STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

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EARL WARREN, Governor

C. H. PURCELL, Director of Public Works

A. D. EDMONSTON, State Engineer

REPORT ON WATERMASTER SERVICE

IN

BUTTE CREEK WATERMASTER SERVICE AREA
Butte County, California

1949 SEASON

Sacramento, California

SUBMISSION TO, AND ADOPTION BY
DEPARTMENT OF PUBLIC WORKS

I, L. C. Jopson, Supervising Hydraulic Engineer, Division of Water Resources, Department of Public Works of the State of California, hereby submit the within contained report entitled "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1949 Season."

/s/ L. C. JOPSON
Supervising Hydraulic Engineer

I, Gordon Zander, Principal Hydraulic Engineer, Division of Water Resources, Department of Public Works of the State of California, hereby approve the within contained report entitled "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1949 Season."

/s/ GORDON ZANDER
Principal Hydraulic Engineer

I, A. D. Edmonston, State Engineer and Chief of the Division of Water Resources, Department of Public Works of the State of California, hereby approve and adopt the within contained report entitled "Report on Watermaster Service in Butte Creek Watermaster Service Area, Butte County, California, 1949 Season," as a report of the Department of Public Works.

WITNESS my hand and the seal of the Department of Public Works of the State of California, this 24th day of March, 1950.

DEPARTMENT OF PUBLIC WORKS

By /s/ A. D. EDMONSTON
A. D. EDMONSTON
State Engineer

SEAL

ORGANIZATION

C. H. Purcell . . . . . Director of Public Works

A. D. Edmonston . . . . . State Engineer

P. H. Van Etten . . . . . Assistant State Engineer

Gordon Zander . . . Principal Hydraulic Engineer

This report is

by

L. C. JOPSON
Supervising Hydraulic Engineer

Watermaster:

Jean H. Jaquith
Junior Civil Engineer

T. R. MERRYWEATHER
Administrative Assistant

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INTRODUCTION

The Butte Creek Watermaster Service Area was created by order of the Department of Public Works, dated January 7, 1943, pursuant to the provisions of the Water Code. Upon petition by the water right owners, watermaster service was initiated in 1943 and has been provided each season from 1943 through 1949.

In 1949, water supply conditions made it necessary to begin watermaster service shortly after May 15 with active regulation starting May 28. The service was terminated for the season on September 27.

Regulation was under the immediate direction of L. C. Jopson, Supervising Hydraulic Engineer with Jean H. Jaquith, Junior Civil Engineer acting was watermaster.

A further hearing on the "Order to Show Cause", issued by the Superior Court, Butte County in re Butte Creek on November 5, 1947, was held on November 9 and 10, 1948 for the Department to report on the results of watermaster service during the 1948 season. Also further evidence was submitted as to past methods of use of the foreign water and natural flow in the creek. Subsequent to the hearing, the court, on May 10, 1949 issued a "Memorandum and Order" directing the watermaster to deliver the full natural flow entitlement of the users below the Parrott Ditch past the Parrott Dam without undue fluctuation from the fluctuating flow of foreign water in the stream. The Court further ordered the watermaster to amplify the service to permit as little as possible of the foreign water to pass the Parrott Dam. Continuing jurisdication was retained to permit additional orders to be issued upon proper representation to the Court.

WATER SUPPLY

Precipitation

Precipitation records collected by the U. S. Weather Bureau are presented at the end of this report as Table 1. The total precipitation for the season was 76.2 per cent of the seventy-nine year mean. Approximately one-third the season's precipitation occurred during the month of March with substantially less than normal rainfall occurring during January and February.

Stream Flow

Water supply and diversion records were collected at six stations equipped with water stage recorders in 1949. The location of the stations and their purposes are as follows:

Butte Creek U.S.G.S. Station below Covered Bridge

This station located below the confluence of Butte Creek and Little Butte Creek is used to measure the combined foreign water and natural flow which is available at the Parrott Dam located 2½ miles downstream.

The discharge at the station is comprised of natural flow without regulation and foreign water after regulation by the Pacific Gas and Electric Company to meet power demands. The daily mean discharge for the period of watermaster service in 1949 is set forth in Table 2. The daily mean flow from July 1 to September 30 is shown graphically by the uppermost heavy line of the hydrograph presented on Plate 1.

Hendricks Canal

This station is located a short distance above the confluence of the Hendricks Canal with the Butte Creek Canal. The entire flow in the canal consists of foreign water from the West Branch of Feather River which is commingled with Butte Creek water in De Sabla Reservoir for use in generating hydroelectric

power at the De Sabla and Centerville power plants of the Pacific Gas and Electric Company. The daily mean discharge for the period from May 26 to September 27, inclusive, is tabulated in Table 3.

