the flow at this station and the amounts of water diverted above it is shown in Table 12.

Water was available in varying amounts for all rights on Rader Creek during 1947. Stock water was available throughout the season for the Nolan, Minto and Dollarhide ranches. The McCulley-Hudspeth Ditch was opened on May 20 and regulated to divert one-seventh of the flow of the creek at the point of diversion. The ditch was closed on July 21, when the water failed to reach the place of use.

Eagle Creek

The regulation of diversions from Eagle Creek was made in accordance with the allotments and priorities set forth in the decree in the case of Harris vs. Adams, No. 3284, Superior Court, Modoc County, dated November 5, 1937. The amount of water available for distribution was determined from measurements of the flow of Eagle Creek taken at the measuring station. The record of daily discharge at this station for the 1947 season is shown in Table 13. A record of daily discharge

above all diversions has been compiled by adding the quantities diverted above the measuring station to the amounts shown in Table 13. This compilation is shown in Table 14.

Third priority users received water in varying amounts until the latter part of June. Second priority water was exhausted by the 15th of August, while first priority users received water throughout the season.

Rotation was commenced on August 15 among all rights on the Gee and Grider Ditches, except those of Groves and Noland who required a continuous flow for stockwatering purposes.

Emerson Creek

The regulation of diversions from Emerson Creek was in accordance with the allotments and priorities set forth in the decree in the case of Murphey vs. Warren, No. 2840, Superior Court, Modoc County, dated March 25, 1930. The amount of water available for distribution was determined from measurements of the flow taken at the measuring station. The record of daily discharge at this station is submitted in Table 15.

Water for third priority rights was available the first week in May only and for second priority rights was available only in varying amounts until the middle of May. At the end of September, first priority users were receiving 88 per cent of their allotment.

OWNERSHIP OF LANDS AND WATER RIGHTS WITHIN SURPRISE VALLEY WATERMASTER SERVICE AREA

Changes in Ownership

The changes in ownership of lands and water rights which have occurred subsequent to filing "Statement for Surprise Valley Watermaster Service Area, County of Modoc, State of California for 1947." and which shall be included in the statement for said watermaster service area for 1948, are listed in the following tabulation:

	Tract	Name of Water Right Owner Appearing in 1947 Statement	Name of Water Right Owner to Appear in 1948 Statement	Amount of water c.f.s.
8-	62 &			
8-	63	George R. McMullin	J. W. Petterson and M. H. Gardner	1.64
8-	167	Frank Nolan	Reginald D. and Hazel N. Roberts	2.90
8-	78	Mrs. H. O. Hughes	Mrs. J. H. Cloud	1.10
8-	96	C. L. Wines	J. E. and Daisy O. Morrison	2.08
8-	28	F. A. Shaffer	J. A. Largent	0.56
8-	40	F. A. Shaffer	J. A. Largent	included in Tract 28

TABLE 1

PRECIPITATION AT CEDARVILLE, CALIFORNIA, 1894-1947, ELEVATION 4,675 FEET
MONTHLY, SEASONAL, AND AVERAGE AMOUNTS IN INCHES

Season	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Seasonal
1940-41	1.04	1.40	1.23	1.38	1.41	1.77	0.67	0.58	1.77	1.33	1.32	1.09	14.99
1941-42	0.34	1.38	1.50	2.79	0.58	1.29	0.43	1.35	1.40	0.73	0	0.16	11.95
1942-43	0.19	T	2.84	1.66	3.66	1.42	1.12	1.40	0.79	0.68	0.12	T	13.88
1943-44	T	1.70	0.09	0.40	0.93	1.52	0.77	1.30	0.25	2.56	0.56	T	10.08
1944-45	0.52	0.51	2.30	0.51	0.96	2.89	1.37	1.17	3.27	1.40	T	0.15	15.05
1945-46	0.25	1.82	2.42	1.93	1.10	0.44	1.92	0.34	0.46	0.26	0.93	0	11.87
1946-47	0.11	1.03	1.56	1.42	0.82	0.52	0.72	0.38	0.20	1.69	T	.11	8.56
Mean 1894-1947	0.52	1.04	1.47	1.46	1.70	1.49	1.44	0.91	0.90	0.73	0.22	0.16	12.03
1946-1947 In per cent of mean	21.2	99.0	106.1	97.3	48.2	34.9	50.0	41.8	22.2	231.5	0	68.7	71.16

Note: See Surprise Valley Watermaster District Report for 1940 and Soldier Creek reports prior to 1940 for previous records.

