STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC WORKS
DIVISION OF WATER RESOURCES

O

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

1947 SEASON

Sacramento, California

March 1951

SUBMISSION TO, AND ADOPTION BY
DEPARTMENT OF PUBLIC WORKS

I, Harrison Smitherum, 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, 1948 Season."

Harrison Smitherum
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, 1948 Season."

Gordon Zander
Principal Hydraulic Engineer

I, Edward Hyatt, 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, 1948 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 8th day of November, 1948.

DEPARTMENT OF PUBLIC WORKS

By _____
State Engineer and Chief of the
Division of Water Resources

SEAL

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INTRODUCTION

The Butte Creek Watermaster Service Area was created by order of the Department dated January 7, 1943, pursuant to the provisions of the Water Code. Watermaster service has been given in said area during the irrigation season of each year from 1943 to 1948, inclusive.

Normally the necessity for watermaster service extends from about June 15 to September 30 of each season. In 1948 watermaster service commenced on June 22 and terminated September 30. However, because of favorable water supply conditions intensive service was required only during the period from about August 1 to September 30.

The service is under the general supervision and control of the Division of Water Resources and the immediate direction of Harrison Smitherum, Supervising Hydraulic Engineer. In 1948, L. C. Jopson, Senior Hydraulic Engineer, was in charge of distribution in the field and in the preparation of this report. Alfred J. Vandenberg, Assistant Civil Engineer, assisted in the field.

Subsequent to termination of watermaster service for the 1947 season, two actions were filed in the Superior Court of Butte County involving the distribution of water within the service area.

The first action entitled Parrott Investment Company, a corporation; Durham Mutual Water Company, a corporation; Fred T. Woell; Charles W. Baxter; E. L. Adams; Ralph Gorrill; Edwin Earl White; Walter L. Counts and Herbert W. Barmann vs. Lancha Plana Gold Dredging Company, a corporation, was brought by the water right owners below the U.S.G.S. station against the gold dredging company operating in the creek channel between the station and the plaintiffs diversions. The plaintiffs claimed that the dredging company was using water to

which it was not entitled and was polluting the stream and filling the channel with tailings. The court held that the dredging company had no right to make any consumptive use of water and authorized the watermaster to order the dredging operations stopped if any diminution of flow occurred. The dredging company was further ordered to cease polluting the stream with its tailings and to modify and correct the restricted channel conditions of Butte Creek over that portion of its course which had been dredged by said company and to leave unrestricted the remaining portion of said channel to be dredged.

The second action was brought by the Durham Mutual Water Company as an order to show cause why the court should not enforce the decree In Re Butte Creek, referred to above. In this action the Durham Mutual Water Company petitioned the court to order the watermaster to regulate the flow of Butte Creek in such a manner that the full natural flow entitlement of the water right owners on Butte Creek below the Parrott Dam would be delivered past said dam without deficiency at any time. It was contended that the downstream owners are entitled to the constant natural flow of Butte Creek without fluctuation, but that under the regulation practiced by the watermaster the natural flow of the stream and the foreign water had been pooled and the pooled water had been distributed without distinction as to the rights therein, with the result that the entitlements delivered past the Parrott Dam had been subjected to wide fluctuations to the detriment of the downstream owners.

A hearing on the above matter was held on March 24 and 25, 1948, and on June 8, 1948, the court filed a Memorandum which contained an Order reopening the matter for further hearing and report on July 19, 1948. Pursuant thereto a report was made to the court by the Division of Water Resources as to the proposed method of operation and distribution of water of Butte Creek during

the 1948 irrigation season. The matter was then continued by order of the court until November 9, 1948, at which time the Division was instructed to report on the results achieved in their distribution of water during 1948 and to recommend means of delivering the constant flow sought to the Durham Water Company.