Parrott Ditch

This station is located near the head of the Parrott Ditch, above the Crouch and Hale takeouts. It gives a record of the amount of water diverted for the use of the Parrott, M. & T., Dayton Mutual Water Company and Miller (Hale) interests. The mean daily discharge for the period from May 27 to September 27, inclusive, is tabulated in Table 4. Hydrographs of daily mean, daily maximum and daily minimum flow with total and natural flow entitlements are shown graphically on Plate II.

Butte Creek below Parrott Dam

The flow at this station, located immediately below the Parrott Dam, is the water supply available for filling the natural flow rights on Butte Creek below Parrott Dam. The mean daily discharge for the period from May 27 to September 27, inclusive, is tabulated in Table 5.

Hydrographs of daily mean and daily minimum flow with the natural flow entitlement below this station are shown graphically on Plate I.

Upper Colony Ditch

The flow at this station, located near the head of the ditch, is a portion of the water diverted by the Durham Mutual Water Company. The daily mean discharge for the period from May 24 to September 27, inclusive, is tabulated in Table 6.

Butte Creek above Lower Colony Dam

The flow at this station, located above the backwater of the Lower Colony Dam and below the Baxter pump, is the water supply available for diversion through the Lower Colony Ditch during the periods of no spill past the dam. The daily mean discharge for the period from June 1 to September 26, inclusive, is tabulated in Table 7. As some water was spilled past the Lower Colony Dam during a portion of the season, the flow through the Lower Colony Ditch has been estimated and is set forth in Table 8.

Table 9 is a combination of Tables 6 and 7 and sets forth the combined flow of the Upper Colony Ditch and Butte Creek above Lower Colony Dam. Table 10 is a combination of Tables 6 and 8 and sets forth the water diverted by the Durham Mutual Water Company.

Hydrographs of the daily mean and daily minimum combined flow of Upper Colony Ditch and Butte Creek above Lower Colony Dam and of the combined flow of the Upper Colony and Lower Colony Ditches with entitlements thereon are shown graphically on Plate III.

DISTRIBUTION OF WATER

The distribution of water on Butte Creek was in accordance with the allotments, priorities and conditions set forth in the decree In Re Butte Creek, No. 18917, Superior Court, Butte County, entered November 6, 1942.

Distribution was based upon the water supply available at the U.S.G.S. gaging station. As the flow at the station comprised natural flow of Butte Creek and foreign water brought over from the West Branch of Feather River through the Hendricks Canal, each of which was distributed under conditions separate from the other, it was necessary to determine the amount of flow contributed from each source of supply.

Prior to about June 20, the flow of Butte Creek plus foreign water was large enough to supply near maximum capacity flow through the De Sabla power plant. Under this condition there was very little fluctuation of flow in Butte Creek due to the foreign water.

After June 20, the total water available at the De Sabla power plant was less than required for operation of the plant at peak load and it became necessary for the Pacific Gas and Electric Company to draw on their foreign water storage in De Sabla Reservoir during portions of the day to supply the power demand and then to decrease the draft through the plant to use only Butte Creek water while the reservoir was refilling. The result of this operation was an increasing fluctuation of flow in Butte Creek at the U.S.G.S. station as the discharge of the stream decreased.

As the flow at the U.S.G.S. station also varied from day to day depending upon the excess or deficiency of withdrawal over recharge in the De Sabla reservoir, it was necessary to average the daily flow of Butte

Creek at the U.S.G.S. station and the Hendricks Canal over seven day periods to determine a mean value of natural flow which would eliminate the storage factor. The period used extended from Monday through Sunday as it was found that the reservoir was more nearly completely recharged over Saturday and Sunday than at any other time during the week.

Entitlements of the Parrott Ditch, Butte Creek below the Parrott Ditch and the combined Upper Colony and Lower Colony Ditches to natural flow of Butte Creek and to foreign water are set forth in Table 11 and are plotted on the hydrographs presented in Plates I, II and III.

The U. S. Plant Garden, Van Nuys, Wakefield and Baxter pumps operated largely during the daylight hours throughout the peak of the season. The maximum capacity of these pumps is approximately 10 cubic feet per second with a maximum entitlement of 6.61 cubic feet per second. As the pumps were usually operated only seven or eight hours per day and averaged less than seven days per week no regulation of their diversion was attempted.

The Compton-Entler-Marybill Ditch diverted continuously throughout the season at something less than their full allotment of 10 cubic feet per second.