TABLE 2

SNOW SURVEY DATE--UPPER PIT RIVER

	1945	1956	1947	1948	1949	1950
Eagle Peak Course Elev. 7500 Ft.						
Date of Survey	3/30	4/5	4/2			
Depth of Snow—Inches	63.5	53.3	22.2			
Water Content—Inches	22.2	21.2	6.4			
Density—Percent	35.0	39.8	28.8			
Record Average—Inches	15.8	16.1	15.5			
% of Record Aver.	140.5	131.7	41.0			
Cedar Pass Course Elev. 7200 Ft.						
Date of Survey	3/29	3/28	3/31			
Depth of Snow Inches	67.5	55.4	26.0			
Water Content Inches	22.4	22.9	10.3			
Density—Percent	33.2	41.3	39.6			
Record Average—Inches	17.2	17.5	17.1			
% of Record Average	130.2	130.8	60.0			

	1945	1946	1947	1948	1949	1950
Adin Mountain Course— Elev. 6500 Ft.						
Date of Survey	4/3	3/26	3/31			
Depth of Snow-In.	41.2	44.0	13.4			
Water Content-In.	15.8	16.2	4.4			
Density—Percent	38.4	37.0	32.8			
Record Average-In	12.2	12.5	12.0			
% of Record Aver.	129.5	129.6	36.6			
Blue Lake Ranch Course Elev. 7300 Ft.			New Course 1940			
Date of Survey	4/3	4/3	4/1			
Depth of Snow—Inches	44.0	44.9	17.5			
Water Content—Inches	15.8	16.2	5.3			
Density—Percent	35.9	36.1	30.4			
Record Average—Inches			11.0			
% of Record Average			48.0			

For records prior to 1945, see 1946 report.

TABLE 3

Daily Discharge in Cubic Feet per Second
MILL CREEK ABOVE DIVERSIONS
March 20 to September 30, 1947

Day	March	April	May	June	July	August	September
1		7.6	17.0	15.4	3.6	2.5	2.2
2		7.4	17.0	9.6	3.4	2.6	2.3
3		6.6	16.0	8.2	3.2	2.6	2.2
4		6.2	16.6	8.6	3.2	2.6	2.2
5		6.2	17.0	9.8	3.2	2.5	2.2
6		5.8	16.6	11.4	3.2	2.5	2.2
7		5.8	16.6	12.2	3.0	2.5	2.5
8		7.6	18.6	11.4	3.0	2.4	2.4
9		7.6	16.6	19.8	2.9	2.5	2.4
10		8.6	13.0	18.0	2.8	2.5	2.4
11		9.6	12.0	13.0	2.8	2.5	2.4
12		9.8	11.0	9.6	2.8	2.5	2.4
13		13.0	9.8	8.8	2.8	2.5	2.4
14		17.0	9.8	8.0	2.8	2.4	2.3
15		14.6	8.8	7.0	2.8	2.4	2.3
16		15.4	8.6	9.2	2.8	2.4	2.3
17		17.6	8.6	7.6	2.6	2.4	2.3
18		17.0	7.6	6.6	2.6	2.3	2.3
19		16.6	7.6	5.8	2.4	2.3	2.3
20	9.6	17.6	8.6	5.8	2.4	2.4	2.3
21	9.6	14.6	8.6	5.6	2.4	2.4	2.3
22	16.4	14.0	8.6	5.6	2.4	2.3	2.3
23	16.0	12.0	8.0	5.2	2.3	2.3	2.3
24	12.0	10.4	8.8	4.8	2.3	2.3	2.3
25	10.0	11.0	8.0	4.2	2.2	2.2	2.3
26	9.6	12.0	7.0	4.6	2.2	2.2	2.2
27	9.2	12.0	11.4	4.4	2.3	2.2	2.2
28	8.6	12.2	11.4	4.0	2.3	2.2	2.3
29	8.6	13.0	7.0	4.0	2.3	2.2	2.2
30	8.6	16.6	9.2	3.6	2.4	2.2	2.2
31	8.0	-	10.6	-	2.5	2.2	-
Total	*126.2	345.4	356.0	251.8	83.9	74.0	68.9
Mean	* 10.5	11.5	11.5	8.4	2.7	2.4	2.3
Runoff in A.F.	*250	684	706	500	166	147	136

Total runoff of 197 day period was 2590 acre-feet.
* 12 day period.

