105

June 23, 1917.

Mr. King:

What is the capacity of the new Murray Dam in gallons and acre feet both?

205 Outlander

3.0

Also Murray 5960 Ac Ft - 1828 000 000 gal

Eucalyptus 26 Ac Ft 8 000 000

Cuyamaca 10 800 Ac Ft 3,519,000,000

By the way add 200,000,000 to Cuyamaca, and add 200,000,000 to Murray dam, because in surveying we have found this to be correct.

Also El Capitan Dam to 140 feet high 51200 Ac Ft - 16700000000

What is the net safe yield, according to Post and Lee of the Cuyamaca system now, and if Dye Canyon, Poverty Gulch and El Capitan Dams were built, together with Murray Dam.

Also put on the paper the capacity of San Elijo built to 140 feet 12011.3 Ac Ft - 3913300 000

San Dieguito as planned 1306 - 425600 000

Carroll 140 feet.

I must have this information by noon or earlier, if possible.

Ed Fletcher.

F-S

105

June 23, 1917

Mr. Ed Fletcher,
Office.

Dear Sir:-

The new Murray Dam will hold 5,960 acre feet which equals 1,828,000,000 gallons, + 200,000,000 gal. = 2,028,000,000 gal.

Murray Reservoir will hold 78 acre feet which equals 25,000,000 gallons.

Eucalyptus Reservoir will hold 26 acre feet, equals 8,000,000 gallons.

Cuyamaca - 10,800 acre feet = 3,519,000,000 gallons, + 200,000,000 gal. = 3,719,000,000 gallons.

El Capitan - 140 ft. high - will hold 51,200 acre feet which equals 16,700,000,000 gallons.

As to the net safe yield of the Cuyamaca System now, and if Dye Canyon, Poverty Gulch and El Capitan were built, together with the Murray Dam, Mr. Faude has these records and I have been unable to get in touch with him.

San Elijo Dam, to impound water to a depth of 140 feet, will hold 12,011.3 acre feet which equals 3,913,300,000 gallons.

San Dieguito, as planned, will hold 1306 acre feet which equals 425,600,000 gallons.

Carroll Dam, to a height of 110 feet, or the 315 foot contour, will impound 37,699 acre feet which equals 12,284,300,000 gallons. To a height of 140 feet or the 345 foot contour, will impound 104,000 acre feet which equals 33,870,000,000 gallons. To a height of 150 feet or the 355 foot contour, will impound 140,000 acre feet which equals 45,660,000,000 gallons.

YHK:K

Yours respectfully,

105

July 23, 1917

Col. Ed Fletcher,
Office.

Dear Sir:-

The information you desire on the reservoirs is as follows:

Carroll Reservoir - with water surface at the 315 ft. contour; will impound water to a depth of 110 feet;
Will flood 1317.1 acres, and will have a capacity of 37,699 acre feet. The outlet will be at elevation 254.

Upper San Dieguito Reservoir - with water surface at the 250 ft. contour; Will impound water to a depth of 47 feet, flooding an area of 86.4 acres, and will have a capacity of 1,060 acre feet. The outlet elevation is 235.

San Elijo Reservoir - with water surface at the 450 ft. contour; Will impound water to a depth of 140 feet, flooding an area of 261.87 acres, and will have a capacity of 12,011 acre feet. The outlet elevation is 360.

Yours respectfully,

K. H. King

THK:K

105

San Dieguito System

NET SAFE YIELD DATA ON CARROLL RESERVOIR

Irrigation Service Period - 1 M.I. flowing for 200 days

Carroll Dam 100 ft. high.

Using Drainage Area of 196 square miles which is drainage area below Pamo.

Irrigation Net Safe Yield = 10,400 Ac. Ft. = 1,300 M. I.

By pumping from Bernardo Gravels =

4,360 Ac. Ft. ---------- 550 M. I.

San Elijo Dam,140 ft. high, on Escondido Creek

1,200 Ac. Ft. ---------- 150 M. I.

San Elijo Watershed = 48 sq. miles.

Total ----------2,000 M. I.

By building Carroll to 140 ft. high would increase capacity by 4,760 ac. ft.------ 600 M. I.

Making Total Yield 20,720 Ac. Ft. ----------2,600 M. I.

Post Estimate of Area Irrigated

12,000 acres gravity
8,600 " pumping
20,600 "

Jones Estimate of Area Irrigated

14,894 acres by gravity
7,323 " " pumping
22,217 "

Net Safe Yield of San Dieguito System

105

Carroll Reservoir

Depth of water in reservoir 110 feet with a storage of 37700 acre feet.
Irrigation Safe Yield equals 10400 acre feet annually = 1300 M.I.
By pumping from Bernardo Gravels = 4.360 Ac Ft = 550 M.I.
Carroll Watershed below Pamo = 196 Sq. miles

San Elijo Reservoir

Depth of water in reservoir 140 feet with a storage of 12.011 Acre feet.
Irrigation Safe Yield equals 1200 Acre feet annually = 150 M.I.
San Elijo Watershed = 48 Sq. miles

By building Carroll Dam to impound water to a depth of 140 feet would increase net safe yield 4760 Acre feet annually = 600 M.I.
Making a total Yield of 20720 Ac Ft Annually = 2600 MI

Note:- A Miner's Inch in this report is based on an irrigation service period of 200 days continuous flow

2

105

VOLCAN SYSTEM

NET SAFE YIELD AS DETERMINED BY BOARD OF ENGINEERS

WARNER RESERVOIR

Depth of water in reservoir 107 feet with a storage of 200,000 acre feet.

Irrigation Safe Yield after deducting for Escondido priorities - 28,000 acre feet annually = 2,800 Miners Inches based upon 8 months continuous flow.

Warner Watershed = 208 Sq Miles

SUTHERLAND RESERVOIR

Depth of water in reservoir 190 feet with a storage of 60,000 acre feet.

Irrigation Safe Yield 12,900 Acre Feet annually = 1,290 Miners Inches based upon 8 months continuous flow.

PAMO RESERVOIR IN CONJUNCTION WITH SAN CLEMENTE (Storage ~~8,570~~)

Depth of water in Reservoir in Pamo 156 feet with a storage of 47,500 acre feet.

Irrigation Safe Yield 7,950 acre feet annually = 795 Miners Inches based upon 8 months continuous flow.

Pamo - Sutherland watershed = 110 Sq Miles

~~Cuyamaca System~~ with Lakeside dam

Depth of Water in Pamo 156 ft with a Storage of 47500 Ac Ft
Depth of Water in San Clemente 90 ft with a storage of 8570 Ac Ft

Griffin Bancroft
1000' above Div.
Dam of San Diego
River in Sec 11
T 14 S R 2 E.
Sept 6 1912

Volcan L & W. Co.
Santa Ysabel
River - 60,000 "
in NE ¼ Sec 27.
T 12 S R 1 E.
Sept. 20 1912

J. E. Gerrish
Santa Ysabel -
40.000 Dec 17
1912

Rob Armstrong in
Santa Maria Cr.
2 miles E of Ramona
1000"
- Feb 13 - 1912

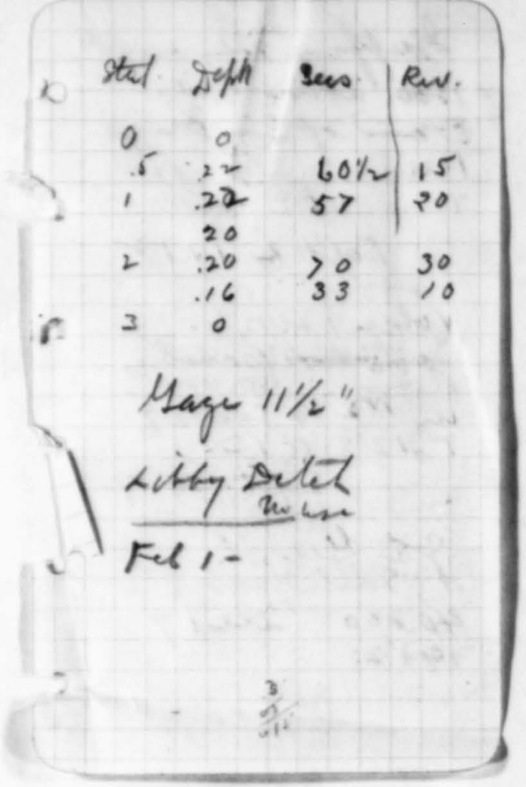
W. E. Woodward
1000" in Blocks 380
381, 282, 283, 284
& 285 of Ramona.
4th Mar 1912

Paul Sunburg
Phuch Ellen T: 1 ½"
in Chollas Cr.
Mar. 6 - 1912.