There was ample water to supply all rights on the stream system prior to about May 24, on which date the Adams dam was tightened cutting all but a small flow out of the creek. Regulation on May 25 made water available again for the Gorrill Ditch which continued to divert water for another ten days. Diversion was continued through the Adams Ditch until June 27 when the Lower Colony Ditch began taking the entire flow reaching its head. A portion of the water diverted by Adams in June was released to Gorrill through Hamlin Slough as long as Gorrill was entitled to water.

On June 28 the Lower Colony Ditch was opened to take the full flow of Butte Creek at that point as shown in Table 7 and continued to utilize all the flow available until July 29 when the Parrott and M. & T., ranches turned most of the foreign water, to which they were entitled, down the Creek to E. L. Adams. During the first three days of use by Adams a large portion of this water was taken through the Colony Ditches. Thereafter it was spilled down the creek and diverted through the Adams Ditch. This operation continued until August 20 when the foreign water was again diverted by the Parrott and M. & T. Ranches.

Subsequent to August 20, the entire flow of the Creek at the Lower Colony Dam was diverted by the Lower Colony Ditch.

As was done in 1948, the storage behind the Parrott, Upper Colony and Lower Colony Dams was utilized to iron out the fluctuations caused by the intermittent release of foreign water. The Parrott and Upper Colony Dams were raised several inches higher in 1949 than in 1948 to provide more water for release during the low discharge portions of the day.

The plan of operation followed was to fix openings through the storage dams and into the ditches that would allow the dams to fill during each period of maximum flow and not quite empty during the period of low flow. The respective size of the openings were fixed by the entitlements to which they released water. When the period between discharge and recharge of the basin was too long, it was necessary to decrease the size of openings into the outlet ditch and hold a minimum water level in the basin which would maintain a flow through the dam openings equal to the natural flow entitlements below. When this occurred water frequently spilled over the top of the dams during peak flow, especially at the Parrott Dam, resulting in an average delivery downstream in

excess of entitlements. This excess was greater in 1949 than in 1948.

Since the court has required that the watermaster regulate the water flowing in Butte Creek so that the owners of natural flow rights shall at all times have the full amount to which they are entitled the question of channel losses below the Parrott Dam appear to have become important. Direct measurement of channel losses on Butte Creek appear almost impossible due to the constant fluctuation of flow. The data set forth in Table 12 was compiled from the data on diversions and entitlements set forth in Tables 2 to 11. The difference between the means of the two right hand columns of Table 12 is a measure of the unaccounted for water which may be assumed as representing the channel loss between the U.S.G.S. station and Lower Colony Ditch.

SUMMARY

The available natural flow of Butte Creek was ample to fill all rights in Schedule 7 of the decree until about July 1, 1949. Prior to July 1, some water was diverted for use by the various surplus class rights with a complete supply available for all such rights prior to June 1. Subsequent to July 1, the available natural flow decreased until on July 7 only first priority rights were filled. Minimum flow occurred during the week following September 18, when water for only 67 per cent of first priority rights was available.

Foreign water delivered into the Butte Creek stream system from the West Branch of Feather River varied from a high of 58 cubic feet per second in June, when natural flow diversion was at its peak, to 24 cubic feet per second the latter part of September. The natural flow from the West Branch was supplemented with storage water from Philbrook and Round Valley Reservoirs beginning July 20 to raise the amount of foreign water from 26 cubic feet per second to about 50 cubic feet per second. This flow was maintained for about twenty days after which the storage supply began to fail and a gradual decrease in flow occurred to the late September minimum. Delivery of foreign water failed in whole or in part from June 15 to 22, inclusive, while the Hendricks Canal was being cleaned, on July 28 to 29 when a break occurred in the ditch, and from September 9 to 12, inclusive, when the water was used to supplement the supply in Magalia Reservoir.

Fluctuations in the flow of Butte Creek, caused by introduction of foreign water by the Pacific Gas and Electric Company to generate power were

minor prior to June 20. After June 20 the power company, by storage in and release from De Sabla Reservoir, utilized its foreign water to meet peak power demands with the result that the flow at the U.S.G.S. station varied greatly between "high" and "low" for each 24-hour period. The range of fluctuation for one such 24-hour period was from about 164 cubic feet per second for the "high" to 59 cubic feet per second for the "low".

Regulation of these fluctuations in flow was made, insofar as possible, by utilizing the storage in the basins above the Parrott and the two Colony dams. In 1949, the periods of "low" flow were of longer duration than in 1948, resulting in almost complete loss of storage above the Parrott Dam whenever an extensive recharge of De Sabla Reservoir occurred. Under this condition it was occasionally found necessary to regulate the Parrott Ditch to its natural flow allotment until the foreign water was again available at the dam. ~~used.~~ In the effort to maintain the downstream entitlements at all times, an average of 13.8 cubic feet per second of foreign water went past the Parrott Dam.