TABLE 4

Daily Discharge in Cubic Feet per Second
SOLDIER CREEK ABOVE DIVERSIONS
March 19 to September 30, 1947

Day	March	April	May	June	July	August	September
1		14.8	32.8	22.2	10.3	6.0	2.0
2		14.1	33.1	22.2	10.3	5.7	1.8
3		12.7	32.8	10.2	9.4	5.7	1.6
4		11.3	27.0	18.0	9.4	5.7	1.6
5		11.0	23.0	13.0	9.0	4.4	1.6
6		10.8	23.6	13.0	8.7	4.4	1.6
7		10.6	21.1	13.0	8.7	4.4	4.8
8		13.0	33.1	19.5	8.4	4.1	2.6
9		13.2	24.9	20.8	8.4	4.1	2.4
10		14.8	19.0	18.0	8.0	4.1	2.2
11		15.7	16.5	16.0	8.0	3.8	2.0
12		18.6	16.0	14.1	8.0	3.8	2.0
13		26.8	15.6	14.1	7.7	3.8	2.0
14		32.8	15.0	13.0	7.7	3.8	1.8
15		33.6	15.0	13.0	7.7	3.8	1.8
16		32.8	15.0	14.1	7.4	3.5	1.8
17		32.3	13.0	13.0	7.4	3.5	1.7
18		33.2	12.0	12.2	7.4	3.5	1.7
19	22.1	30.0	11.4	12.0	7.0	3.5	1.7
20	22.1	28.5	10.8	11.5	7.0	3.5	1.7
21	22.1	24.8	10.8	11.3	7.0	3.1	1.7
22	31.7	26.6	10.6	11.3	7.0	3.1	1.7
23	23.2	28.5	10.6	11.1	7.0	2.7	1.7
24	22.1	32.3	10.6	10.4	6.7	2.7	1.7
25	21.1	30.0	10.1	10.4	6.7	2.7	1.7
26	21.1	32.6	13.0	10.4	6.7	2.4	1.7
27	15.7	33.0	13.2	10.6	6.4	2.4	1.7
28	14.8	30.0	11.4	10.3	6.4	2.1	1.7
29	16.0	32.6	9.1	10.3	6.4	2.1	1.7
30	15.2	33.2	13.7	10.3	6.4	2.1	1.7
31	14.8	-	24.9	-	6.0	2.1	-
Total	*262.0	714.2	548.7	409.3	238.6	112.6	57.4
Mean	* 20.1	23.8	17.7	13.6	7.7	3.6	1.9
Runoff in A.F.	*520	1416	1089	811	474	224	113

Total run-off of 196 day period was 4650 acre-feet.

* 13 day period.

TABLE 5

Daily Discharge in Cubic Feet Per Second
PINE CREEK ABOVE DIVERSIONS
March 19 to May 12, 1947

Day	March	April	May	June	July	August	September
1		3.7	4.3				
2		3.4	4.3				
3		3.4	4.3				
4		5.3	3.9				
5		5.7	3.3				
6		5.3	3.1				
7		5.7	3.1				
8		6.2	2.9				
9		6.5	2.9				
10		7.5	2.7				
11		8.1	2.3				
12		8.7	2.1				
13		10.2					
14		11.9					
15		12.8					
16		12 .4					
17		12.2					
18		9.1					
19	9.1	8.5					
20	8.5	8.5					
21	7.7	7.0					
22	10.2	5.8					
23	9.9	6.4					
24	10.2	6.0					
25	9.7	5.9					
26	8.5	6.0					
27	7.5	5.2					
28	6.2	4.8					
29	5.7	4.8					
30	5.3	4.7					
31	5.3	-					
Total	*103.8	211.7	**39.2				
Mean	* 8.0	7.1	** 3.3				
RUN-OFF in A.F.	* 206	420	** 77				

Total run-off of 55 day period was 700 acre-feet.
**12 day period.

TABLE 6

Daily Discharge in Cubic Feet Per Second
CEDAR CREEK ABOVE DIVERSIONS
March 19 to September 30, 1947

Day	March	April	May	June	July	August	September
1		6.4	7.3	4.6	2.8	1.6	0.7
2		6.4	7.3	3.8	2.8	1.4	.7
3		6.0	7.0	3.8	2.8	1.4	.7
4		6.0	6.8	4.0	2.6	1.4	.7
5		6.0	6.6	4.1	2.6	1.2	.7
6		6.1	6.4	4.1	2.5	1.2	.7
7		6.0	6.1	4.5	2.5	1.0	2.3
8		6.1	6.8	6.6	2.5	1.0	1.6
9		6.4	6.8	7.8	2.3	1.0	1.0
10		7.3	6.1	5.5	2.3	1.0	.7
11		6.8	5.8	5.2	2.1	.9	.7
12		7.0	5.4	4.0	2.1	.9	.7
13		7.5	4.8	3.7	1.9	.8	.6
14		7.8	4.6	3.7	1.9	.8	.6
15		9.8	4.3	3.6	1.9	.9	.6
16		10.5	4.3	4.0	2.0	.9	.6
17		11.2	4.1	4.0	2.1	.9	.6
18		10.5	4.3	3.7	2.1	.8	.6
19	7.5	10.5	4.3	3.7	2.1	.8	.6
20	7.3	10.2	4.3	3.7	2.1	.8	.6
21	7.3	9.8	3.7	3.7	1.9	.8	.6
22	10.2	9.2	3.7	3.6	1.9	.8	.6
23	8.3	8.0	3.6	3.6	1.9	.7	.6
24	8.3	7.3	3.6	3.3	1.9	.7	.6
25	7.5	6.4	3.6	3.3	1.9	.7	.6
26	7.0	6.6	3.5	3.3	1.8	.7	.6
27	6.8	7.0	4.5	3.3	1.7	.7	.6
28	6.6	7.3	4.5	3.1	1.6	.7	.6
29	6.6	7.5	3.6	3.1	1.6	.7	.6
30	6.6	7.5	4.3	3.1	1.6	.7	.6
31	6.8	-	5.5	-	1.6	.7	-
Total	* 96.8	231.1	157.5	121.5	65.4	28.6	22.0
Mean	* 7.4	7.7	5.1	4.1	2.1	.9	.7
Runoff in A.F.	* 192	458	311	240	129	56	44