WATER SUPPLY

Precipitation

Precipitation records collected by the U. S. Weather Bureau at Chico are presented at the end of this report as Table 1. The total precipitation for the season was 117 per cent of the seventy-eight year mean. Distribution of the precipitation was unusual in that the rainfall was substantially below normal during the winter months and above normal during the spring months.

Stream Flow

Water supply and diversion records were collected at six stations equipped with automatic water stage recorders in 1948. The location of the stations and their purposes are as follows:

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

The Butte Creek U.S.G.S. 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 2½ miles down stream at the Parrott Dam.

The discharge for the station shows natural flow without regulation combined with foreign flow after regulation by the Pacific Gas and Electric Company to fit power demands. The mean daily discharge for the period of watermaster service in 1948 is set forth in Table 2. The hourly flow from August 1 to September 30 is shown graphically by the uppermost irregular line of the hydrograph presented in Plate 1.

Hendricks Canal

The Hendricks Canal 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 hydro-electric power at the De Sabla and Centerville power plants of the P. G. & E. The mean daily discharge for the season of watermaster service is tabulated in Table 3.

Parrott Ditch

The Parrott (Crouch) Ditch station is located near the head of the Parrott Ditch. This station measures the natural flow and foreign water diverted by the ditch. The mean daily discharge for the season of watermaster service is tabulated in Table 4. The hourly flow from August 1 to September 30 is shown graphically by the third irregular line of the hydrograph presented in Plate 1.

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 the Parrott Dam. The mean daily discharge for the period of record in 1948 is tabulated in Table 5. The hourly flow from August 1 to September 30 is shown graphically by the second irregular line of the hydrograph presented in Plate 1.

Upper Colony Ditch

The flow at this station, located near the head of the ditch, is a portion of the water supply diverted by the Durham Colony. The mean daily discharge for the period of watermaster service is tabulated in Table 6. The hourly flow from August 1 to September 30 is shown graphically by the third irregular line of the hydrograph presented on Plate 2.

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. The mean daily discharge for

the period of record in 1948 is tabulated in Table 7. The hourly flow from August 1 to September 30 is shown graphically by the first irregular line of the hydrograph presented in Plate 2. The discharge at this station combined with the discharge at the Upper Colony Ditch station gives the water supply available for diversion by the Durham Colony. The hourly flow of the combined water supply is shown graphically by the second irregular line of the hydrograph presented in Plate 2.

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.

Distribtuion was based upon the water supply available at the U.S.C.S. gaging station. Inasmuch as the flow at the station was partly natural flow of Butte Creek and partly 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 what portion of the available flow belongs in each class.

Early in the season and prior to about August 1, the flow of Butte Creek plus foreign water was large enough to supply near maximum capacity flow through the De Sabla power plant so that very little fluctuation of flow occurred. During this period of steady flow the amount of foreign water available for re-diversion at the Parrott Dam was determined as the flow of Hendricks Canal less five per cent.

Subsequent to August 1, the 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 P.G. & E. to draw on their De Sabla Reservoir storage 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 in flow at the U.S.G.S. station.

The daily natural flow of Butte Creek available for distribution to the water right owners entitled thereto was the mean daily flow of Butte Creek at the U.S.G.S. station less the flow of the Hendricks Canal, corrected for increase or decrease of storage in De Sabla Reservoir and a deduction of five per cent of said flow for channel loss.

From August 2 to 22, natural flow means were computed for each seven-day period from Monday through the following Sunday. This period was selected after observation of the water level in De Sabla Reservoir which was nearly at the same stage at the beginning and end of said period, indicating that the storage and releases from the reservoir were in balance.

For the periods from August 23 to 30 and September 10 to 30, an automatic water stage recorder was maintained on De Sabla Reservoir and a record was obtained of the fluctuations in water level. By reducing this record of gage heights to amounts of storage it was possible to determine the amount of foreign water that was either stored or released from storage during any twenty-four hour period. By reducing this amount to cubic feet per second, a correction was available to apply to the flow in the Hendricks Canal to determine the amount of foreign water released through the De Sabla power plant each day. This amount less five per cent thereof was deducted from the flow at the U.S.G.S. station to determine the natural flow.