Halfield Creek.
Philip W Ellithorpe.
10.000 in Sect 13-
T. 13 S R 1 E.
Aug 30, 1912

CUYAMACA WATER COMPANY
AREA AND CAPACITY TABLE - CUYAMACA RESERVOIR

Gage	Area Acres	Capacity Mill. Gall.	Capacity Mill. Cu.Ft.	Capacity Acre Feet	Gage	Area Acres	Capacity Mill. Gall.	Capacity Mill. Cu.Ft.	Capacity Acre Feet
10' 0"	9.0	4.94	0.66	15.15	13' 0"	81.0	37.40	5.00	114.80
10' 1"	10.3	5.24	0.70	16.07	13' 1"	83.0	39.87	5.33	122.38
10' 2"	11.6	5.54	0.74	16.99	13' 2"	86.0	42.34	5.66	129.95
10' 3"	13.0	5.76	0.77	17.68	13' 3"	89.0	44.88	6.00	137.76
10' 4"	14.3	5.98	0.80	18.37	13' 4"	91.0	47.35	6.33	145.34
10' 5"	15.6	6.21	0.83	19.06	13' 5"	94.0	49.89	6.67	153.14
10' 6"	17.0	6.51	0.87	19.98	13' 6"	97.0	52.36	7.00	160.72
10' 7"	18.3	6.73	0.90	20.66	13' 7"	99.0	54.83	7.33	168.30
10' 8"	19.6	6.96	0.93	21.35	13' 8"	102.0	57.30	7.66	175.87
10' 9"	21.0	7.26	0.97	22.27	13' 9"	105.0	60.59	8.10	185.98
10' 10"	22.3	7.63	1.02	23.42	13' 10"	108.0	63.29	8.46	194.24
10' 11"	23.6	8.45	1.13	25.94	13' 11"	111.0	65.30	8.73	200.34
11' 0"	25.0	9.20	1.23	28.24	14' 0"	115	69	9.20	210
11' 1"	26.8	9.95	1.33	30.54	14' 1"	117	71	9.55	219
11' 2"	28.6	10.70	1.43	32.83	14' 2"	120	74	9.90	227
11' 3"	31.5	11.45	1.53	35.13	14' 3"	123	77	10.25	235
11' 4"	33.3	12.12	1.62	37.20	14' 4"	126	81	10.77	247
11' 5"	35.1	12.87	1.72	39.49	14' 5"	129	85	11.30	260
11' 6"	37.0	13.61	1.82	41.79	14' 6"	132	89	11.83	272
11' 7"	39.0	14.59	1.95	44.77	14' 7"	135	93	12.35	283
11' 8"	41.0	15.56	2.08	47.76	14' 8"	138	97	12.88	295
11' 9"	43.0	16.46	2.20	50.51	14' 9"	141	101	13.41	307
11' 10"	45.0	17.80	2.38	54.64	14' 10"	144	105	13.94	320
11' 11"	47.0	19.15	2.56	58.78	14' 11"	147	109	14.47	332
12' 0"	49.0	20.50	2.74	62.91	15' 0"	150	113	15.00	344
12' 1"	51.0	21.84	2.92	67.04	15' 1"	153	117	15.54	357
12' 2"	54.0	23.19	3.10	71.18	15' 2"	156	121	16.08	359
12' 3"	57.0	24.54	3.28	75.31	15' 3"	159	125	16.62	381
12' 4"	59.0	25.88	3.46	79.44	15' 4"	162	129	17.16	394
12' 5"	62.0	27.23	3.64	83.57	15' 5"	165	133	17.70	406
12' 6"	65.0	28.58	3.82	87.71	15' 6"	168	137	18.24	419
12' 7"	67.0	30.67	4.01	92.07	15' 7"	171	141	18.78	431
12' 8"	70.0	31.42	4.20	96.43	15' 8"	174	145	19.32	443
12' 9"	73.0	32.91	4.40	101.02	15' 9"	177	149	19.87	455
12' 10"	75.0	34.41	4.60	105.62	15' 10"	180	153	20.41	468
12' 11"	78.0	35.91	4.80	110.21	15' 11"	183	157	20.95	481



Stat	Depth	Secs.	Rev.
0	0		
.5	.22	60½	15
1	.22	57	20
	.20		
2	.20	70	30
	.16	33	10
3	0		

Gage 11½"

Libby Ditch

Feb 1-

Stat	Depth	Secs.	Rev.	Vel.	Vel. Coeff.	Mins.	
0	0						
.5	.22	60½	15	.58	.19	.05	.02
1	.22	57	20	.81	.70	.11	.08
	.20						
2	.20	70	30	.91	.90	.20	.18
2.5	.16	33	10	.70	.84	.09	.07
3	0				.35	.04	.01
							.36

Gage 11½"

water meeting Feb 1st 1913 Libby Ditch

CUYAMACA WATER COMPANY
AREA AND CAPACITY TABLE - CUYAMACA RESERVOIR

Gage	Area Acres	Capacity Mill. Gall.	Capacity Mill. Cu.Ft.	Capacity Acre Feet	Gage	Area Acres	Capacity Mill. Gall.	Capacity Mill. Cu.Ft.	Capacity Acre Feet
16' 0"	186	162	21.50	494	20' 0"	354	502	67.0	1538
16' 1"	189	167	22.20	510	20' 0¼"	354	504	67.2	1544
16' 2"	192	172	22.91	526	20' 0½"	355	506	67.5	1551
16' 3"	195	177	23.62	542	20' 0-3/4"	356	508	67.8	1557
16' 4"	198	182	24.32	558	20' 1"	357	510	68.1	1564
16' 5"	201	187	25.03	574	20' 1¼"	357	512	68.4	1570
16' 6"	204	193	25.74	591	20' 1½"	358	514	68.7	1577
16' 7"	207	198	26.45	607	20' 1-3/4"	359	516	69.0	1584
16' 8"	210	203	27.16	623	20' 2"	360	519	69.3	1591
16' 9"	213	208	27.87	639	20' 2¼"	360	521	69.6	1598
16' 10"	216	213	28.58	655	20' 2½"	361	523	69.9	1605
16' 11"	219	219	29.29	672	20' 2-3/4"	362	525	70.2	1612
					20' 3"	363	528	70.5	1619
17' 0"	223	224	30.00	689	20' 3¼"	363	530	70.7	1625
17' 1"	226	230	30.83	708	20' 3½"	364	532	71.0	1632
17' 2"	230	236	31.66	727	20' 3-3/4"	365	534	71.3	1638
17' 3"	233	242	32.50	746	20' 4"	366	536	71.6	1645
17' 4"	237	248	33.33	765	20' 4¼"	366	538	71.9	1651
17' 5"	240	254	34.16	784	20' 4½"	367	540	72.2	1658
17' 6"	244	261	35.00	804	20' 4-3/4"	368	542	72.5	1664
17' 7"	247	267	35.83	823	20' 5"	369	545	72.8	1671
17' 8"	251	273	36.66	842	20' 5¼"	370	547	73.1	1678
17' 9"	254	280	37.50	861	20' 5½"	371	549	73.4	1685
17' 10"	258	286	38.33	880	20' 5-3/4"	372	551	73.7	1692
17' 11"	262	292	39.16	899	20' 6"	373	554	74.0	1699
					20' 6¼"	373	556	74.3	1706
18' 0"	266	299	40.0	918	20' 6½"	374	558	74.6	1713
18' 1"	269	306	41.0	941	20' 6-3/4"	375	560	74.9	1721
18' 2"	272	314	42.0	964	20' 7"	376	563	75.3	1729
18' 3"	276	321	43.0	987	20' 7¼"	377	565	75.6	1736
18' 4"	280	329	44.0	1010	20' 7½"	378	567	75.9	1743
18' 5"	284	336	45.0	1033	20' 7-3/4"	379	570	76.2	1751
18' 6"	288	344	46.0	1056	20' 8"	380	573	76.6	1759
18' 7"	291	352	47.2	1082	20' 8¼"	381	575	76.9	1766
18' 8"	294	361	48.3	1109	20' 8½"	382	577	77.2	1774
18' 9"	298	370	49.5	1135	20' 8-3/4"	383	580	77.6	1782
18' 10"	302	378	50.7	1162	20' 9"	384	583	78.0	1790
18' 11"	306	387	51.8	1188	20' 9¼"	384	585	78.3	1797
					20' 9½"	385	587	78.6	1805
19' 0"	310	396	53.0	1217	20' 9-3/4"	385	590	78.9	1813
19' 1"	313	404	54.2	1243	20' 10"	387	593	79.3	1821
19' 2"	316	413	55.3	1270	20' 10¼"	387	595	79.6	1828
19' 3"	320	422	56.5	1297	20' 10½"	388	597	79.9	1835
19' 4"	324	431	57.7	1324	20' 10-3/4"	389	600	80.2	1843
19' 5"	328	440	58.8	1351	20' 11"	390	603	80.6	1851
19' 6"	332	449	60.0	1378	20' 11¼"	391	605	80.9	1859
19' 7"	335	457	61.2	1404	20' 11½"	392	607	81.2	1867
19' 8"	338	466	62.3	1430	20' 11-3/4"	393	610	81.6	1875
19' 9"	342	475	63.5	1457					
19' 10"	346	484	64.7	1484					
19' 11"	350	493	65.8	1510					