Total runoff of 196 day period was 1430 acre-feet

* 13 day period.

TABLE 7

Daily Discharge in Cubic Feet Per Second
NORTH DEEP CREEK ABOVE DIVERSIONS
March 19 to September 30, 1947

Day	March	April	May	June	July	August	September
1		5.9	7.6	3.6	1.8	0.7	0.6
2		5.3	6.2	3.6	1.8	.9	.6
3		5.3	5.9	3.4	1.6	.9	.6
4		4.6	5.6	3.4	1.6	.9	.6
5		4.6	5.6	3.6	1.4	.8	.6
6		4.6	6.2	4.0	1.4	.7	.6
7		4.4	5.6	4.2	1.2	.7	2.0
8		4.4	5.3	4.2	1.2	.7	1.6
9		5.6	6.2	5.9	1.0	.7	.8
10		6.5	5.3	5.0	1.0	.5	.6
11		8.9	4.8	5.0	1.0	.8	.6
12		9.3	4.8	4.2	1.0	.8	.6
13		10.4	4.8	3.6	1.0	.8	.6
14		11.0	4.0	3.2	.9	.7	.6
15		12.5	3.8	3.6	.9	.8	.6
16		12.5	3.6	4.8	.8	.8	.6
17		16.0	3.6	3.6	.8	.7	.6
18		15.0	3.6	3.2	.8	.6	.6
19	6.8	12.5	3.6	3.0	.8	.6	.8
20	6.2	12.5	3.4	2.8	1.0	.5	.8
21	5.9	11.0	3.4	2.8	.9	.5	.8
22	10.4	9.3	3.6	2.6	.8	.4	.8
23	9.9	9.3	3.4	2.4	.8	.4	.8
24	8.9	9.3	3.4	2.0	.8	.4	.8
25	8.0	8.9	3.2	2.0	.8	.4	.8
26	7.6	9.3	3.2	1.8	.8	.4	.8
27	7.2	10.4	4.0	1.6	.8	.4	.8
28	6.5	9.9	3.8	1.6	.7	.4	.8
29	6.2	10.4	3.6	1.6	.7	.4	.8
30	6.5	9.9	3.6	1.6	.7	.6	.8
31	6.5	-	3.6	-	.7	.6	-
Total*	96.6	269.5	138.3	97.9	31.5	19.5	23.0
Mean*	7.4	9.0	4.5	3.3	1.0	.6	.8
Runoff in A.F.*	192	534	274	194	62	39	46

Total run-off of 196 day period was 1340 acre-feet.
*13 day period.

TABLE 8

Daily Discharge in Cubic Feet Per Second
SOUTH DEEP CREEK BELOW ESPIL DITCH
March 19 to September 30, 1947