During the period from August 31 to September 9, due to a poor record of reservoir levels, it was again necessary to make the determination of natural flow by using mean flows, this time for the ten-day period of missing record. The computations of natural flow from August 1 to September 30 are given in detail in Table 8.

Entitlements of the Parrott Ditch, Butte Creek below the Parrott Dam and the combined Upper and Lower Colony Ditches to natural flow and to foreign water from the flow of Butte Creek at the U.S.G.S. station are set forth in Table 9 and are plotted on the hydrographs presented in Plates 1 and 2.

The Plant Garden pump operated for about seven hours, five days a week, with maximum diversion near the amount of its allotment. The Wakefield pump operated at irregular hours as convenient not to exceed twenty hours per week with maximum diversion of approximately double its allotment. The Baxter pump operated daily except Sunday during the daylight hours and occasionally over night during the peak of the irrigation season with a rate of diversion of approximately five cubic feet per second. The Compton-Entler-Marybill Ditch diverted continuously at near allotment throughout the season.

The regulation of the flow available for the Parrott Ditch and for the Upper and Lower Colony Ditches was accomplished by utilizing all possible storage behind the respective diversion dams to smooth out the power draft fluctuation. It was possible by drawing the water level down in each of the three basins in turn, as the low period of flow occurred in the creek, to supplement the low flow by the stored water. The openings through the dams and into the various diversion conduits were adjusted so that the basins never emptied completely before the flow of the creek increased. With this method of operation it was possible to maintain a fairly even flow past the Parrott Dam while that storage basin was filling and emptying. After the basin was full the water in excess of the capacity of the openings spilled over the flashboards on the dam and wasted down the

creek where it was used in turn to assure refilling of the basins at the Upper and Lower Colony Dams. Occasionally some water spilled at the lower dam and passed on down the channel to the Adams Dam.

The operating pressure head on the various openings into ditches and through dams varied from one to about six feet. Nearly all openings were adjusted so that minimum allotments equal to natural flow rights would be delivered at all times.

SUMMARY

The available natural flow of Butte Creek was ample to fill all rights in Schedule 7 of the decree until August 1, 1948. Prior to August 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 26. Subsequent to August 1 the available natural flow decreased until on August 24 only first priority rights were filled. Minimum flow occurred on September 15 when water for only 85 per cent of first priority rights was available.

Foreign water delivered into the Butte Creek stream system varied from 75 cubic feet per second on June 24 to 34 cubic feet per second on August 11, when it was increased to over 50 cubic feet per second by release of stored water from Philbrook and Round Valley Reservoirs. The flow was reduced from 55 cubic feet per second to 27 cubic feet per second during the last few days of September.

The fluctuations in the flow of Butte Creek, caused by introduction of foreign water by the Pacific Gas & Electric Company to generate power, were inconsequential prior to August 1. After August 1 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 the "low" and the "high" for each 24-hour period. The maximum fluctuation for one such 24-hour period was from 82 cubic feet per second for the "low" to 164 cubic feet per second for the "high."

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. However, it was impossible to fully regulate the flow by the facilities available and it was necessary during August and September to spill an average of 10.8 cubic feet per second of foreign water past the Parrott Dam to maintain the downstream entitlements at all times.

The foreign water spilled past the Parrott Dam was diverted by the Upper Colony, Lower Colony and E. L. Adams ditches together with the natural flow of Butte Creek to which they were entitled. More adequate provision to control the fluctuation of the flow would make possible the diversion and use of this water by its rightful owners on the Parrott Ditch.

Regulation of diversions by the watermaster was made at regular intervals early in the season. After August 1, more intensive regulation was necessary and service was rendered daily when necessary to properly distribute the water.