DATA ON USE OF WATER ON CUYAMACA SYSTEM FURNISHED FRANK ADAMS, IN CHARGE OF IRRIGATION INVESTIGATIONS FOR UNITED STATES, FOR USE IN DUTY OF WATER STUDIES FOR PROPOSED IRRIGATION DISTRICT BETWEEN DEL MAR AND OCEANSIDE.

W. A. Laidlaw - La Mesa - 9.5 acres Citrus

Total Use of Water in 1916 -------- 471,500 cubic feet
Total Use of Water in 1917 -------- 510,550 " "

Duty of Water in 1916 ---------- 1.14 acre feet per acre
" " " " 1917 ---------- 1.23 " " " "

Sterling Smith - La Mesa - 8 acres Citrus

Total Use of Water in 1916 -------- 420,020 cubic feet
" " " " " 1917 -------- 289,050 " "

Duty of Water in 1916 ---------- 1.21 acre feet per acre
" " " " 1917 ---------- 0.78 " " " "

L. & W. Mansur - Old La Mesa - 10.25 acres Gross
7.83 Actual Net Irrigated Area - Vegetables, Citrus, Deciduous and green feed for chickens.

Total Use of Water in 1916 -------- 325,090 cubic feet
" " " " " 1917 -------- 387,670 " "

Duty of Water (Gross Area) in 1916- 0.73 acre feet per acre
" " " " " " 1917-- 0.86 " " " "
" " " (Actual Net Irrigated) (Area) in 1916 ------ 0.96 acre feet per acre.
" " " (Actual Net Irrigated) (Area) in 1917 ------- 1.13 acre feet per acre.

R. E. Ground - North La Mesa - 30 acres net
10 acres Vegetables and 20 acres Citrus.

Total Use of Water in 1916------- 1,138,250 cubic feet
" " " " " 1917------ 1,025,200 " "

Duty of Water in 1916 ---------- 0.87 acre feet per acre
" " " " 1917 ---------- 0.79 " " " "

W. A. Adams - North La Mesa - 10 acres - citrus

Total Use of Water in 1916 ------ 379,270 cubic feet
" " " " " 1917 ------ 361,530 " "

Duty of Water in 1916 ---------- 0.87 acre feet per acre
" " " " 1917 ---------- 0.83 " " " "

Mrs. H. E. Trelear - North La Mesa - 11.25acres - citrus

Total Use of Water in 1916 ------ 271,180 cubic feet
" " " " " 1917 ------ 318,200 " "

Duty of Water in 1916 ---------- 0.56 acre feet per acre
" " " " 1917 ---------- 0.65 " " " "

C. L. Good - Lemon Grove - 10.68 acres - Citrus, etc.

Total Use of Water in 1916 ------ 323,260 cubic feet
Duty of Water in 1916 ---------- 0.7 acre feet per acre.

J. H. Halley - Lemon Grove - 9 acres - citrus

Total Use of Water in 1916 ------ 376,370 cubic feet
Duty of Water in 1916 ---------- 1.01 acre feet per acre.

E. G. Morse - Lemon Grove - 12 acres - Citrus

Total Use of Water in 1916 ---------- 493,940 cubic feet

Duty of Water in 1916 ---------- 0.94 acre feet per acre

T. J. Bryan - Lemon Grove - 47.7 acres - Citrus

Total Use of Water in 1916 ----------2,261,790 cubic feet

Duty of Water in 1916 ---------- 1.09 acre feet per acre

Harden B. Bell - Lemon Grove - 14.77 acres - Citrus

Total Use of Water in 1916 ---------- 584,340 cubic feet

Duty of Water in 1916 ---------- 0.60 acre feet per acre

CUYAMACA WATER COMPANY

STATEMENT SHOWING COMPARISON BETWEEN SO-CALLED WATER RIGHT CONTRACTS AND AMOUNTS OF WATER ACTUALLY DELIVERED TO CONSUMERS.

In June 1910 the San Diego Flume Company's property was transferred to Murray and Fletcher and the property was thereafter operated under the name of Cuyamaca Water Company.

At this time there were contracts outstanding calling for delivery to consumers of 463.08 miners inches of water, which is equivalent to 6,705 acre feet per year.

The following tabulation shows the amounts of water actually delivered to consumers during various years:

Year	Delivered to consumers acre feet	Percent of contract quantities
1909	3,572	53
1910	3,837	57
1911	3,006	45
1912	2,784	42
1913	1,177	18
1914	1,472	22
1915	3,394	51
1916	3,675	55

- Full supply not furnished to irrigators.

The average amount actually delivered annually to consumers during the full service years 1909, 1910, 1915 and 1916 was 3,625 acre feet or 54% of the contract quantity of 6,705 acre feet.

Figures for 1917 delivery to consumers are not yet available, but will be less than for 1916.

CUYAMACA WATER COMPANY

COMPUTATIONS SHOWING DUTY OF WATER ON THE SYSTEM

On the Cuyamaca Water System the areas irrigated and various crops raised were determined by actual field surveys in 1913 and 1914. This survey covered several months and cost the Company nearly $5,000 for surveys, computations and platting. The net areas irrigated and crops raised were as follows:

	Area Irrigated in Acres			
Crop	Low Service	High Service	Flume Service	Total
Olives	3	196	153	354
Deciduous Fruits	22	56	138	216
Grapes	0	1	604	605
Citrus Fruits	196	926	1092	2214
Alfalfa	0	12	40	52
Vegetables	52	82	71	205
Ornamental, etc.	20	21	38	79
Total	293	1296	2136	3725

The Low Service Area includes lands lying between the limits of the City of San Diego and Old La Mesa. The two Hansour 5 acre tracts are on the easterly edge of the Low Service Area.

The High Service Area includes lands lying between Old La Mesa and Eucalyptus Reservoir. The La Mesa, Lemon Grove and Spring Valley districts are included within the High Service Area.

The Flume Service Area includes all lands east of the Eucalyptus Reservoir and are all served direct from the Company's flume.

While the surveys referred to above were made in 1913-1914 conditions have changed but little since that time and the total areas Irrigated will not be materially affected. The areas in citrus fruits, deciduous fruits, olives and grapes are practically the same and practically the only changes will be found in the other crops whose total areas are small.

Owing to the mixed character of crops on lands under irrigation under the system, it will be impossible to give duties of water for any particular crop, such as oranges, lemons, olives, etc., except in isolated cases. The duty of water for the system will therefore have to be worked out as an average one covering all crops.

The duty of water for 1915 was as follows:

	Low Service	High Service	Flume Service	Total
Water delivered acre feet	260	1235	1642	3137
Acres Irrigated	293	1296	2136	3725
Depth of Water applied acre feet per acre	0.89	0.95	0.77	0.84

A full supply of water was furnished in 1915.

The duty of water for 1916 was as follows:

	Low Service	High Service	Flume Service	Total
Water delivered acre feet	277	1297	1782	3356
Acres Irrigated	293	1296	2136	3725
Depth of Water applied acre feet per acre	0.95	1.0	0.83	0.90

A full supply of water was furnished in 1916 except for a short interruption after the floods of January 1916. This interruption was, however, for so short a period and came at a time when the ground was so saturated that the total supply for the year was not appreciably affected.