Day	March	April	May	June	July	August	September
1		9.0	8.7	4.6	2.7	1.5	1.3
2		8.2	8.2	3.3	2.5	1.5	1.3
3		7.7	7.7	3.3	2.5	1.5	1.3
4		7.4	7.4	3.3	2.4	1.5	1.3
5		6.8	7.4	6.2	2.4	1.5	1.3
6		6.8	5.7	7.7	2.3	1.4	1.3
7		6.5	5.4	4.2	2.3	1.4	3.2
8		7.9	5.4	10.5	2.3	1.4	1.8
9		8.7	6.2	15.6	2.1	1.3	1.3
10		8.5	4.6	7.9	2.1	1.3	1.5
11		8.5	4.0	7.0	2.1	1.6	1.5
12		10.0	3.9	5.1	2.1	1.6	1.5
13		11.1	3.8	5.4	2.1	1.6	1.5
14		13.3	3.7	5.0	2.1	1.6	1.5
15		15.1	3.7	4.6	2.1	1.6	1.5
16		15.1	3.4	5.7	1.9	1.5	1.5
17		15.1	3.4	4.6	1.8	1.4	1.5
18		15.1	3.3	3.8	1.7	1.4	1.5
19	10.0	13.9	3.3	3.8	1.7	1.4	1.5
20	9.0	13.6	3.3	3.7	1.7	1.4	1.5
21	8.7	13.3	3.2	3.5	1.7	1.5	1.3
22	13.0	13.3	3.1	3.5	1.9	1.5	1.3
23	11.1	9.0	3.1	3.4	1.9	1.5	1.3
24	11.8	8.7	3.1	3.4	1.7	1.4	1.3
25	10.2	8.7	2.8	3.3	1.7	1.4	1.3
26	10.2	8.7	2.9	3.3	1.7	1.3	1.3
27	9.4	8.7	3.7	3.2	1.7	1.3	1.3
28	9.0	8.7	3.5	3.2	1.7	1.3	1.3
29	9.4	8.7	2.9	3.2	1.7	1.3	1.3
30	9.0	8.5	3.3	2.8	1.7	1.3	1.3
31	9.0	-	3.8	-	1.7	1.3	-
Total	*129.8	304.6	138.0	148.1	62.0	44.5	43.6
Mean	*10.0	10.2	4.4	4.9	2.0	1.4	1.5
Runoff in A.F.	*257	604	274	294	123	88	86

Total run-off of 196 day period was 1730 acre-feet.

*13 day period.

TABLE 9

Daily Discharge in Cubic Feet Per Second
NORTH AND SOUTH DEEP CREEK ABOVE DIVERSIONS
March 19 to September 30, 1947

Day	March	April	May	June	July	August	September
1		14.9	16.3	8.2	4.5	2.2	1.9
2		13.5	14.4	6.9	4.3	2.4	1.9
3		13.0	13.6	6.7	4.1	2.4	1.9
4		12.0	13.0	6.7	4.0	2.4	1.9
5		11.4	13.0	9.8	3.8	2.3	1.9
6		11.4	11.9	11.7	3.7	2.1	1.9
7		10.9	11.0	8.4	3.5	2.1	5.2
8		12.3	10.7	14.7	3.5	2.1	3.4
9		14.3	12.4	21.5	3.1	2.0	2.1
10		15.0	9.9	12.9	3.1	1.8	2.1
11		17.4	8.8	13.0	3.1	2.4	2.1
12		19.3	8.7	9.3	3.1	2.4	2.1
13		21.5	8.6	9.0	3.1	2.4	2.1
14		24.3	7.7	8.2	3.0	2.3	2.1
15		27.6	7.5	8.2	3.0	2.4	2.1
16		27.6	7.0	10.5	2.7	2.3	2.1
17		31.1	7.0	8.2	2.6	2.1	2.1
18		30.1	6.9	7.0	2.5	2.0	2.1
19	16.8	26.4	6.9	6.8	2.5	2.0	2.3
20	15.2	26.1	6.7	6.5	2.7	1.9	2.3
21	14.6	24.3	6.6	6.3	2.6	2.0	2.1
22	23.4	22.6	6.7	6.1	2.7	1.9	2.1
23	21.0	18.3	6.5	5.8	2.7	1.9	2.1
24	20.7	18.0	6.5	5.4	2.5	1.8	2.1
25	18.2	17.6	6.1	5.3	2.5	1.8	2.1
26	17.8	18.0	6.1	5.1	2.5	1.7	2.1
27	16.6	19.1	7.7	4.8	2.5	1.7	2.1
28	15.5	18.6	7.3	4.8	2.4	1.7	2.1
29	15.6	19.1	6.5	4.8	2.4	1.7	2.1
30	15.5	18.4	6.9	4.4	2.4	1.9	2.1
31	15.5	-	7.4	-	2.4	1.9	-
Total	*226.4	574.1	276.3	246.0	93.5	64.0	66.6
Mean	*17.4	19.1	8.9	8.2	3.0	2.1	2.2
Runoff in A.F.	*449	1138	548	488	185	127	132

Total run-off of 196 day period was 3070 acre-feet.

*13 day period.