Water supply conditions in 1948 were such as to maintain a favorable flow of water through the Hendricks Canal throughout the season thereby lessening the fluctuation in the foreign flow. This condition made possible the regulation of Butte Creek with a loss to the Parrott Ditch of an average of only 10.8 cubic feet per second of foreign water during August and September. In less favorable seasons the amount of such loss would probably be much greater.

It does not appear that better regulation of the fluctuation in flow of Butte Creek, than was obtained in 1948, could be had without 24-hour attendance and regulation at the Parrott Dam and with greatly intensified watermaster service.

The alternatives to the above would be the installation of automatic regulation facilities at the head of the Parrott Ditch or the construction of offstream storage facilities. There appears to be a favorable condition for such offstream storage facilities adjacent to the Upper Colony Ditch.

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

Changes 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 1948," and which shall be included in the statement for said watermaster service area for 1949, are listed in the following tabulation:

Tract No.	Name of Water Right Owner Appearing in 1948 Statement	Name of Water Right Owner to Appear in 1949 Statement	Amount of Water c.f.s.
13-23	Barbara Ina Atkins and Estate of Samuel A. Atkins	Varney Wakefield	0.43
10-29	Donald Cummins and Vera Fae Cummins	L. C. Hook and Helen N. Hook	0.555
		Mary E. Roth	0.555
10-32	Donald Hale and Alice Hilby Hale	Robert S. Miller, Robert J. Miller, O. L. Stephens and Phoebe Stephens	3.00
10-26	Harold A. Staples and N. Anchor Christensen	Bill R. Baxter and Elenor C. Baxter) ¼ Interest	1.89
		A. W. Stormes and Florence K. Stormes) ¼ Interest	
		Feather River Homes, Inc., A Corporation) ½ Interest	
10-26	W. P. Turner and Nora C. Turner	G. B. Leethem	3.11

TABLE 1

PRECIPITATION - CHICO, BUTTE COUNTY

Elevation 189 feet

Month	Mean Precipitation (78 year record) inches	Precipitation 1947-48 inches	1947-48 Per Cent of Total mean
October	1.27	5.38	22.0
November	2.69	1.98	8.1
December	4.53	2.05	8.4
January	4.86	2.51	10.3
February	4.25	1.56	6.4
March	3.15	5.18	21.2
April	1.76	7.13	29.1
May	.99	1.97	8.1
June	.41	.81	3.3
July	.02	T	0
August	.02	*	0
September	.50	*	0
Total	24.45	28.57	117.0

* Record not yet published but precipitation known to be very small.

TABLE 2

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK AT U. S. G. S. STATION BELOW COVERED BRIDGE
JUNE 22 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1		213	133	130
2		251	142	130
3		236	142	125
4		244	136	130
5		244	127	130
6		225	136	119
7	N	236	119	144
8	O	232	130	127
9	T	225	151	130
10		225	133	133
11		220	119	136
12	C	199	127	113
13	O	209	151	139
14	M	195	142	133
15	P	188	133	125
16	U	191	154	130
17	T	191	144	139
18	E	160	133	144
19	D	178	144	133
20		184	142	148
21		173	139	133
22	324	160	139	142
23	310	160	148	132
24	306	167	144	142
25	314	151	139	134
26	288	160	133	142
27	276	164	136	146
28	264	157	133	142
29	260	148	122	110
30	271	144	136	104
31		144	130	
Total	*2613	5974	4237	3,965
Mean	* 290	193	137	132
Runoff in Ac. Ft.	*5,180	11,850	8,400	7,860

*9-Day Period
Total discharge 101 day period - 33,290 Ac. Ft.