From an inspection of the computations for duty of water in 1915 and in 1916, it is seen that the use on the flume line is less per acre than on either the high or low service areas. This is explained by the fact that some of the flume line consumers have pumping plants which are operated occasionally. Such operation in 1916 was almost negligible. No definite figures are available to show the actual quantities pumped as the owners of the plants keep no reliable records.

The duty on the high service area in 1915 was 0.18 acre feet more than on the flume service area and in 1916 was 0.17 acre feet less.

If 0.18 acre feet is added to the flume service use to compensate for pumped water from private plants, the 1916 figures become:

Low Service Area ———— 1.00 acre feet per acre
High " " ———— 0.95 " " " "
Flume " " ———— 1.01 " " " "
Average for entire system— 1.00 " " " "

On April 1st, 1917, a new schedule of rates went into effect. Under the old rates the irrigator paid at the rate of $65 per year per miner's inch (630,720 Cubic feet) for water delivered on the flume and $70 per year per miner's inch for water delivered on the Low and High Service Districts. Each consumer had a certain allowance each month which he could use but not exceed and for which he paid whether he used the water or not. Under the new rates the irrigator pays $4.00 for the first 2,000 cubic feet and for all additional water used, 2-1/2 cents per 100 cubic feet with no restrictions as to minimum or maximum use.

The result has been that use has decreased 27% for the first eight months of operation under the new rates as compared with the corresponding months of the previous year. The table below shows the comparative records:

Month	Use Under Old Rates Year 1916 Irrigation use in Thousand Cu. Ft.	Use Under New Rates Year 1917 Irrigation Use in Thousand Cu. Ft.	Percent of Decrease
April	16,649	6,883	59
May	17,896	7,386	58
June	16,087	12,806	20
July	20,304	17,969	12
August	17,507	15,380	12
September	15,659	12,930	17
October	12,133	12,945	# 7
November	14,075	8,356	41
	130,310	94,655	27

= Increase

The decrease shown above is in spite of the fact that the year 1917 has been one of considerably less rainfall than 1916. It is expected by the Company officials that the winter use under the new rates will be considerably less than in 1916.

It is unquestionably true that the new rates will operate to decrease the use of water for irrigation and that the average compensated use for 1916 of 1 acre foot per irrigated acre over the entire system will in 1917 show a substantial decrease, which will undoubtedly amount to at least 20%, giving an average annual use of water on the entire system of approximately 0.80 acre feet per irrigated acre.

Conclusions:

Average duty of Water in 1915 uncompensated for water supplied by pumping ---------- 0.84 acre feet per acre

Average Duty of Water in 1916 uncompensated for water supplied by pumping ---------- 0.90 acre feet per acre

Average Duty of Water in 1916 Compensated for water supplied by pumping ---------- 1.00 acre feet per acre

That the average use of water in 1917 will be much less than in 1916 and that when compensated for water supplied by pumping, will be very nearly 0.80 acre feet per irrigated acre, in spite of the fact that 1917 was a year of low rainfall.

It should be borne in mind that the foregoing computations have all been based upon net irrigated areas, deductions having been made for all dedicated streets and roads and for all waste land.

CITY OF SAN DIEGO DATA

September 1, 1914.

Reservoir	Gage	
Morena	83.29'	1,275,000,000
Upper Otay	66' 9"	625,000,000
Lower Otay	75' 3-3/4	2,725,000,000
Chollas	About	30,000,000
University	About	9,000,000
		4,664,000,000
Mr. Whitney is quoted as saying that 700,000,000 is below outlets, subtract		700,000,000
Net amount available ----------		3,964,000,000.

Pumping at Old Town Plant, San Diego River, is abandoned. New plant, 5 miles above, pump capacity 4 millions now being erected.

Amount available in storage ----------	3,964,000,000
Net amount anticipated for next year from watershed (average 4 years preceeding)	950,000,000
Total available for next season ----------	4,914,000,000
Total system losses, evaporation, seepage, etc., estimated at ----------	2,000,000,000
Amount available for consumption ----------	2,914,000,000

Assuming use of 8½ million gallons per day, thenbove supply is good for 360 days or until Sept. 1st, 1915.

Assuming 3 millions a day pumped from the San Diego River, this period will be extended three months or until December 1,1915.

--------oOOo--------

REPORT ON WATER SUPPLY

September 1, 1914.

--oOo--

September 1st - Cuyamaca Lake contains 175 million gallons

Estimated losses - September,

Evaporation	30	million	gallons
Boulder Creek	40	"	"
Flume	30	"	"
Flume consumption - full supply,	62	"	"
Requirement	162	"	"
Made up by Pumps 2 and 3,	11	"	"
Net withdrawal,	151	---------- 151	" "
Cuyamaca - October 1st,		---------- 24	" "

La Mesa

September 1st - La Mesa Reservoir contains 161 million gallons

Estimated withdrawals - September,

Evaporation	7	million	gallons
Pipe leakage	10	"	"
High Service	62	"	"
Low Service	26	"	"
	105	---------- 105	" "
Amount on hand October 1st in La Mesa		---------- 56	" "
Add in Murray Hill October 1st		---------- 20	" "
Total available October 1st,		---------- 76	" "

Full Supply:

The Flume will be out of water by October 15th.

La Mesa will be empty by October 15th.

[DATE: ?]

EXHIBIT B

EXISTING RESERVOIRS

Showing Water Storage of Each

NAME	CAPACITY		AREA FLOODED IN ACRES	SPILLWAY ELEVATION U.S.G.S.
	ACRE FEET	MILLION GALLONS		
Henshaw	203,580	66,300.0	6020	2727
El Capitan	116,448	38,000.0	1574	750
Morena	67,211	21,900.0	1743	3044
Lower Otay	56,314	18,353.3	1266	490
Barrett	42,796	13,979.0	861	1615
Hodges	37,533	12,284.3	1317	315
Sweetwater	29,065	9,470.0	1030	235
Cuyamaca	11,595	3,678.2	978	4623
Wohlford	7,560	2,463.4	225	1495
Murray	5,898	1,921.0	194	541
Upper Otay	2,566	835.7	139	549
San Dieguito	1,132	368.6	75	250
Judson	652	212.4	35	220
Chollas	310	101.4	17	422
Peckstein	200	65.3	10	829

CAPACITY AND FLOODED AREA CURVE OF LOWER OTAY RESERVOIR

COMPILED FROM DATA FILED IN OFFICE OF CITY ENGINEER
JUNE 1916

TOTAL ACRES FLOODED 1414 — CAPACITY AT 150 CONTOUR = 21653 M.G.

DEPTH	ACRES FLOODED	MILLION GAL'S
0	0	0
10	2.4	4
20	11.61	24
30	40.19	109
40	96.16	331
50	160.09	750
60	239.46	1402
70	276.29	2245
80	303.00	3191
90	451.65	4424
100	567.05	6088
110	690.84	8147
120	803.45	10589
124	869.20	11679
130	1000.00	13766
150	1414.00	21653

APPROVED BY GEO. CROMWELL
CITY ENGINEER
R.A.S. - F.M.R.

SCALE IN 100 ACRES

"0" CONTOUR = 346.65 USGS

GAUGE HEIGHT IN FEET

CAPACITY IN BILLION GALLONS

845 T-1

TOTAL ACRES FLOODED 1414

CAPACITY AT 150 CONTOUR = 21653 M.G.

CAPACITY AND FLOODED AREA CURVE OF LOWER OTAY RESERVOIR

COMPILED FROM DATA FILED IN OFFICE OF CITY ENGINEER

JUNE 1916

DEPTH	ACRES FLOODED	MILLION GAL'S
0	0	0
10	2.4	4
20	11.61	24
30	40.19	109
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50	160.09	750
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100	567.05	6088
110	690.84	8147
120	803.45	10589
124	869.20	11679
130	1000.00	13766
150	1414.00	21653

APPROVED BY GEO. CROMWELL.
CITY ENGINEER

P.A.S. - F.M.R.

SCALE IN 100 ACRES

"0" CONTOUR = 346.65 U.S.G.S.