No attempt was made in 1949 to improve diversion and regulation facilities on the stream system beyond putting additional flashboards on the Parrott and Upper Colony Dams in an attempt to create more storage for smoothing out fluctuations. The results of the season's work indicate that additional diversion and distribution facilities are necessary to materially improve the distribution of the available water supply.

OWNERSHIP OF LANDS AND WATER RIGHTS WITHIN
THE BUTTE CREEK WATERMASTER SERVICE AREA

Change of Ownership

The changes in ownership of lands and water rights which have occurred subsequent to filing "Statement for Butte Creek Watermaster Service Area, County of Butte, California, for 1949", and which shall be included in the statement for said watermaster service area for 1950, are listed in the following tabulation:

Tract No.	Name of Water Right Owner Appearing in 1949 Statement	Name of Water Right Owner to Appear in 1950 Statement	Amount of Water c.f.s.
13-26	G. B. Leethem	Earl L. Harter and Margaret B. Harter	1.89
		M. J. Klausen and Hazel Klausen	1.22

TABLE 1

PRECIPITATION - CHICO, BUTTE COUNTY

Elevation 189 feet

Month	Mean Precipitation (79 year record) Inches	Precipitation 1948-49 Inches	1948-49 Per cent of Total Mean
October	1.27	0.33	1.4
November	2.69	1.33	5.5
December	4.53	4.73	19.3
January	4.86	.91	3.7
February	4.25	1.84	7.5
March	3.15	8.38	34.3
April	1.76	.00	.0
May	.99	.77	3.1
June	.41	.00	.0
July	.02	.01	.0
August	.02	.00	.0
September	.50	.33	1.4
Total	24.45	18.63	76.2

TABLE 2

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK AT U.S.G.S. STATION BELOW COVERED BRIDGE
JUNE 1 TO SEPTEMBER 30, 1949

Day	June	July	August	September
1	283	136	122	87
2	224	130	119	102
3	227	108	124	92
4	213	116	127	90
5	231	133	116	92
6	202	136	119	97
7	213	116	116	87
8	192	113	116	105
9	188	116	110	80
10	192	87	108	62
11	188	116	122	60
12	181	108	122	80
13	175	108	116	77
14	161	108	127	92
15	142	102	108	84
16	158	100	97	90
17	155	80	116	82
18	155	108	102	84
19	175	97	110	90
20	168	90	82	75
21	155	116	108	87
22	133	130	102	92
23	130	119	102	66
24	155	133	102	84
25	155	130	92	80
26	142	97	97	90
27	136	130	92	92
28	127	90	110	87
29	136	87	113	97
30	136	116	105	100
31		119	90	
Total	5,228	3,475	3,392	2,583
Mean	174	112	109	86.1
Runoff in Ac. Ft.	10,400	6,890	6,730	5,120

Total discharge 122 day period - 29,100 Ac. Ft.

TABLE 3

DAILY DISCHARGE IN CUBIC FEET PER SECOND
HENDRICKS CANAL

MAY 26 TO SEPTEMBER 27, 1949

Day	May	June	July	August	September
1		54	39	48	31
2		54	38	46	30
3		54	36	47	30
4		54	34	46	29
5		54	34	49	30
6		52	34	49	31
7		49	33	49	32
8	NO	47	33	48	33
9		48	31	48	22
10		50	31	48	4.2
11		50	30	48	1.8
12		50	29	48	11.5
13		49	28	46	27
14	RECORD	46	28	40	26
15		33	28	37	26
16		31	27	36	26
17		32	27	36	26
18		58	27	36	25
19		58	26	36	24
20		31	42	35	24
21		33	50	35	24
22		31	51	35	24
23		53	51	35	24
24		52	49	35	24
25		49	46	34	25
26	54	46	49	35	25
27	54	44	49	35	25
28	54	43	15.3	35	
29	54	43	29	36	NO
30	55	42	50	34	
31	54		50	31	RECORD
Total	*325	1,390	1,124.3	1,256	**660.5
Mean	* 54	46	36	41	** 24
Runoff in Ac.Ft.	*645	2,760	2,230	2,490	**1,310

* 6-Day Period
** 27-Day Period

Total discharge 125 day period - 9,440 Ac. Ft.