TABLE 10

Daily Discharge in Cubic Feet Per Second
OWL CREEK BELOW ALLEN ARRECHE DITCH
April 1 to September 30, 1947

Day	March	April	May	June	July	August	September
1		16.3	46.1	26.4	6.2	1.0	0.9
2		15.0	42.6	28.2	6.8	.9	.9
3		15.2	41.0	26.6	5.6	1.0	.9
4		14.6	40.0	28.2	6.4	1.0	.9
5		12.4	36.2	32.6	6.2	1.0	.9
6		12.9	34.1	28.6	5.9	.8	.9
7		12.6	30.6	26.4	5.6	.8	2.1
8		13.5	36.8	29.8	5.4	1.0	1.6
9		13.7	32.2	27.6	5.4	1.0	1.0
10		15.2	31.0	27.0	4.2	1.0	.9
11		17.9	29.2	28.2	4.6	1.0	.9
12		19.7	28.0	24.0	4.2	.7	.9
13		22.1	29.2	18.6	3.8	.9	.9
14		24.2	28.2	19.2	3.6	1.4	.9
15		28.8	26.0	16.0	3.2	1.0	.9
16		36.2	30.2	12.4	3.0	1.0	.9
17		22.0	32.8	11.6	3.0	1.0	.9
18		12.8	42.4	11.0	3.0	1.0	.7
19		10.6	42.1	10.4	3.0	1.0	.7
20		9.7	46.9	10.6	3.2	1.0	.7
21		13.2	41.0	11.0	2.8	1.0	.7
22		12.1	42.6	9.6	2.8	.9	.7
23		14.6	40.0	9.2	2.8	.9	.7
24		14.8	42.0	8.0	2.6	.9	.7
25		15.2	43.6	8.0	2.8	.9	.7
26		16.8	44.8	8.0	2.4	.9	.7
27		15.2	46.0	7.6	2.4	.9	.7
28		13.5	45.2	7.4	2.0	.9	.7
29		28.8	40.6	7.0	1.9	.9	.7
30		42.0	38.6	7.0	1.6	.9	.7
31		–	36.2	–	1.5	.9	–
Total		531.6	1166.2	526.2	117.9	29.5	26.4
Mean		17.7	37.6	17.5	3.8	1.0	.9
Runoff in A.F.		1054	2313	1043	234	58	52

Total run-off of 183 day period was 4750 acre-feet.

TABLE 11
Daily Discharge in Cubic Feet Per Second
RADER CREEK ABOVE PARSHALL FLUME DIVISION STRUCTURE
April 1 to September 30, 1947

Day	March	April,	May	June	July	August	September
1		2.8	16.6	16.0	8.8	2.4	1.0
2		2.4	22.4	14.6	8.8	2.4	.8
3		2.4	24.6	14.8	8.6	2.2	.8
4		2.6	26.8	15.6	8.2	2.2	.8
5		2.4	27.2	20.6	7.8	1.8	.6
6		2.2	27.0	18.2	7.2	1.8	.6
7		2.4	28.2	20.8	7.0	1.6	2.4
8		2.4	29.3	25.0	7.0	1.6	1.2
9		2.6	27.2	20.2	7.2	1.6	1.0
10		2.6	26.8	19.6	6.8	1.6	.8
11		3.2	23.4	16.8	6.6	1.4	.8
12		3.6	19.6	15.0	6.6	1.4	.8
13		3.6	16.2	14.2	6.2	1.4	.8
14		3.6	13.8	12.8	6.0	1.2	.6
15		3.8	12.4	12.4	5.8	1.2	.6
16		4.4	15.0	17.2	6.0	1.2	.6
17		5.2	15.6	16.0	5.8	1.2	.6
18		5.8	14.8	14.8	5.6	1.2	.6
19		5.8	15.4	13.6	5.2	1.2	.6
20		6.6	15.4	12.0	5.2	1.4	.6
21		7.4	16.2	10.2	4.8	1.4	.6
22		7.8	15.8	9.8	4.6	1.2	.6
23		7.8	14.6	9.8	4.6	1.2	.6
24		8.2	14.2	9.6	4.0	1.2	.6
25		8.2	14.6	9.6	3.8	1.0	.6
26		9.6	15.0	8.8	3.4	1.2	.6
27		9.4	15.6	8.8	3.4	1.0	.6
28		9.8	14.0	9.0	3.0	1.0	.6
29		9.8	14.2	9.0	2.8	1.0	.6
30		10.0	18.8	9.2	2.6	1.0	.6
31		-	17.2	-	2.4	1.0	-
Total		158.4	587.9	424.0	175.8	44.2	22.6
Mean		5.3	19.0	14.1	5.7	1.4	.8
Runoff in A.F.		314	1166	841	349	88	45

Total run-off of 183 day period was 2800 acre-feet.