GAUGE HEIGHT IN FEET

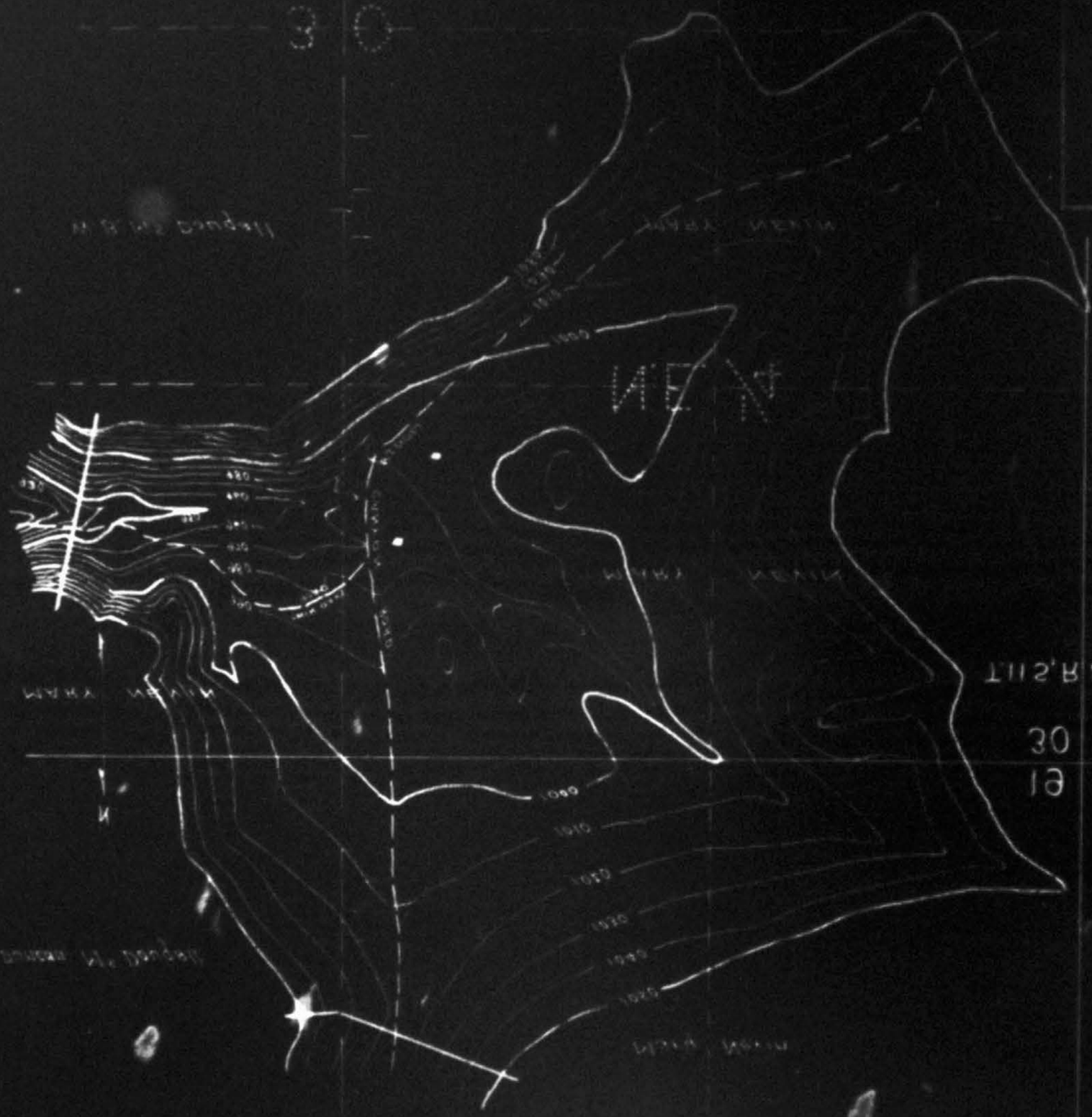
CAPACITY IN BILLION GALLONS

845 T-1

PLATE 3

MERRIAM RESERVOIR SITE

LOGAN LAND & WATER CO.



CAPACITY AND FLOODED AREA CURVE OF BARRETT RESERVOIR

COMPILED FROM DATA FILED IN DEPARTMENT OF WATER JUNE 1916

TOTAL ACRES FLOODED 936.2

CAPACITY AT 179' CONTOUR = 15360 M.G.

GAUGE HEIGHTS IN FEET

DEPTH	ACRES FLOODED	MILLION GALS
10	1.0	
20	5.6	
30	11.6	
40	20.8	
50	44.0	
60	70.4	191
70	97.0	460
80	147.2	861
90	182.9	1405
100	231.5	2060
110	285.3	2924
120	362.5	3950
130	468.8	5326
140	576.5	7015
150	661.7	9009
160	784.1	11454
170	871.4	14154
175	936.2	15630

APPROVED BY GEO CROMWELL
CITY ENGINEER

RAT — EMR

SCALE IN 100 ACRES

"0" CONTOUR = 1446.12' USGS

CAPACITY IN BILLION GALLONS

844 T-1

(2)

TOTAL ACRES FLOODED 936.2

CAPACITY AT 179' CONTOUR = 15360 MG

CAPACITY AND FLOODED AREA CURVE OF BARRETT RESERVOIR

COMPILED FROM DATA FILED IN DEPARTMENT OF WATER JUNE 1916

DEPTH	ACRES FLOODED	MILLION GALS
10	1.0	
20	5.6	
30	11.6	
40	20.8	
50	44.0	
60	70.4	191
70	97.0	460
80	147.2	861
90	182.9	1405
100	231.5	2060
110	285.3	2924
120	362.5	3950
130	468.9	5326
140	576.5	7015
150	661.7	9069
160	784.1	11454
170	871.4	14154
175	936.2	15630

APPROVED BY GEO CROMWELL
CITY ENGINEER

R.A.T. — F.M.R.

GAUGE HEIGHTS IN FEET

SCALE IN 100 ACRES

0 CONTOUR = 1446.12' USGS

CAPACITY IN BILLION GALLONS

844 T-1

(2)

