

Monte Vista, Colorado
 December 22, 1947

Mr. M. C. Hinderlider
 State Engineer
 Denver, Colorado

Dear Mr. Hinderlider:

Following is my annual report covering the irrigation season of 1947, water District No. 20, Division No. 3.

Our annual meeting with you this year was somewhat early, thus my report was not complete but was presented orally, as was most of the others. I wish to mention that our meeting with you was most interesting and instructive this year, to me at least, for a great deal of the discussion covered problems and matters common to all; at times we like to know how the other fellow handles his problems, it is educational and offers each confidence.

The snow-survey of April 1st on the water-shed supplying water to District 20, reported 75% of the ten year average, giving the run-off estimate of 425,000 acre feet against 555,000 acre feet for the ten year average. In spite of this dark outlook at the beginning of the season, there was delivered to the canals and ditches 639,727 acre feet compared with 452,001 acre feet in 1946. It may also be added that the reservoir storage was only about 25% of capacity.

Prolonged rainy periods in the surrounding mountains and proportionate amounts in the valley, this accompanied with an orderly and uniform run-off, made a generally satisfactory irrigation season.

Some pumping for irrigation was done in some areas, but only to a limited extent, as compared with recent years.

Following is the amount of water delivered to ditches in acre feet, in Water District No. 20.

Year	River Direct	Reservoir	Trans. Mtn. Diversion	Total
1946	425,920	24,155	1,926	452,001
1947	611,200	26,619	1,892	639,727
Normal				550,000

As has been mentioned, and as the general crop report will indicate, crops produced in District #20 were above normal and I think an interesting observation may be made that the quality of the potatoes produced (our principal crop) were of unusual high quality. If asked why this high quality, the producer would likely tell you it was due to the fact that water users generally were able to hold the ground water at the proper level for maximum results, both as to quality as well as quantity production. Putting it another way, especially in potato growing, better results seem to be obtained by the sub-irrigation method as compared with flooding.

Some interesting studies and experiments have been carried on here in the use of chemicals for the eradication of willows and of weeds and moss in the canals and ditches. By spraying the willows, a pest along the ditch banks and fence lines, with a solution of one part 2-4-Dichlorophenoxy acetic acid, common 2-4-d, and 400 parts of water, very satisfactory eradication has been realized; the cost is not excessive. With the use of a chemical, Benicor, (question of spelling) an ingredient of 2-4-d, for the eradication of weeds and fungi in the canals and ditches, results thus far here have been not too satisfactory. The flow of the canal is cut down to a very small percent of its capacity and the solution is mixed with the slowly moving water.

Rather extensive new construction and repairs has been done on the past season, with the installation of Calco Meter gates, popular equipment here for the measurement of water. Common also on the Rio Grande Canal, the largest in the district, is the use of the "orifice" for measurement to the water user. A slot 6 inches high, top of opening under a minimum head of 5 inches pressure, length 16 $\frac{2}{3}$ inches, is supposed to deliver 100 statutory inches.

Some of the larger canals contemplate, in the near future, extensive repairs, at their diversion head-works.

Mention should be made concerning repairs and construction in connection with reservoirs and dams the past season.

Elk Creek Reservoir

A new dam forming a small reservoir to be used principally for fish culture was started in the fall of 1946 and completed late this summer appears to be a substantial and well constructed earthfill. The reservoir designated as Elk Creek No. 1, has a capacity of 33.3 acre feet. The dam is approximately 200 feet in length with a maximum height of 16.0 feet with a 5 foot free-board. The up-stream face of the dam has a $2\frac{1}{2}$ to 1 slope with a stone rip-rap as has also the small carrying ditch within the 100 foot wide spillway.

Shaw Reservoir

The Shaw reservoir, holding priority No-1, in Water District 20, is formed by two dams constructed for the purpose of enlarging a small natural lake. The reservoir takes its supply from Cat Creek within the drainage basin of the South Fork of the Rio Grande.

Shaw Reservoir, Cont'd.

The original statement of claim was filed with the State Engineer on June 16, 1908, filing No. 4851; the stated capacity was 15,748,000 cubic feet. An amended claim was accepted for filing by the State Engineer on December 15, 1913, filing No. 10554; the stated capacity of the reservoir was 21,374,640 cubic feet with water surface in the reservoir at 16 feet, or a claimed increase of 5,626,640 cubic feet. This additional increase in capacity was never accomplished.

On July 24, 1945, the central portion of the north and main dam in which the outlet pipe was located failed.