TABLE 12
Daily Discharge in Cubic Feet Per Second
RADER CREEK ABOVE DIVERSIONS
April 1 to September 30, 1947

Day	March	April	May	June	July	August	September
1		3.3	17.1	18.8	10.6	2.9	1.2
2		2.9	22.9	17.2	10.6	2.9	1.0
3		2.9	25.1	17.4	10.5	2.4	1.0
4		3.1	27.3	18.3	9.9	2.4	1.0
5		2.9	27.7	24.1	9.4	2.0	1.8
6		2.7	27.5	21.3	8.7	2.0	.8
7		2.9	28.7	24.3	8.5	1.8	2.6
8		2.9	29.8	29.1	8.5	1.8	1.4
9		3.1	27.7	23.6	8.7	1.8	1.2
10		3.1	27.3	22.9	8.3	1.8	1.0
11		3.7	23.9	19.7	8.0	1.6	1.0
12		4.1	20.1	17.6	8.0	1.6	1.0
13		4.1	16.7	16.7	7.6	1.6	1.0
14		4.1	14.3	15.1	7.4	1.4	.8
15		4.3	12.9	14.7	7.1	1.4	.8
16		4.9	15.5	20.2	7.4	1.4	.8
17		5.7	16.1	18.8	7.1	1.4	.8
18		6.3	15.3	17.4	6.9	1.4	.8
19		6.3	15.9	16.0	6.4	1.4	.8
20		7.1	18.2	14.2	6.4	1.6	.8
21		7.9	19.0	12.2	6.0	1.6	.8
22		8.3	18.6	11.7	5.8	1.4	.8
23		8.3	17.2	11.7	5.8	1.4	.8
24		8.7	16.7	11.5	5.1	1.4	.8
25		8.7	17.2	11.5	4.3	1.2	.8
26		10.1	17.6	10.6	3.9	1.4	.8
27		9.9	18.3	10.6	3.9	1.2	.8
28		10.3	16.5	10.8	3.5	1.2	.8
29		10.3	16.7	10.8	3.3	1.2	.8
30		10.5	22.0	11.0	3.1	1.2	.8
31		-	20.2	-	2.9	1.2	-
Total		173.4	630.0	499.8	213.6	51.0	29.6
Mean		5.8	20.3	16.6	6.9	1.6	1.0
Runoff in A.F.		344	1249	991	424	101	59

Total run-off of 183 day period was 3170 acre-feet.

TABLE 13
Daily Discharge in Cubic Feet Per Second
EAGLE CREEK ONE-HALF MILE BELOW MOUTH OF CANYON
April 1 to September 30, 1947

Day	March	April	May	June	July	August	September
1		2.0	16.2	16.2	8.8	5.6	3.4
2		2.1	24.6	14.0	8.6	5.4	3.2
3		2.1	28.0	15.2	8.0	5.4	3.2
4		2.2	29.2	15.8	8.0	5.4	3.0
5		2.1	26.4	22.6	7.8	5.0	3.0
6		2.4	28.4	19.4	7.8	5.0	3.0
7		2.4	29.6	21.4	8.0	4.6	5.4
8		2.4	30.0	26.8	8.0	4.6	4.0
9		2.4	29.8	22.6	7.8	4.2	3.2
10		2.5	26.2	18.4	7.6	4.0	3.0
11		2.8	24.2	16.2	7.6	3.8	3.0
12		2.8	21.0	14.0	7.6	3.8	3.0
13		3.0	17.6	13.6	7.4	3.8	3.0
14		3.0	14.5	12.0	7.6	3.8	3.0
15		4.2	14.0	12.0	7.6	3.8	3.0
16		4.8	16.8	18.6	7.2	3.8	2.8
17		6.1	16.6	16.2	6.0	3.8	2.8
18		6.6	15.4	15.1	6.0	3.8	2.8
19		7.2	16.2	14.8	6.0	3.6	2.8
20		7.8	15.4	12.2	6.2	3.6	2.8
21		8.2	16.0	10.1	6.0	3.8	2.8
22		8.6	15.6	9.9	6.0	3.8	2.8
23		8.6	14.2	9.8	6.0	3.8	2.8
24		8.2	14.0	9.8	5.8	3.8	2.8
25		8.2	14.8	9.8	5.8	3.8	2.8
26		8.4	14.6	8.6	5.8	3.6	2.8
27		8.6	15.0	9.0	5.8	3.6	2.8
28		8.9	14.6	8.8	5.6	3.4	2.8
29		9.2	14.6	9.0	5.6	3.4	2.8
30		9.6	21.6	9.2	5.6	3.4	2.8
31		-	19.4	-	5.6	3.4	-
Total		157.4	614.5	431.1	213.2	126.6	91.4
Mean		5.2	19.8	14.3	6.9	4.1	3.0
Runoff in A.F.		312	1218	855	422	252	180

Total run-off of 183 day period was 3240 acre-feet.