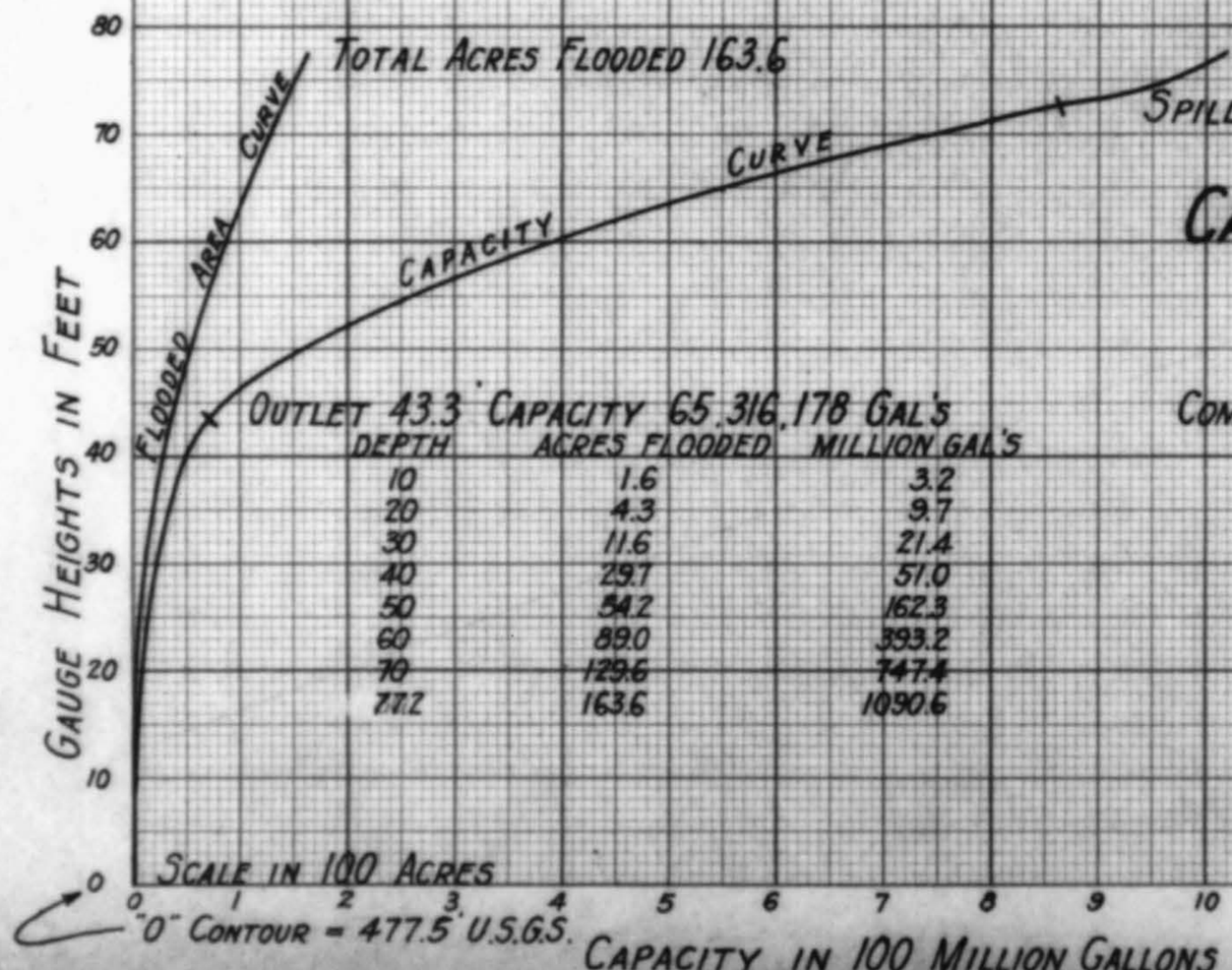
1-L
3A8

(5)

T-1
346

CAPACITY AND FLOODED AREA CURVE OF UPPER OTAY RESERVOIR

COMPILED FROM DATA ON FILE IN THE DEPARTMENT OF WATER
JUNE 1916



DEPTH	ACRES FLOODED	MILLION GAL'S
10	1.6	3.2
20	4.3	9.7
30	11.6	21.4
40	29.7	51.0
50	54.2	162.3
60	89.0	393.2
70	129.6	747.4
77.2	163.6	1090.6

APPROVED BY GEO CROMWELL
CITY ENGINEER

R.A.S — F.M.R.

846 T-1

155.0
Increased Capacity - 1923: 17,492.8 M.G.

Total Acres Flooded 1370.6 Capacity at 150' Contour - 15226 M.G.

Spillway Elev. 146 Capacity 13400 M.G.

Capacity and Flooded Area Curve of Morena Reservoir

Compiled from data on file in Department of Water.
June 1916.

Gauge Height in Feet.

Depth	Acres Flooded	Million Gal's
10	68	1.4
20	4.38	4.3
30	11.24	33.6
40	21.65	81.4
50	38.42	182.0
60	72.54	351.4
70	111.16	660.9
80	152.31	1080.4
90	225.05	1690.5
100	303.94	2557.6
110	437.62	3736.1
120	623.57	5473.9
130	850.08	7854.6
140	1137.26	11094.4
150	1370.65	15226.9 = 46.730 Ac-Ft

Outlet Elev. 33.5'
Capacity 41.5 M.G.

Scale in 100 Acres

"0" Contour = 2882.4 U.S.G.S.

Capacity in Billion Gallons.

Approved By Geo. Cromwell
City Engineer

R.A.S.—E.M.R.

843 T-1

[other copy of figures from letter Jan 25, 1916 to L. MATTHEWS FROM E. H. N. NATO. LOCAL WEATHER FORECASTER FILED W/ MATTHEWS CSM]

CUYAMACA WATER COMPANY

San Diego, Cal.
January 25, 1916.

Ten year precipitation average, annual, 1905-1914.

Julian 31.23
Escondido.....18.20
Los Angeles.....16.64
San Diego 10.82

Seasonal, to January 24th., this year.

Julian .....No record.
Escondido.....17.70
Los Angeles.....13.96
San Diego 8.13

SAN DIEGO GORGE RESERVOIR

BEING RESERVOIR ON SAN DIEGO RIVER AT MISSION CANYON.

AREA AND CAPACITY TABLE.

Elevation	Depth	Acres Flooded	Capacity Ac. Ft.	Capacity Mil.Gal.
100	0	0.0	0.00	0.0
110	10	0.37	1.85	0.6
120	20	1.86	13.00	4.2
130	30	3.96	42.10	13.7
140	40	7.69	100.35	33.8
150	50	13.57	206.65	67.3
200	100	41.10	1,573.40	513.5
250	150	92.75	4,919.65	1,602.0

TABULATION

SHOWING NET SAFE YIELD OF EL CAPITAN RESERVOIR, WITH DAM IMPOUNDING WATER TO DEPTHS FROM 60 FEET TO 200 FEET INCLUSIVE.

CONDITIONS OF STUDY

ALL RESERVOIRS ASSUMED TO BE FULL AT BEGINNING OF STUDY. FLETCHER DAM BUILT TO HEIGHT OF 150 FEET ABOVE STREAM BED, HAVING STORAGE OF 17,106 ACRE FEET. BOULDER CREEK DIVERTED TO FLETCHER RESERVOIR. DIVERTING DAM AND SOUTH FORK DIVERSIONS AS AT PRESENT.

HEIGHT OF DAM IN FEET	AMOUNT STORED IN ACRE FT.	EVAP. LOSS IN ACRE FT.	NET YIELD ACRE FEET	NET YIELD M. G. D.
60	4708	472	1100	1.0
80	10448	686	1866	1.7
100	20831	1303	2761	2.5
120	36474	2302	3685	3.3
140	55781	2880	5252	4.7
160	78953	3404	7303	6.5
167	90000	3667	8267	7.4
180	106600	3644	9954	8.9
200	139200	4304	12554	11.2

8/8/24 T. H. KING,
CHIEF ENGINEER,
CUYAMACA WATER CO.

Reservoir on San Diego River at Mission Canyon

Area & Capacity Table

Elev	Depth	Area Flooded	Capacity Acre Ft	Capacity Mil Gal
100	0	0.0	0.00	0.0
110	10	.37	1.85	.6
120	20	1.86	13.00	4.2
130	30	3.96	42.10	13.7
140	40	7.69	100.35	33.8
150	50	13.37	206.66	67.3
200	100	41.10	1573.40	513.5
250	150	92.75	4919.65	1602.0

San Diego Gorge Res

~~Area &~~ Capacity Table


```
43560)176232.04(4.0457
      174240
        199204
        174240
         249640
         217800
          318400
```

Computations of Area & Capacity of Reservoir in Mission Canyon of San Diego River

Equation 434 — 4.0457

	Planimeter	Area
110 ft Contour	40	.37
120 ft "	200	1.86
130 ft "	425	3.96
140 ft "	825	7.69
150 ft "	1455	13.57
200 ft "	3440	
	965	
	4405	41.10
250 ft "	2135	
	3800	
	3880	
	136	
	9951	92.75

109

RES

	Planimeter	Area
110 ft Contour	40	.37
120 ft "	200	1.86
130 ft "	425	3.96
140 ft "	825	7.69
150 ft "	1455	13.57
200 ft "	3440	
	965	
	4405	41.10
250 ft "	2135	
	3800	
	3880	
	136	
272	9951	92.75

434

		Area	Capacity Acre Ft
100 ft Contour		0	0
110 ft	"	0.37	1.85
120 ft	"	1.86	11.15
130 ft	"	3.96	29.10
140 ft	"	7.69	58.25
150 ft	"	13.57	106.30
200 ft	"	41.10	1366.75
250 ft	"	92.75	3346.25

OK

.37
1.86
2.23
1.115

1.86
3.96
5.82
29.10

3.96
7.69
11.65
58.25

7.69
13.57
21.26
10.63

13.57
41.10
54.67
27.335
50
1366.750

41.10
92.75
133.85
66.925
50
3346.250

.185
2.23
1.115
5.82
2.91
11.65
5.825
21.26
10.63
54.67
27.335
133.85
66.925

1.85
11.2
13.05
29.1
42.15

3.07) 49.65
30 7
18 4 9
18 4 2
7 65

160

F. M. FAUDE
CIVIL AND HYDRAULIC ENGINEER
ASSOC. MEM. AM. SOC. CIVIL ENGINEERS
824 6TH ST., SAN DIEGO, CALIFORNIA

SAN DIEGO, CALIFORNIA, March 21, 1918

Col. Ed Fletcher,
Mgr C W Co.

Dear Sir:-

Answering your letter of March 19th, I give you the following information regarding the City of San Diego's water system.