The owners of the reservoir immediately took steps to secure replacement of the break and at the same time reconstruct both dams in such a manner as to gain the total approved reservoir capacity of 21,374,640 cubic feet or 490.7 acre feet.

To determine the accuracy of the old capacity table, at the time the general survey was made (July, 1946) a resurvey was made of the reservoir site with the result that the new figures checked very closely with the original table.

A road was constructed starting at a point known as the Twin-Bridges on Highway 160, on Wolf Creek Pass, into Shaw Reservoir in the summer of 1946. This made possible the transportation of rather heavy earth moving equipment into the reservoir; a very important factor in the proper construction of earth dams.

About July 1, 1947, the contractor moved into complete the construction on the Shaw project. Considerable difficulty was encountered with the contractor to secure proper procedure in connection with the installation of the 24" outlet pipe. Recalling that the weakness of the old structure was along the old outlet pipe which was the final cause of failure, with serious damage to the canon and trails below. Determined that the new discharge pipe would be properly installed it was necessary to require a considerable portion of the new pipe be removed after it had been placed and partially backfilled. This had been done contrary to and without the knowledge of the owners or the engineer.

Following the above experience an inspector was placed on the job by the owners. The procedure was then more satisfactory and the work was completed on the Shaw project in August.

Beaver Reservoir

The Beaver Reservoir owned by the Mosca Irrigation District has a rather satisfactory storage capacity, a very good Priority and is so situated that it may be filled practically every season. These important facts have urged the owners to do something about excessive leakage and water loss which has existed since its construction some 35 years ago.

Much has been done and considerable money expended in years past in attempt to stop this heavy water loss but with quite unsatisfactory results. Within the last ten years considerable study and investigation has been made to determine what might be done to reclaim, what may become rather valuable property.

Beaver Reservoir cont'd.

Plans and Specifications approved in your office call for an earth blanket or fill to be placed against the front face of the present dam and extending on proper slope out about 160 feet in front and similarly against the right bank of the reservoir; study indicating that the principal water loss has been from this area.

The placing then, of such an earth fill required the extension of the discharge tube to the front face of the new embankment and for a new trashrack at the new inlet.

After many delays, actual work was started in the late summer of 1946. Work done then consisted of partial completion of a ditch to carry the natural stream flow around and away from the proposed location of the new conduit. Winter closed in and nothing more was done in 1946.

With the reservoir empty again about August 1, 1947, the owners advertised for bids to be submitted on or before August 26th, involving the construction of a re-inforced concrete outlet conduit, the excavation transportation, blending and placing of materials for embankment, repairs to the present concrete face of the dam and outlet structures, drilling and pressure grouting and other items of work as called for in the schedule of bids for the first stage of the proposed repairs.

No general bids were received but about September 1, 1947, a contract was entered into for the construction of the reinforced concrete conduit, the removal of the old steel trash rack structure and the erection of the new steel trash-rack.

Delays were encountered due to the necessity of the construction of a new bridge over the spillway on top of the dam before heavy equipment could be moved on to the job. Actual construction of the concrete conduit was not started until about October 1st. Had it not been that the month of October was mild, this delay might have proven serious.

It is to be noted that the reservoir has filled somewhat with silt over a period of years. It seemed then there would be little or no capacity loss and the construction of the concrete conduit simplified, if the new conduit was raised some above elevation indicated on the plans.

With your approval and also that of the owners the entire new structure was raised 1.75 feet, with the entire drop formed at the union of the new structure and the floor of the old trash rack. The change thus, gives the elevation of the floor of the new trash rack 2.75 feet instead of elevation 1.0 foot.

The forms used for the construction of the concrete conduit were made in 12 foot unit sections, removable design. The inside forms were metal clad, thus producing very smooth inner walls. Three complete sets of the 12 foot lengths were made up, making it convenient for spacing construction and expansion joints 24 feet apart.

Beaver Reservoir cont'd.

Attempt was made to use some imbedded expansion filler, thus a steel corrugated band was ordered and delivered at the site but its use seemed to me objectionable; it appeared if any unequal vertical settlement occurred in the joint, the metal filler would cause a fracture in the concrete, with serious results. After considerable thought and study and your approval of the matter it was finally agreed to adopt the use of a plain, vertical joint in both the slab walls and top. This joint, over walls and top to be treated with an application of hot asphalt before covering with the earth fill. If it seemed necessary, a strip of heavy roofing paper could then be placed over each joint from floor line to floor line.

With no special difficulties encountered the concrete work was completed and the water turned from the bypass ditch through the new conduit the latter part of November.