TABLE 14
Daily Discharge in Cubic Feet Per Second
EAGLE CREEK ABOVE DIVERSIONS
April 1 to September 30, 1947

Day	March	April	May	June	July	August	September
1		2.5	16.7	16.7	9.4	6.2	3.9
2		2.6	25.1	14.5	9.2	6.0	3.7
3		2.6	28.5	15.7	8.6	6.0	3.7
4		2.7	29.7	16.3	8.6	6.0	3.5
5		2.6	26.9	23.1	8.4	5.6	3.5
6		2.9	28.9	19.9	8.4	5.6	3.5
7		2.9	30.1	21.9	8.6	5.2	5.9
8		2.9	30.5	27.3	8.6	5.2	4.5
9		2.9	30.3	23.1	8.4	4.8	3.7
10		3.0	26.7	18.9	8.2	4.6	3.5
11		3.3	24.7	16.7	8.2	4.4	3.5
12		3.3	21.5	14.5	8.2	4.4	3.5
13		3.5	18.1	14.1	8.0	4.4	3.5
14		3.5	15.0	12.5	8.2	4.4	3.5
15		4.7	14.5	12.5	8.2	4.4	3.5
16		5.3	17.3	19.1	7.8	4.4	3.3
17		6.6	17.1	16.7	6.6	4.4	3.3
18		7.1	15.9	15.6	6.6	4.4	3.3
19		7.7	16.7	15.3	6.6	4.2	3.3
20		8.3	15.9	12.7	6.8	4.2	3.3
21		8.7	16.5	10.6	6.6	4.3	3.3
22		9.1	16.1	10.4	6.6	4.3	3.3
23		9.1	14.7	10.3	6.6	4.3	3.3
24		8.7	14.5	10.4	6.4	4.3	3.3
25		8.7	15.3	10.4	6.4	4.3	3.3
26		8.9	15.1	9.2	6.4	4.1	3.3
27		9.1	15.5	9.6	6.4	4.1	3.3
28		9.4	15.1	9.4	6.2	3.9	3.3
29		9.7	15.1	9.6	6.2	3.9	3.3
30		10.1	22.1	9.8	6.2	3.9	3.3
31		-	19.9	-	6.2	3.9	-
Total		172.4	630.0	446.8	231.8	144.1	106.4
Mean		5.7	20.3	14.9	7.5	4.6	3.5
Runoff in A.F.		341	1249	886	460	286	210

Total run-off of 183 day period was 3430 acre-feet.

TABLE 15
Daily Discharge in Cubic Feet Per Second
EMERSON CREEK ABOVE DIVERSIONS
March 22 to September 30, 1947

Day	March	April	May	June	July	August	September
1		6.0	15.0	5.6	3.4	2.0	1.8
2		6.0	16.4	5.7	2.8	2.0	1.8
3		6.2	16.0	5.7	3.0	2.0	1.8
4		6.0	15.2	5.7	3.0	2.0	1.8
5		6.0	13.4	6.6	2.6	2.0	1.8
6		5.8	13.6	6.8	2.6	2.0	1.8
7		5.4	13.2	7.2	2.6	2.0	3.6
8		5.4	13.5	7.8	2.6	1.8	2.2
9		5.4	13.0	8.6	2.6	1.8	2.0
10		5.6	11.6	9.2	2.4	1.8	1.8
11		5.6	10.0	10.5	2.4	1.8	1.8
12		5.8	9.6	10.8	2.4	1.8	1.8
13		6.0	8.4	9.6	2.4	1.8	1.8
14		6.6	8.0	8.4	2.4	1.8	1.8
15		6.6	7.8	8.2	2.0	1.8	1.8
16		7.2	7.8	7.6	2.0	1.8	1.8
17		7.8	7.6	7.4	2.0	1.8	1.8
18		7.8	7.1	7.2	2.1	1.8	1.8
19		7.6	7.1	7.0	2.1	1.8	1.8
20		8.2	6.8	6.6	2.0	1.8	1.8
21		9.0	6.2	6.2	2.0	1.8	1.8
22	9.5	9.6	5.6	6.0	2.0	1.8	1.8
23	9.2	9.8	5.3	5.6	2.1	1.8	1.8
24	7.5	10.4	5.3	5.0	1.8	1.8	1.8
25	7.2	10.0	5.3	4.4	1.8	1.8	1.8
26	7.2	10.8	5.1	4.2	1.8	1.8	1.8
27	7.2	10.8	5.1	4.0	2.0	1.8	1.8
28	7.0	10.6	5.4	3.9	2.0	1.8	1.8
29	6.8	12.2	5.6	3.8	1.8	1.8	1.8
30	6.6	13.6	5.8	3.7	1.8	1.8	1.8
31	6.2	-	5.4	-	1.8	1.8	-
Total	* 74.4	233.8	281.2	199.0	70.3	57.2	56.4
Mean	* 7.4	7.8	9.1	6.6	2.3	1.8	1.9
Runoff in A.F.	* 147	464	557	395	139	113	111

Total run-off of 193 day period was 1930 acre-feet.