TABLE 4

DAILY DISCHARGE IN CUBIC FEET PER SECOND
PARROTT DITCH
MAY 27 TO SEPTEMBER 27, 1949

Day	May	June	July	August	September
1		88	52	23	27
2		80	52	20	27
3		81	47	20	27
4		82	43	20	25
5		85	43	20	24
6		77	42	19.7	23
7	NO	76	42	19.7	23
8		73	34	19.7	24
9		72	38	19.3	17.2
10		67	30	19.7	18.4
11		62	31	19.7	19.7
12	RECORD	63	37	19.7	18.7
13		63	37	19.3	23
14		63	38	19.3	26
15		40	38	18.4	25
16		40	34	23	28
17		42	29	23	30
18		45	19	18.4	31
19		48	30	23	30
20		51	26	34	32
21		53	37	29	34
220		49	45	33	33
23		48	48	36	30
24		52	48	34	25
25		54	52	31	22
26		51	48	31	30
27	102	57	44	31	34
28	94	54	44	29	
29	84	55	22	30	NO
30	90	54	21	28	RECORD
31	86		24	27	
Total	*456	1,825	1,175	757.9	707.0
Mean	* 91	61	38	24.4	26.2
Runoff in Ac. Ft.	*904	3,620	2,330	1,500	1,400

* 5-Day Period
** 27-Day Period
Total discharge 124 day period - 9,750 Ac. Ft.

TABLE 5

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK BELOW PARROTT DITCH
MAY 27 TO SEPTEMBER 27, 1949

Day	May	June	July	August	September
1		164	84	94	68
2	NO	131	80	92	70
3		135	72	92	76
4		124	72	97	66
5		129	88	92	72
6		113	92	92	78
7	RECORD	118	84	94	72
8		109	76	92	80
9		109	78	92	70
10		111	76	80	62
11		113	82	94	51
12		113	74	94	57
13		101	78	88	68
14		97	76	97	68
15		94	74	86	66
16		107	64	76	66
17		103	68	82	55
18		97	80	84	57
19		111	74	76	66
20		107	64	68	51
21		92	84	72	62
22		84	78	68	60
23		78	72	68	53
24		97	68	76	55
25		101	68	72	66
26		88	62	70	70
27	129	86	74	64	60
28	135	72	59	76	
29	145	76	62	84	NO
30	182	84	92	80	RECORD
31	157		92	64	
Total	* 748	3,144	2,347	2,566	**1,745
Mean	* 150	105	76	83	** 65
Runoff in Ac. Ft.	*1,480	6,240	4,660	5,090	**3,460

* 5-Day period
** 27-Day period

Total discharge 124 day period - 20,900 Ac. Ft.

TABLE 6

DAILY DISCHARGE IN CUBIC FEET PER SECOND
UPPER COLONY DITCH
MAY 24 TO SEPTEMBER 27, 1949

Day	May	June	July	August	September
1		57	32	34	27
2		55	32	28	27
3		56	32	28	28
4		54	31	27	27
5		55	34	27	28
6		54	35	27	28
7	NO	54	36	27	27
8		53	34	27	29
9		53	35	28	28
10		49	35	28	26
11		45	33	28	22
12		45	28	28	21
13	RECORD	43	30	28	26
14		43	30	28	26
15		41	32	27	26
16		44	28	27	27
17		43	27	26	24
18		43	27	27	23
19		44	32	27	25
20		43	31	26	23
21		41	40	26	23
22		40	39	26	23
23		37	38	26	24
24	58	41	37	27	21
25	60	41	36	27	26
26	61	39	32	27	27
27	61	38	26	26	26
28	62	31	27	28	
29	61	32	24	29	NO
30	59	34	43	28	RECORD
31	57		42	27	
Total	* 479	1,348	1,018	850	** 688
Mean	* 60	45	33	27	** 25
Runoff in Ac. Ft.	* 950	2,670	2,020	1,690	**1,360

* 8-Day Period
** 27-Day Period

Total discharge 127 day period - 8,690 Ac.Ft.

TABLE 7

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK ABOVE LOWER COLONY DAM
JUNE 1 TO SEPTEMBER 26, 1949

Day	June	July	August	September
1	62	28	30	19
2	47	26	31	19
3	45	27	31	23
4	40	22	32	20
5	41	21	33	20
6	33	26	31	23
7	34	23	34	21
8	31	21	33	23
9	33	21	32	23
10	33	25	33	20
11	38	19	31	18
12	37	20	31	18
13	32	20	31	24
14	30	23	34	23
15	28	23	29	23
16	39	20	26	23
17	27	23	21	20
18	29	22	26	20
19	34	24	23	21
20	33	18	22	20
21	26	20	20	20
22	26	21	20	20
23	22	21	18	22
24	28	20	20	19
25	32	19	21	22
26	28	20	21	23
27	27	20	21	
28	23	21	21	NO
29	24	14	26	
30	25	25	24	RECORD
31		30	22	
Total	987	683	827	* 547
Mean	38	22	27	* 21
Runoff in Ac. Ft.	1,960	1,360	1,640	*1,090

* 26 day period

Total discharge 118 day Period - 6,050 Ac. Ft.