TABLE 3

DAILY DISCHARGE IN CUBIC FEET PER SECOND
HENDRICKS CANAL

JUNE 23 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1		70	42	50
2		69	40	50
3		68	40	52
4		67	39	53
5		70	38	53
6		70	38	54
7		70	36	55
8	NO	70	36	55
9		69	35	55
10		68	35	56
11		67	34	56
12	RECORD	68	50	56
13		67	54	55
14		67	54	56
15		64	53	55
16		63	53	56
17		62	53	57
18		60	53	56
19		58	53	56
20		57	53	54
21		54	52	54
22		52	52	55
23	74	50	53	55
24	75	50	53	55
25	74	50	52	55
26	74	47	51	55
27	74	47	50	54
28	73	46	50	44
29	70	45	50	27
30	71	43	50	29
31		43	50	
Total	*585	1,851	1,452	1,573
Mean	* 73	60	47	52
Runoff in Ac. Ft.	*1,160	3,670	2,880	3,120

* 8-Day Period
Total discharge 100 day period - 10,800 Ac. Ft.

TABLE 4

DAILY DISCHARGE IN CUBIC FEET PER SECOND
PARROTT DITCH
JUNE 23 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1		92	50	52
2		101	54	54
3		96	56	54
4		99	56	54
5		97	54	54
6		90	56	55
7		96	51	53
8	NO	92	52	55
9		88	54	54
10		87	52	55
11		86	47	54
12		77	48	49
13	RECORD	83	57	58
14		76	54	52
15		76	54	52
16		77	59	52
17		77	58	55
18		67	54	57
19		72	59	54
20		76	58	60
21		76	58	55
22		72	57	59
23	135	71	61	57
24	132	72	60	59
25	127	66	59	59
26	114	68	57	62
27	113	67	58	61
28	111	61	56	60
29	102	57	55	50
30	105	56	57	44
31		54	57	
Total	*940	2,425	1,718	1,649
Mean	*118	78	55	55
Runoff in Ac. Ft.	*1,860	4,810	3,410	3,270

* 8-Day Period
Total discharge 100 day period - 13,350 Ac. Ft.

TABLE 5

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK BELOW PARROTT DAM
JULY 11 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1			82	72
2			86	74
3		NO	92	72
4			78	76
5			72	76
6			78	72
7			72	78
8		RECORD	74	76
9			88	74
10			86	72
11		114	76	72
12		104	78	69
13	NO	110	96	78
14		106	86	70
15		106	82	70
16		106	92	69
17	RECORD	108	88	72
18		94	78	76
19		98	84	70
20		96	80	76
21		90	78	76
22		86	76	80
23		88	84	76
24		94	84	78
25		86	82	74
26		88	76	78
27		92	78	76
28		94	76	78
29		90	74	65
30		88	78	62
31		88	80	
Total		*2,026	2,514	2,207
Mean		*96	81	74
Runoff in Ac. Ft.		*4,020	4,990	4,380

*21-Day Period
Total discharge 82 day period - 13,390 Ac. Ft.

TABLE 6

DAILY DISCHARGE IN CUBIC FEET PER SECOND
UPPER COLONY DITCH
JUNE 23 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1		53	52	38
2		54	51	40
3		54	50	39
4		54	50	41
5		54	49	41
6		53	50	42
7		54	47	41
8	NO	54	50	42
9		58	54	43
10		64	54	44
11		64	48	44
12		63	50	43
13	RECORD	63	55	44
14		62	50	42
15		62	47	43
16		62	50	41
17		62	47	45
18		58	45	46
19		58	46	45
20		57	46	45
21		54	46	47
22		52	45	49
23	57	52	46	46
24	56	54	47	48
25	57	52	46	47
26	56	53	43	46
27	55	56	43	45
28	55	61	42	45
29	55	57	41	40
30	55	53	42	35
31		53	44	
Total	*446	1,760	1,476	1,297
Mean	* 56	57	48	43
Runoff in Ac. Ft.	*884	3,490	2,930	2,570

*8-Day Period
Total discharge 100 day period - 9,874 Ac. Ft.