You were kept informed as to the progress of the work and many photographic views have been furnished to you showing somewhat, a step by step advancement of the job.

The cost to the owners for some 150 cubic yards of very heavily reinforced concrete was approximately \$55.00 per cubic yard, for forms, labor and materials complete.

On the front face and one side of the concrete trash rack structure was placed sections made from new steel and on the other side and top sections made from the old steel were placed, thus when it may become necessary to replace the old steel it will not be necessary to disturb in any way, the new steel sections.

As you know, all concerned were anxious to get some backfill around the new conduit structure this fall before storage was started and an attempt was made to get this done, but due to extreme weather conditions at the time it seemed best not to go ahead with any earth work but to get the new structure covered with water as quickly as possible.

The plan now is to proceed as soon as it may be practical next summer with the necessary grouting and earth fill, above the dam.

Farmers Union Reservoir

Due to excessive run off caused by heavy rain on our west watershed during much of the summer and especially early in October it seemed impractical to attempt to install the new steel trash rack at the Farmers Union Reservoir, with the far above normal flow through the gates. With your sanction storage was permitted about October 14, with a result that more than 15,000 acre feet is in storage at this date.

Further strengthening of the old trash rack structure was done in November 1946, by placing additional steel struts from the trash rack sections in front back to the concrete headwall, under the supervision of the Farmers Union Canal Superintendent. I have not personally inspected this work.

Hermit Lakes and Troutvale Reservoirs.

Little has been done in the way of improving the conditions at Hermit Lakes and Troutvale Reservoirs, only the lowering of the water level in compliance with your recommendations, after your visit and inspection of them last summer.

Owners of the Hermit Lakes group have indicated their willingness to co-operate in improving the conditions of their several dams and have so demonstrated, but the owner of the two Troutvale Reservoirs refused to do anything about your recommended repairs, but did comply with the order to lower Troutvale No. 1, two feet. On my last inspection of this area the reservoir was still at the lowered stage.

The entire development on South Clear Creek embraces some six or seven small lakes owned by the Hermit Lakes Trout Club and the two Troutvale Reservoirs owned by Earl Brown will require rather frequent visits and inspections in the future if extensive damage to property below, does not occur.

Land Leveling

Leveling of the land relates so closely to irrigation practices that it seems appropriate to mention something of its progress in the district.

In Rio Grande County in which much of water district No. 20 is included, figures furnished by the U. S. Soil Conservation Service here indicates some 18,000 acres have been leveled to date under their agency alone. It is probable that a like amount has been leveled under private supervision. Approximately 6,000 acres have been leveled in the county under Government supervision.

The average amount of dirt moved is about 324 cubic yards per acre with an average cost in 1946 of 13.5 cents per cubic yard or about 44 dollars per acre. In rare cases the cost has reached as much as \$100.00 per acre. In a quarter section just east of Monte Vista, the entire quarter was leveled recently, requiring the movement of 87,000 cubic yards of earth or about 543 cubic yards average per acre. The total cost to the owner was approximately \$12,000 or an average of \$75.00 per acre.

Administration

Few, if any, serious administrative problems have arisen during the past season, but it is apparent that water users as a whole are becoming more water conscious and are alert as to their rights and as to the accuracy of measurement of water.

Finally, I wish to state that the best of co-operation has existed between canal and ditch superintendents, water users and water officials for the season just past. This brings to a close one of the most satisfactory irrigation years since I have been privileged to work in this district.

Respectfully Submitted,



Special Deputy State Engineer

M. C. HINDERLIDER
STATE ENGINEER
C. C. HEZMALHALCH
DEPUTY

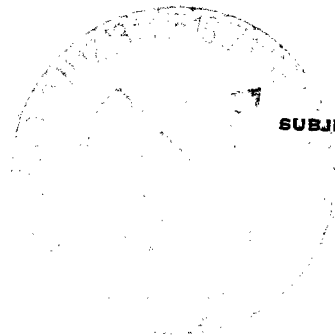


L. T. BURGESS
CHIEF HYDROGRAPHER
W. T. BLIGHT
OFFICE ENGINEER

STATE OF COLORADO
OFFICE OF STATE ENGINEER
DIVISION OF WATER RESOURCES

- DENVER 2

Alamosa, Colorado.
December 16th, 1947.



SUBJECT:

Mr. M. C. Hinderlinder,
State Engineer,
State Capitol Building,
Denver, Colorado.

Dear Mr. Hinderlinder:

Enclosed is my Annual Report for 1947. This report has been delayed several weeks waiting for reservoir reports from District # 20.