TABLE 8

*DAILY DISCHARGE IN CUBIC FEET PER SECOND
LOWER DOLONY DITCH
JUNE 1 TO SEPTEMBER 26, 1949

Day	June	July	August	September
1	10	28	22	19
2	14	26	22	19
3	19	27	18	23
4	19	22	18	20
5	14	21	16	20
6	12	26	16	23
7	12	23	18	21
8	12	21	18	23
9	12	21	18	23
10	20	25	20	20
11	20	19	20	18
12	20	20	18	18
13	20	20	18	24
14	20	23	18	23
15	20	23	18	23
16	20	20	18	23
17	20	23	18	20
18	20	22	18	20
19	20	24	20	21
20	20	18	22	20
21	22	20	20	20
22	22	21	20	20
23	20	21	18	22
24	20	20	20	19
25	20	19	21	22
26	20	20	21	23
27	22	20	21	
28	23	21	20	NO
29	24	14	26	
30	25	25	24	RECORD
31		25	22	
Total	562	678	607	**547
Mean	19	22	20	** 21
Runoff in Ac. Ft.	1120	1340	1200	**1080

* Estimated
** 26 Day Period

Total Discharge 118 day period - 4740 Ac. Ft.

TABLE 9

COMBINED DAILY DISCHARGE IN CUBIC FEET PER SECOND
UPPER COLONY DITCH AT HEAD AND BUTTE CREEK
ABOVE LOWER COLONY DAM
JUNE 1 TO SEPTEMBER 26, 1949

Day	June	July	August	September
1	119	60	64	46
2	102	58	59	46
3	101	59	59	51
4	94	53	59	47
5	96	55	60	48
6	87	61	58	51
7	88	59	61	48
8	84	55	60	52
9	86	56	60	51
10	82	60	61	46
11	83	52	59	40
12	82	48	59	39
13	75	50	59	50
14	73	53	62	49
15	69	55	56	49
16	83	48	53	50
17	70	50	47	44
18	72	49	53	43
19	78	56	50	46
20	76	49	48	43
21	67	60	46	43
22	66	60	46	43
23	59	59	44	46
24	69	57	47	40
25	73	55	48	48
26	67	52	48	50
27	65	46	47	
28	54	48	48	NO
29	56	38	55	
30	59	68	52	RECORD
31		72	49	
Total	2335	1,701	1,677	1,209
Mean	77	54	54	46
Runoff in Ac. Ft.	4,630	3,370	3,330	2,400

Total discharge 118 day Period - 13,700 Ac. Ft.

TABLE 10

COMBINED DAILY DISCHARGE IN CUBIC FEET PER SECOND
OF UPPER AND LOWER COLONY DITCHES
JUNE 1 TO SEPTEMBER 26, 1949

Day	June	July	August	September
1	67	60	56	46
2	69	58	50	46
3	75	59	46	51
4	73	53	45	47
5	69	55	43	48
6	66	61	43	51
7	66	59	45	48
8	65	55	43	52
9	65	56	46	51
10	69	60	48	46
11	65	52	48	40
12	65	48	46	39
13	63	50	46	50
14	63	53	46	49
15	61	55	45	49
16	64	48	45	50
17	63	50	44	44
18	63	49	45	43
19	64	56	47	46
20	63	45	48	43
21	63	60	46	43
22	62	60	46	43
23	57	59	44	46
24	61	57	47	40
25	61	45	48	48
26	59	52	48	50
27	60	46	47	
28	54	48	48	NO
29	56	38	55	
30	59	68	52	RECORD
31		67	49	
Total	1,910	1,686	1,457	*1,209
Mean	63	54	47	* 46
Runoff In Ac. Ft.	3,790	3,340	2,840	*2,400

* 26-Day Period

Total Discharge 118 day Period - 12,400 Ac. Ft.