TABLE 7

DAILY DISCHARGE IN CUBIC FEET PER SECOND
BUTTE CREEK ABOVE LOWER COLONY DAM
JULY 21 TO SEPTEMBER 30, 1948

Day	June	July	August	September
1			24	16.2
2			23	18.3
3			32	16.2
4			46	15.7
5			20	22
6			18.4	25
7			12.6	17.1
8		NO	15.9	18.8
9			16.5	16.9
10			24	16.3
11			14.3	16.9
12			12.3	16.6
13	NO	RECORD	22	16.4
14			18.3	16.5
15			20	16.2
16			19.3	16.3
17			23	17.6
18	RECORD		19.4	18.8
19			21	18.3
20			17.3	15.8
21		45	17.6	18.8
22		28	17.7	24
23		19.6	19.9	22
24		35	19.7	21
25		26	16.4	22
26		22	17.6	21
27		18.4	13.8	23
28		21	16.6	22
29		24	19.6	18.5
30		36	17.6	15.1
31		33	21	
Total		*308.0	616.8	559.3
Mean		*28.0	19.9	18.6
Runoff in Ac. Ft.		*611	1,220	1,110

*11-Day Period
Total discharge 72 day period - 2,941 Ac. Ft.

TABLE 8

COMPUTATION OF NATURAL FLOW OF BUTTE CREEK
AT U.S.G.S. GAGING STATION
AUGUST 1 TO SEPTEMBER 30, 1948
AUGUST 1948

Date	Butte Creek at U.S.G.S. c.f.s.	Hendricks Canal c.f.s.	Added to (+) and deducted from (-) storage in De Sabla c.f.s.	Hendricks Canal + or - storage Less 5% c.f.s.	Natural Flow of Butte Creek at U.S.G.S. c.f.s.
1	133	42			
2	142	40			
3	142	40			
4	136	39		7 day mean	7 day mean
5	127	38		= 36.2	= 96.9
6	136	38			
7	119	36			
8	130	36			
9	151	35			
10	133	35			
11	119	34		7 day mean	7 day mean
12	127	50		= 42.8	= 93.8
13	151	54			
14	142	54			
15	133	53			
16	154	53			
17	144	53			
18	133	53		7 day mean	7 day mean
19	144	53		= 50.1	= 92.0
20	142	53			
21	139	52			
22	139	52			
23	148	53	-5.0	55.1	92.9
24	144	53	-4.5	54.6	89.4
25	139	52	-2.5	51.8	87.2
26	133	51	+1.5	47.0	86.0
27	136	50	-4.5	51.8	84.2
28	133	50	-2.0	49.4	83.6
29	122	50	+6.5	41.3	80.7
30	136	50	-8.0	55.1	80.9
31	130	50			

TABLE 8 (Con't.)

COMPUTATION OF NATURAL FLOW OF BUTTE CREEK
AT U.S.G.S. GAGING STATION
AUGUST 1 TO SEPTEMBER 30, 1948
SEPTEMBER 1948

Date	Butte Creek at U.S.G.S.	Hendricks Canal	Added to (+) and deducted from (-) storage in De Sabla	Hendricks Canal + or - storage Less 5%	Natural Flow of Butte Creek at U.S.G.S.
	c.f.s.	c.f.s.	c.f.s.	c.f.s.	c.f.s.
1	130	50			
2	130	50			
3	125	52		10 day mean	10 day mean
4	130	53		= 90.1	= 79.4
5	130	53			
6	119	54			
7	144	55			
8	127	55			
9	130	55			
10	133	56	+1.0	52.2	80.8
11	136	56	-0.0	53.2	82.8
12	113	56	+19.0	35.2	77.8
13	139	55	-13.0	64.6	74.4
14	133	56	-4.0	57.0	76.0
15	125	55	+1.5	50.8	74.2
16	130	56	- .5	53.7	76.3
17	139	57	+8.0	46.6	92.4
18	144	56	-2.0	55.1	88.9
19	133	56	+10.5	43.2	89.8
20	148	54	-11.0	61.8	86.2
21	133	54	-1.0	52.2	80.8
22	142	55	-3.0	55.1	86.9
23	132	55	+10.0	42.8	89.2
24	142	55	-2.5	54.6	87.4
25	134	55	+10.0	42.8	91.2
26	142	55	-1.0	53.2	88.8
27	146	54	-12.5	63.2	82.8
28	142	44	-14.5	55.6	86.4
29	110	27	+ 3.0	22.8	87.2
30	104	29	+ 7.5	20.4	83.6