Safe Yield of System

The safe yield of the system as determined by the Hydraulic Engineer of the Railroad Commission of the State of California, in 1914, was 6.5 million gallons daily. The safe yield of the system today is less than this determination shows for the reason that in January 1916 the Lower Otay Dam was destroyed by flood and has not yet been rebuilt. In the Railroad Commission's study of safe yield this structure was included in the storage reservoirs on the system.

I should say that the destruction of the Lower Otay Reservoir has reduced the safe yield of the system at least 1.5 million gallons daily, making the present safe yield 5 million gallons daily. It is admitted that this is a very rough approximation, but I believe gives fair results.

Demands on the System

The total consumption of water on the City system during the last five years has been as follows:

	Total Gallons	Average Million Gallons per day
Year 1913 ----------	2,706,771,227	7.42
" 1914 ----------	2,905,259,023	7.96
" 1915 ----------	3,073,601,091	8.42
" 1916 ----------	3,062,678,406	8.39
" 1917 ----------	3,216,784,192	8.81

During each of the last five years, the consumption of water has been greater than the safe yield of the system, even when the Lower Otay Reservoir was intact and storing water.

In connection with a consideration of the demands on the system, it is interesting to note that in the entire year 1917 the runoff into the City's reservoirs was 1,440 million gallons less than consumption and seepage, evaporation and transmission losses. Also that for the last seven months of 1917 this deficiency amounted to 3,568 million gallons, including 28 million gallons pumped from Mission Valley.

A study of the records of operation of the City system (see next page) shows that in the years 1907, 1911, 1913, 1914 and 1917 the runoff into the reservoirs failed to provide sufficient water to take care of use and losses during the year.

The demands on the system were increased during the year 1917 after the City undertook to supply the Cantonment at Camp Kearny. This additional demand did not assume large proportions until late in the year and consequently does not greatly affect the average daily use. It is extremely probable that during 1918 the average daily use in the City, including Camp Kearny, will be in excess of 10 million gallons.

STATEMENT SHOWING WATER IN STORAGE, USE OF WATER, AND INCREASE OR DECREASE IN STORAGE AFTER TAKING CARE OF USE AND LOSSES. CITY OF SAN DIEGO WATER SYSTEM.

Year	Storage: Beginning of year	Storage: Increase during year	Storage: Decrease during year	Total Use during year	Average use per day
1905 #	3,000.00	1,100.00		761.02	2.48
1906 X	4,100.00	3,080.00		944.08	2.58
1907	7,180.00		180.00	1,362.03	3.73
1908	7,000.00	600.00		1,534.57	4.20
1909	7,600.00	100.00		1,559.15	4.27
1910	7,700.00	1,250.00		1,782.99	4.88
1911	8,950.00		1,230.00	1,991.78	5.46
1912	7,720.00	60.00		2,276.87	6.24
1913	7,780.00		2,980.00	2,706.77	7.42
1914	4,800.00		1,160.00	2,905.26	7.96
1915	3,640.00	7,670.00		3,073.60	8.42
1916	11,310.00	1,748.19		3,062.68	8.39
1917	13,058.19		1,412.02	3,216.78	8.81
1918	11,646.17				

# = March 1, 1905.
X = Commenced purchase of water from Southern California Mountain Water Company.

The above statement shows that in 1907, 1911, 1913, 1914 and 1917 the runoff into the reservoirs failed to provide sufficient water to take care of use and losses during the year.

Col. Ed Fletcher,

Cost of Water Delivered by City System

A report of the City's Manager of Operation gives the cost of gravity water delivered to University Heights Reservoir as $0.189 per thousand gallons in 1915 and $0.19 in 1916. I have not yet seen any figures for costs during 1917.

The cost for 1916 does not include interest on the cost of rebuilding the Lower Otay Dam which will be at least $35,000 per year.

The cost of water delivered at Camp Kearny will amount to about 5 cents per thousand gallons more than the cost delivered at University Heights Reservoir on account of two pumping lifts, one at the University Heights stand pipe and one on the mesa near the camp. The total lift being about 180 feet.

Necessity for other Sources of Supply for Camp Kearny

The demand on the city System during 1918 will be at least 10 million gallons daily. The safe yield of the system is now only 5 million gallons daily, and it is only a question of time before an acute shortage is experienced. The past few years have been of more than normal rainfall and there is every reason to expect a series of dry years in the near future. Lower Otay Dam will not be completed in time to store any water until 1919 and even when completed will add only about 1.5 million gallons daily to the safe yield. Experience in the past has shown that Lower Otay watershed is only fairly productive of runoff as evidenced by the fact that from the date of completion

of the original dam in 1895 the reservoir was never filled until January 1916 when the dam was destroyed by flood.

From Morena Reservoir to University Heights Reservoir is approximately 50 miles. In this distance the chance of damage to the transmission line is great as is also the consequent danger of interruption of the supply to the Camp. From Upper Otay to University Heights is approximately 27 miles, and here the same dangers exist. From University Heights to Camp Kearny is about 8 miles which should be added to the lengths of transmission lines previously given. From your own La Mesa Reservoir, with a capacity of 2 billion gallons, is only eight miles as compared to 35 and 58 from Upper Otay and Morena. Naturally a supply from La Mesa Reservoir would be much less liable to interruption than from the City System.

Very truly yours,

FMF:BK

-- Copy --

OPERATING DEPARTMENT

CITY OF SAN DIEGO, CAL.
MAIN OFFICE CITY HALL

Feb. 23rd, 1917

TO THE HONORABLE, THE MAYOR AND THE COMMON COUNCIL
OF THE CITY OF SAN DIEGO, CALIFORNIA.

Gentlemen:

Complying with instructions contained in Resolution No. 22363, I am handing you herewith report on the amount of water delivered to consumers outside the city, its ratio of amounts to the whole. Also cost of water from the impounding system to the University Heights reservoir for the years 1915 and 1916.

Respectfully,

F. M. LOCKWOOD
MANAGER OF OPERATION

FML/L

COST OF WATER DELIVERED AT UNIVERSITY HEIGHTS RESERVOIR, 1915

Per 1000 Gallons

GRAVITY WATER FROM IMPOUNDING SYSTEM	PUMPED FROM MISSION VALLEY	PURCHASED FROM CUYAMACA WATER CO	TOTAL GALLONS DELIVERED
1,735,918,071	841,241,000	191,238,126	2,768,397,197

Interest on 4,000,000.00 at 4% 1915	176,781.25	
Interest on 520,196.07 at 5% 1915	26,009.80	
Maintenance	21,232.36	
Operation	29,760.03	
Depreciation	76,001.54	
City water delivered 1,735,918,071 Gallons, Cost	329,784.98	- .189 per 1000 Gals.

IMPROVEMENT OF SYSTEM SINCE DATE OF PURCHASE

Cottonwood Conduit	171,642.63
Pine Creek Intake	46,044.83
Tunnels Dulzura Conduit	9,575.99
Bonita Pipe Line	221,516.33
Lower Otay Seepage Pump	5,587.81
Filtration Plant	65,828.48

COST OF WATER DELIVERED AT UNIVERSITY HEIGHTS RESERVOIR, 1916

per 1000 Gallons

Gravity Water from Impounding System	Pumped from Mission Valley	Pumped from Old Town	Purchased from Cuyamaca Water Co.	Totals Gallons Delivered
1,923,665,141	577,771,000	13,534,500	510,541,355	3,025,511,996

COST, MAINTENANCE & OPERATION IMPOUNDING SYSTEM, 1916

	Operation	Maintenance	Total
Labor	10,718.15	19,038.53	29,756.68
Material	48,378.55	7,915.54	56,294.99
	59,096.70	26,954.07	86,050.77

Interest on $4,000,000.00 at 4½% year 1916 -	171,281.25	
" " 738,980.72 at 5% " 1916 -	33,928.13	Bonds issued
Operation - - - - - - - - - - - - - - - - - -	59,096.70	for improvements
Maintenance - - - - - - - - - - - - - - - - - -	26,954.07	since date of
Depreciation - - - - - - - - - - - - - - - - - -	76,001.54	purchase
Gravity water delivered 1,923,665,141 Cost	367,261.69	- 19 per 1000 Gallons

The increased cost of Maintenance & Operation of the Impounding System in 1916 due to abnormal weather are shown in the following items:

Power purchased	13,724.86
Chemicals for purification	25,000.00
Repairs to Morena	5,943.84
Pumps and Sumps Lower Otay	12,500.00
Repairs to Telephone Lines	2,088.94
	59,257.64

(This does not include flood damage of 1916 of	$260,000
(Rebuilding Bonita Pipe line ----------	220,000
(Rebuilding Lower Otay Dam ----------	700,000
	$1,180,000

(The above does not increase the supply of water.
Ed Fletcher.