TABLE 11

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW AND TO FOREIGN WATER FROM THE FLOW OF BUTTE CREEK AT THE U.S.G.S. STATION JUNE 1 TO SEPTEMBER 30, 1949

JUNE

	Butte Creek U.S.G.S Nr. Chico c.f.s.	Hendricks Canal c.f.s.	Hendricks Canal Less 5% c.f.s.	Natural Flow of Butte Creek c.f.s.	Natural Flow Entitlement: Butte Creek Below Parrott Ditch c.f.s.	Natural Flow Entitlement: Parrott Ditch c.f.s.	Natural Flow Entitlement: Durham Colony Ditches c.f.s.	Total Entitlement: Parrott Ditch c.f.s.
1	283	54						
2	224	54						
3	227	54		(Five-day mean)	123			112
4	213	54	51	185	130	55	53.48	106
5	231	54						
6	202	52						
7	213	49						
8	192	47		(Seven-day mean)				
9	188	48	47	147	128	19	53.48	66
10	192	50						
11	188	50						
12	181	50						
13	175	49						
14	161	46						
15	142	33		(Seven-day mean)				
16	158	31	42	118	99	19	53.48	61
17	155	32						
18	155	58						
19	175	58						
20	168	31						
21	155	33						
22	133	31		(Seven-day mean)				
23	130	53	40	108	89	19	53.48	59
24	155	52						
25	155	49						
26	142	46						
27	136	44						
28	127	43						
29	136	43						
30	136	42						

TABLE 11 (Cont'd.)

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW AND TO FOREIGN WATER FROM THE FLOW OF BUTTE CREEK AT THE U.S.G.S. STATION
JUNE 1 TO SEPTEMBER 30, 1949

JULY

	Butte Creek U.S.G.S. Nr. Chico c.f.s.	Hendricks Canal c.f.s.	Hendricks Canal Less 5% c.f.s.	Natural Flow of Butte Creek c.f.s.	Natural Flow Entitlement: Butte Creek Below Parrott Ditch c.f.s.	Natural Flow Entitlement: Parrott Ditch c.f.s.	Natural Flow Entitlement: Durham Colony Ditches c.f.s.	Total Entitlement: Parrott Ditch c.f.s.
1	136	39						
2	130	38	(Seven-day mean)					
3	108	36	39	91	72.0	19.0	52.01	58
4	116	34						
5	133	34						
6	136	34						
7	116	33	(Seven-day mean)					
8	113	33	31	86	67.3	18.7	50.2	49.7
9	116	31						
10	87	31						
11	116	30						
12	108	29						
13	108	28						
14	108	28	(Seven-day mean)					
15	102	28	27	76	59.5	16.5	44.4	43.5
16	100	27						
17	80	27						
18	108	27						
19	97	26						
20	90	42						
21	116	50	(Seven-day mean)					
22	130	51	40	73	57.3	15.7	42.6	55.7
23	119	51						
24	133	49						
25	130	46						
26	97	49						
27	130	49						
28	90	15.3	(Seven-day mean)					
29	87	29	39	71	55.7	15.3	41.4	54.3
30	116	50						
31	119	50						

TABLE 11 (Cont'd.)

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW AND TO FOREIGN WATER FROM THE FLOW OF BUTTE CREEK AT THE U.S.G.S. STATION
JUNE 1 TO SEPTEMBER 30, 1949

AUGUST

	Butte Creek U.S.G.S. Nr. Chico c.f.s.	Hendricks Canal c.f.s.	Hendricks Canal Less 5% c.f.s.	Natural Flow of Butte Creek c.f.s.	Natural Flow Entitlement: Butte Creek Below Parrott Ditch c.f.s.	Natural Flow Entitlement: Parrott Ditch c.f.s.	Natural Flow Entitlement: Durham Colony Ditches c.f.s.	Total Entitlement: Parrott Ditch c.f.s.
1	122	48						
2	119	46						
3	124	47						
4	127	46		(Seven-day mean)				
5	116	49	48	74	58	16.0	43.2	62
6	119	49						
7	116	49						
8	116	48						
9	110	48						
10	108	48						
11	122	48		(Seven-day mean)				
12	122	48	46	73	58	16.0	42.6	61
13	116	46						
14	127	40						
15	108	37						
16	97	36						
17	116	36						
18	102	36		(Seven-day mean)				
19	110	36	32	75	57.3	15.7	43.7	49.7
20	82	35						
21	108	35						
22	102	35						
23	102	35						
24	102	35						
25	92	34		(Seven-day mean)				
26	97	35	32	68	52.5	14.5	39.7	47.5
27	92	35						
28	110	35						
29	113	36						
30	105	34						
31	96	31						

TABLE 11 (Cont'd.)