TABLE 9

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW OF
BUTTE CREEK AND TO FOREIGN WATER
AUGUST 1 TO SEPTEMBER 30, 1948
AUGUST

Date	Discharge At USGS Station c.f.s	Natural Flow Butte Creek c.f.s	Natural Flow Entitlements: Below Parrott Dam c.f.s	Durham Colony Ditches c.f.s.	Parrott Ditch c.f.s.	Total Entitlement Parrott Ditch c.f.s.
1	133					
2	142					
3	142					
4	136		(Seven-day means)			
5	127	96.9	77.90	53.48	19.00	55.2
6	136					
7	119					
8	130					
9	151					
10	133					
11	119		(Seven-day means)			
12	127	93.8	74.80	52.71	19.00	61.8
13	151					
14	142					
15	133					
16	154					
17	144					
18	133		(Seven-day means)			
19	144	92.0	73.00	52.24	19.00	69.1
20	142					
21	139					
22	139					
23	148	92.9	73.9	52.48	19.00	74.1
24	144	89.4	70.4	51.62	19.00	73.6
25	139	87.2	68.4	50.83	18.84	70.6
26	133	86.0	67.4	50.14	18.58	65.6
27	136	84.2	66.0	49.09	18.20	70.0
28	133	83.6	65.5	48.74	18.07	67.5
29	122	80.7	63.3	47.05	17.43	58.7
30	136	80.9	63.4	47.16	17.48	72.6
31	130					

TABLE 9 (Cont.)

COMPUTATION OF ENTITLEMENTS TO NATURAL FLOW OF
BUTTE CREEK AND TO FOREIGN WATER
AUGUST 1 TO SEPTEMBER 30, 1948
SEPTEMBER

Date	Discharge At USGS Station c.f.s.	Natural Flow Butte Creek c.f.s.	Natural Flow Entitlements: Below Parrott Dam c.f.s.	Durham Colony Ditches c.f.s.	Parrott Ditch c.f.s.	Total Entitlement Parrott Ditch c.f.s.
1	130					
2	130					
3	125			(Ten-day means)		
4	130	79.4	62.2	46.29	17.16	67.3
5	130					
6	119					
7	144					
8	127					
9	130					
10	133	80.8	63.3	47.12	17.46	69.7
11	136	82.8	64.9	48.27	17.89	71.1
12	113	77.8	61.0	45.36	16.81	52.0
13	139	74.4	58.3	43.37	16.08	80.7
14	133	76.0	59.6	44.31	16.42	73.4
15	125	74.2	58.2	43.26	16.03	66.8
16	130	76.3	59.8	44.48	16.49	70.2
17	139	92.4	72.4	53.87	19.97	66.6
18	144	88.9	69.7	51.83	19.21	74.3
19	133	89.8	70.4	52.35	19.41	62.6
20	148	86.2	67.6	50.25	18.63	80.4
21	133	80.8	63.3	47.11	17.46	69.7
22	142	86.9	68.1	50.66	18.78	73.9
23	132	89.2	69.9	52.00	19.28	62.1
24	142	87.4	68.5	50.95	18.89	73.5
25	134	91.2	71.5	53.17	19.71	62.5
26	142	88.8	69.6	51.77	19.19	72.4
27	146	82.8	64.9	48.27	17.89	81.1
28	142	86.4	67.7	50.37	18.67	74.3
29	110	87.2	68.4	50.84	18.84	41.6
30	104	83.6	65.5	48.74	18.07	38.5