The Water Commissioners' books and summary sheets for each District are being sent under separate cover to Mr. Blight. As you will recall I prepare these books and sheets, as well as the copies for my office, from reports sent in each ten days from the various water commissioners.

Yours very truly,

Roy B. Heilman
Roy B. Heilman

Alamosa, Colorado,
December 16th, 1947

Mr. M. C. Hinderlider,
State Engineer,
State Capitol Building,
Denver, Colorado.

Dear Mr. Hinderlider:

Herewith is submitted my annual report as Irrigation Division Engineer for Division No. 3. This report includes the tabulated summaries of the reports, of the Water Commissioners of the various Districts, of diversions, crops and reservoir storage.

The past season was very good in this Division. The amount of water diverted for irrigation was considerably in excess of that diverted the past several years. This excess was due mostly to rains which came at just the right time to hold the stream flow up. The amount of snow in the mountains at the start of the season as reported was below normal and the estimate of the spring run off was discouraging. However, the run off was better than expected due to the snow in the high mountains on which no report was available. Due to intermittent cold spells the spring run off was slow. There was no high water and all the run off was put to beneficial use.

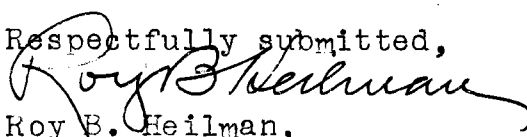
Most of the larger reservoirs were practically empty at the close of the 1946 season and due to the slow run off there was very little storage during ¹⁹⁴⁷ ~~the run off period~~. However heavy rains in the latter part of the season made it possible for most of these reservoirs to pick up some storage and finish the season with about as much water in storage as at the start of the season. There was not as much demand for reservoir water as in the past several seasons, due to the rains, and a number of the smaller reservoirs did not deliver any ~~storage~~ water. Artesian wells and pumps ~~were used to~~ furnish ^{ad} supplemental water where reservoir water was not available, although not so much as ⁱⁿ the past two years.

Livestock came through the season in good condition. At the start of the season the mountain ranges were not too good, but when the rains started the ranges improved so that there was sufficient feed to bring the livestock through in good condition.

The crops were good. Vegetable shipments increased again this year. The hay crop in the north end of the division was much better than ⁱⁿ the past several years.

There were but few administrative problems that came up during the season which is usual when there is a fair run of water. The problems that did come up were settled satisfactorily.

Respectfully submitted,


Roy B. Heilman,
Irrigation Division Engineer,
Division No. 3.

WATER COMMISSIONERS' DITCH REPORTS

1947

No. of Water District	No. of Ditches Reporting	First day Water was Carried	Last day Water was Carried	No. of Acre Feet Carried by all
20	198	2-11	11-6	679985
21	61	3-1	10-31	87105
22	115	3-11	10-31	336182
24	54	4-1	10-31	70444
25	53	4-1	10-20	61920
26	57	4-1	10-31	55398
27	34	4-1	10-31	13376
35	69	4-1	10-31	46819
Totals				1351229

These figures include Reservoir water and Trans-Mountain Diversions.

WATER COMMISSIONERS' DITCH REPORTS

1947

Number of Acres

Water District	No. Acres That Can Be Irrigated	Alfalfa	Natural Grass	Cereals	Pasture	Garden Peas
20	488550	56658	52546	72741	90796	3332
21	64996	5346	10372	12023	13534	4229
22	194336	14265	26235	20952	23804	2025
24	23105	3599	2860	10175	2765	388
25	129509	972	27319	879	94301	
26	60594	2611	31295	815	15160	
27	14275	923	5446		2405	27
35	34393	2024	11367	3525	1679	148
Totals:	1009758	86398	167440	121110	244444	10149

Number of Acres

Water District	Potatoes	Sugar Beets	Beans	Field Peas	Cab- bage	Sweet Clover
20	27688	1073	204	11628	631	19254
21	2049	82	587	3044	391	1922
22	1673	210	845	4801	62	5368
24	1189		2113	9255	321	306
25	3					220
26	2					
27	30		8	144		
35	281	44	119	2094	425	142
Totals:	32915	1409	3876	30966	1830	27212

Number of Acres

Water District	Lettuce	Cauli- flower	Spinach	Summer Plow	Canning Peas	Other Crops	Total Irrigat- ed
20	1213	763	132	4217		733	343609
21	34	321		1509	177	97	55717
22	122	292		1155		223	102032
24	150	1415				1053	35589
25				25		10	123729
26						10	49893
27				50		103	9136
35	114	399		25		198	22584
Totals:	1633	3190	132	6981	177	2427	742289

RESERVOIR STORAGE - 1947 - DIVISION No. 3

AMOUNTS IN STORAGE IN ACRE FEET.