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW AND TO FOREIGN WATER FROM THE FLOW OF BUTTE CREEK AT THE U.S.G.S. STATION
JUNE 1 TO SEPTEMBER 30, 1949

SEPTEMBER

	Butte Creek U.S.G.S. Nr. Chico c.f.s.	Hendricks Canal c.f.s.	Hendricks Canal Less 5% c.f.s.	Natural Flow of Butte Creek c.f.s.	Natural Flow Entitlement: Butte Creek Below Parrott Ditch c.f.s.	Natural Flow Entitlement: Parrott Ditch c.f.s.	Natural Flow Entitlement: Durham Colony Ditches c.f.s.	Total Entitlement: Parrott Ditch c.f.s.
1	87	31						
2	102	30		(Seven-day mean)				
3	92	30	30	67	52.5	14.5	39.1	44.5
4	90	29						
5	92	30						
6	97	31						
7	87	32		(Seven-day mean)				
8	105	33	21	62	48.6	13.4	36.2	34.4
9	80	22						
10	62	4.2						
11	60	1.8						
12	80	11.5						
13	77	27						
14	92	26		(Seven-day mean)				
15	84	26	23	61	47.8	13.2	35.6	36.2
16	90	26						
17	82	26						
18	84	25						
19	90	24						
20	75	24						
21	87	24		(Seven-day mean)				
22	92	24	23	59	46.3	12.7	34.4	35.7
23	66	24						
24	84	24						
25	80	25						
26	90	25						
27	92	25		(Five-day mean)				
28	87		24	69	54.2	14.8	40.2	38.8
29	97							
30	100							

Natural Flow of Butte Creek is divided as follows:

149 to 274 c.f.s.	Parrott Ditches	19.0 c.f.s + flow between 149 and 274 c.f.s.
	Colony Ditch	53.48 c.f.s. (constant)
	Other Diversions	76.52 c.f.s. (constant)
96.66 to 149 c.f.s.	Parrott Ditch	19.0 c.f.s. (constant)
	Colony Ditches	53.48 c.f.s. (constant)
	Other Diversions	17.66 c.f.s. + flow between 87.91 and 149 c.f.s.
87.91 to 96.66 c.f.s.		(See decree)
0 to 87.91 c.f.s.	Parrott Ditch	19.0 / 87.91 per cent of flow
	Colony Ditch	51.25 / 87.91 per cent of flow

TABLE 12

USE COMPARED TO ENTITLEMENTS
BUTTE CREEK

JUNE 5 TO SEPTEMBER 25, 1949

Period	Butte Creek Natural Flow C.f.s.	Colony Ditches Entitlement C.f.s.	Colony Ditches Actual Diversion C.f.s.	Colony Ditches Diversion in excess of Entitlement C.f.s.	Parrott Ditch Actual Diversion C.f.s.	Passing Parrott Ditch Entitlements C.f.s.	Passing Parrott Ditch Actual Discharge C.f.s.	Entitlements other than Parrott and Colony Ditches C.f.s.	Diversion by other than Parrott and Colony Ditches plus Channel Losses below U.S.G.S. Station C.f.s.
6/6 – 6/12	147	53.48	66.0	+ 12.5	70	128	112	74.5	46
6/13 – 6/19	118	53.48	63.0	+ 9.5	49	99	101	45.5	38
6/20 – 6/26	108	53.48	60.8	+ 7.3	51	89	92	35.5	31.2
6/27 – 7/3	91	52.0	58.0	+ 6.0	53	72	79	20.0	21.0
7/4 – 7/10	86	50.2	57.0	+ 6.8	31	67.3	81	17.1	24.0
7/11 – 7/17	76	44.4	50.8	+ 6.4	35	59.5	73	15.1	22.2
7/18 – 7/24	73	42.6	55.7	+ 14.1	36	57.3	74	14.7	18.3
7/25 – 7/31	71	41.4	52.0	+ 10.6	* 36	55.7	73	14.3	20.3
8/1 – 8/7	74	43.2	46.8	+ 3.6	* 20	58	93	14.8	33.1
8/8 – 8/14	73	42.6	46.4	+ 3.8	* 19	58	92	15.4	32.1
8/15 – 8/21	75	43.7	45.7	+ 2.0	* 24	57.3	78	13.6	27.6
8/22 – 8/28	68	39.7	46.8	+ 7.1	32	52.5	70	12.8	23.2
8/29 – 9/4	67	39.1	49.4	+ 10.3	27	52.5	72	13.4	22.6
9/5 – 9/11	62	36.2	48.0	+ 11.8	21	48.6	69	12.4	21.0
9/12 – 9/18	61	35.6	46.3	+ 10.7	25	47.8	62	12.2	15.7
9/19 – 9/25	59	34.4	44.1	+ 9.7	29	46.3	59	11.9	14.9
Means 6/5 – 9/25	81.8	44.1	52.3	8.2	35.4	65.5	80.0	21.4	25.1

* Note -- Foreign water to Adams July 29, 1949
Foreign water back to Parrott Ditch August 19, 1949