F. M. FAUDE
CIVIL AND HYDRAULIC ENGINEER
ASSOC. MEM. AM. SOC. CIVIL ENGINEERS
924 6TH ST., SAN DIEGO, CALIFORNIA

SAN DIEGO, CALIFORNIA, March 20, 1918

Col. Ed Fletcher,
Mgr C W Co.
Office.

Dear Sir:-

Answering your letter of March 19th, I give you the following information regarding the Cuyamaca Water Company's System.

Location of System

The Cuyamaca Water System is located in San Diego County. Beginning at the Cuyamaca Reservoir, 60 miles east of San Diego in the Cuyamaca Mountains, and extending through the San Diego River Valley, El Cajon Valley, Cities of El Cajon, La Mesa, and East San Diego, to the easterly limits of the City of San Diego. A map of the system is attached.

Sources of Water Supply

The water supply is secured from the runoff of the water sheds of the Cuyamaca Reservoir, San Diego River, South Fork Creek and La Mesa Reservoir. Also, in case of necessity, from water pumped out of the bed of the San Diego River above Lakeside.

Storage Reservoirs

The storage reservoirs on the system and their capacities are as follows:

Reservoirs	Capacities — Acre Feet	Thousand Cubic Feet	Million Gallons
Cuyamaca	13,200	574,992	4,301
Diverting Dam	69	3,006	22
Murray Hill	127	5,532	41
Eucalyptus	26	1,133	8
La Mesa	6,138	267,371	2,000
Total Present Storage	19,560	852,034	6,372

Plans have been drawn and bids are about to be received for the construction of a concrete multiple arched dam at the Diverting Dam, which will increase the storage at that point to a total of 12,000 acre feet. This will give a total system storage of:

31,491 acre feet
1,371,748 thousand cubic feet
10,252 million gallons

In addition to these storage reservoirs, there is an underground storage basin on the San Diego River, above the town of Lakeside, where the Company's El Monte Pumping Plant is located, and from which water is pumped into the system in seasons of drought. This pumping plant has a present daily capacity of 2 million gallons.

Attention should be called to the fact that the system does not depend entirely upon water held in storage in its reservoirs. There is a large summer flow in the San Diego River and the South Fork Creek which is drawn upon to such an extent that in many years the draft from Cuyamaca Reservoir is very small. In ordinary years this draft will not exceed 4 months in the year and in 1916 was only 63 days for a total of 400 acre feet. For the past twenty years the average runoff of the San Diego River at the Diverting Dam was approximately 12,000 acre feet, and of the South

Fork Creek was approximately 3,600 acre feet, or a total of 15,600 acre feet. The additional supply furnished by the summer flow of these two streams naturally decreases the necessity for large storage.

Safe Yield of the System

The safe Yield of the system was determined in 1915 by Charles H. Lee, of the United States Geological Survey and the Los Angeles Aqueduct Engineering Departments, to be 3,472 acre feet per year, or 3.1 million gallons per day. Since this study was made the Railroad Commission has declared, in its decision No. 4058, copy of which is attached, that the system is capable of caring for all demands of consumers and allowed the Company to sell additional water; in other words, that the system was 100 per cent efficient. Also since this safe yield study was made, the Capacity of the La Mesa Reservoir has been increased by 4,951 acre feet, and other improvements made on transmission lines which increase capacity and yield. The total increase in safe yield is from 2 to 3 million gallons per day.

The construction of the new dam at the diverting dam will also materially increase the yield of the system.

Demands of Present Consumers

The demands of present consumers can best be determined by their use in the past. For the years 1916 and 1917 the total use was as follows:

	Total Acre Feet	Total Cubic Feet	Average Million Gallons per day
Year 1916	3,670	159,823,000	3.28
Year 1917	2,963	129,075,000	2.65

These records show that in 1917 the total use was only 81 per cent of the 1916 demands, in spite of the fact that 1917 was a very dry year. From April 1st to December 31st, 1917, the use of water was only 74.5 percent of the use in the corresponding months of 1916. This is explained by the fact that on April 1st, 1917 a new schedule of increased rates was put into effect, which naturally worked to reduce consumption. In addition there was a further reduction due to the fact that under the old rates a consumer was allowed a certain quantity each month which he paid for whether he used it or not, and as a consequence frequently used more than needed simply because he "had it coming". Under the new rates he pays for only what he uses in any month, and as a result the use has dropped off materially.

Under these conditions, and keeping in mind the fact that 1917 was a very dry year, it is safe to assume that the average use per year will not exceed 75 per cent of the 1916 demands. This will give the following results:

Probable Average Annual Demands in Acre Feet -------	2,753
" " " " " Cubic Feet-------	119,867,000
" " " " " Million gallons daily ---	1.99

Quantity Available for sale to others than Present Consumers

Taking into account the safe yield of the system and the demands of present consumers, it is safe to assume that from 3 to 4 million gallons daily is available for sale to outsiders.

Very truly yours,

FMF:BK

F M Faude

PACIFIC OCEAN

L.A.&S.D.B.R.R.

A.T.&S.F.R.R.

MISSION BAY

CAMP KEARNY

7

8

EASTERLY LIMITS OF CITY OF SAN DIEGO

RANCHO EX-M

SAN DIEGO

SAN DIEGO RIVER

UNIVERSITY HEIGHTS RESERVOIR

LA MESA RESERVOIR

MAIN DISTRIBUTION PIPE LINE

CITY OF SAN DIEGO PIPE LINE

PIPE LINE

BAY OF SAN DIEGO

U.S. MILITARY RESERVE

NORTH ISLAND

CORONADO

SAN DIEGO

EAST SAN DIEGO

CHOLLAS RESERVOIR

SAN DIEGO & ARIZONA

EX-MISSION

RANCHO

EL CAJON

2 W.

1 W.

W. FOSTER

SYCAMORE CREEK

SAN VICENTE CREEK

SAN DIEGO RIVER

SAN DIEGO RIVER

SANTEE

LAKESIDE

EL MONTE PUMPING PLANT

TUNNEL No. 5

TUNNEL No. 6

CUYAMACA FLUME

TUNNEL No. 7

LA MESA RESERVOIR

LA MESA DITCH

PIPE LINE

MURRAY HILL RESERVOIR

SAN DIEGO & ARIZONA R.R.

LA MESA

EUCALYPTUS RESERVOIR

EL CAJON

CUYAMACA FLUME

TUNNEL No. 8

SAN DIEGO & ARIZONA R.R.

16S.

RANCHO SAN VICENTE

14S.

15S.

1E.

2E.

CAPITAN GRANDE INDIAN RESERVATION

SAN DIEGO RIVER

CEDAR CREEK

DIVERTING DAM

TUNNEL No. 1
SAND CREEK SYPHON

TUNNEL No. 2

SAN DIEGO RIVER
CUYAMACA FLUME

SOUTH FORK SYPHON

SOUTH FORK DIVERTING DAM

SOUTH FORK CREEK

FEEDER FLUME

TUNNEL No. 3

CHOCOLATE SYPHON

CHOCOLATE CREEK

TUNNEL No. 4

CONEJOS CR.

KING CREEK

BOULDER

2E.
3E.
4E.
13S.
SAN DIEGO RIVER
CEDAR CREEK
INAJA I.R.
COSMIT I.R.
DIVERTING DAM
BOULDER CREEK
CUYAMACA RESERVOIR
GRANDE
INDIAN
RESERVATION
CONEJOS CR.
KING CREEK

RANCHO CUYAMACA

MAP OF CUYAMACA WATER SYSTEM

APPROXIMATE SCALE - 1 INCH = 1 MILE

0 ½ 1 2 3 4 5 6 MI.

OFFICE OF CUYAMACA WATER CO.

MARCH 21, 1918.

Ed Fletcher Papers

1870-1955

MSS.81

Box: 56 Folder: 3

Business Records - Water Companies - Cuyamaca Water Company - Net safe yield studies: San Dieguito System, Warner-Volcan System, Cuyamaca System