	Rio Grande (Farmer's Union) Reservoir	Santa Maria Reservoir	Continental Reservoir	Sanchez Reservoir	Terrace Reservoir
12-1-46	638	1949	1258	5130	1564
1-1-47	2527	2788	1258	5827	2236
2-1-47	3983	3473	1318	5867	2613
3-1-47	4856	4424	1258	6060	3189
4-1-47	6918	5549	1258	6720	3568
5-1-47	6918	5549	1258	7939	2438
6-1-47	11094	7014	7866	19710	2868
7-1-47	12376	7943	7947	17697	3260
8-1-47	---	1273	7974	12100	1948
9-1-47	---	756	1233	7677	1869
10-1-47	3642	1490	1555	8040	3989
11-1-47	10684	2754	1555	8200	4628

	Mt. Home Reservoir	Smith Reservoir	Cove Lake Reservoir	La Jara Reservoir
12-1-46	953	1841	0	796
1-1-47	1335	2400	0	796
2-1-47	1602	2805	0	796
3-1-47	1951	3362	0	796
4-1-47	2395	4869	483	796
5-1-47	3020	5336	1662	2891
6-1-47	10676	5336	3180	4102
7-1-47	12901	5336	1270	3466
8-1-47	9853	4191	0	2358
9-1-47	6758	3362	0	1586
10-1-47	6441	3453	0	1431
11-1-47	6816	3717	0	1253

WATER COMMISSIONERS' RESERVOIR REPORTS

1947

Name of Reservoir	District in which located.	Capacity in Acre Feet	Amount in Storage		Amount of Water Delivered in Acre Feet.
			May 1, 1947. Acre Feet.	Nov. 1, 1947. Acre Feet.	
Rio Grande	20	51113	6918	10684	11395
Santa Maria	20	43560	5549	2754	7187
Continental	20	26716	1258	1555	5387
San Luis Valley	20	4434	---	0	734
Metroz	20	188	---	44	88
Lake Cliff	20	17	17	17	16
Spruce # 1	20	51	51)	95	(56
Spruce # 2	20	105	105)		(30
Fuchs	20	237	237	54	168
Troutvale # 1	20	510	510	410	90
Troutvale # 2	20	257	219	219	none
Squaw	20	140	140	73	120
Poage	20	157	157	---	140
Shaw	20	490	No delivery	-	
Bristol # 1	20	151	" "		
Bristol # 2	20	804	" "		
Road Canon	20	395	395	395	None
Regan	20	975	160	0	140
Lost Lakes	20	966	583	---	522
S U Dude	20	120	78	52	24
Hermit # 1	20	123	123	---	126
Hermit # 2	20	74	75	---	69
Goose Lake	20	232	167	---	150
Trout Lake	20	225	225	82	130
Terrace	21	17700	2438	4628	2813
La Jara	21	14052	2891	1253	1302
Cove Lake	22	7910	1662	0	4350
Sanchez	24	103155	7939	8200	34398
Eastdale # 1	24	3468	1308	141	1256
Salazar # 1	24	134	10	25	966
Mountain Home	35	19150	3020	6816	5456
Smith	35	5336	5336	3717	7448
Total for Division		302720	41571	41214	84561

COMPARISON FOR 10 YEAR PERIOD.

	<u>No. of Acres Irrigated.</u>	<u>Acre Feet of Water Delivered to Ditches.</u>
1938	702392	1371664
1939	715332	994770
1940	664267	769141
1941	717654	1635840
1942	733996	1398212
1943	769680	1123219
1944	749625	1557569
1945	746751	1318180
1946	698431	912394
1947	742289	1351229
<i>Averages</i>	<u>7,240,417</u>	<u>12,432,211</u>
<i>Average per year</i>	724,042	1,243,221

VEGETABLE SHIPMENTS

1947 Season

Lettuce	416	carloads
Mixed Vegetables	624	"
Spinach	48	"
Garden Peas	729	"
Cabbage	524	"
Carrots	12	"
Cauliflower	1036	"
Potatoes	8450	" - Estimated
<hr/>		
Total	11839	"

1947 - SUMMARY

TRANS-MOUNTAIN DIVERSIONS

Acre Feet

Weminuche -	
East-Fuchs	531
Robert West-Lohr	1298
Tabor (SpringCreek Pass)	559
Squaw Pass	88
Treasure Pass	186
Piedra	None
<hr/>	
Total	2662 ✓