1957

Alamosa, Colorado,

November 25th., 1957

Mr. J. E. Whitten,

State Engineer,

State Capitol Building,

Denver, Colorado

Dear Sir:

Herewith is submitted my annual report as Irrigation Division Engineer of Division No. 3 for the year 1957. This report includes the tabulated and summarized reports of the water commissioners in this division of the amounts of water diverted from the various streams, of the reservoir storage and of acres irrigated.

1957 was a very satisfactory year so far as irrigation was concerned. Stream flow was above normal and in almost every instance was sufficient to supply the demand for water. Run off from snow melt came out gradually and due to rains in the mountains and in the valley stream flow held up so that there was small demand for reservoir water. The reported diversions for this division in 1957 were more than twice as much as the reported diversions in 1956, and were more than in any year since 1935, being 157% of the previous 10 year average. The increased amount of diversions was reflected in the number of acres irrigated, these being increased from 434445 in 1956 to 570796 acres in 1957.

There was considerable reservoir storage during the season. The Rio Grande Reservoir was the only large reservoir which filled to capacity, however, all the other reservoirs stored water and finished the season with more water in storage than at the beginning of the season. The Mountain Home and the Sanchez Reservoirs stored water throughout most of the season. The total capacity of all the reser-

voirs in this division is approximately 370,000 acre feet. On November 1, 1956 the total amount of storage in this division was 12,283 acre feet. This increased to 118,370 acre feet on May 1, 1957. During the season there were delivered from the reservoirs 58,881 acre feet. On November 1, 1957 there were in storage in this division 167089 acre feet. None of the larger reservoirs are filled to capacity. This would indicate that there is some 200,000 acre feet of storage capacity available for storage and flood control next spring.

Platora Reservoir in District No. 22, which is subject to the Rio Grande Tri-State Compact, stored 49,505 acre feet. The gates of the reservoir were opened to deliver water to New Mexico on October 27th. and closed on November 9th. Approximately 19,000 acre feet were released during this period of which approximately 16,000 acre feet were delivered to the Rio Grande River. These figures are subject to revision when the final computation is made. This reservoir was operated by the Reclamation Bureau presumedly for flood control, however, in my opinion, a certain percentage of the water stored this year was stored illegally, because the gates are not large enough to permit the natural flow of the stream to go through. At the meeting of the Tri-State Compact Commissioners last February in Santa Fe, a resolution was passed that the natural flow of the stream be permitted to come through the Reservoir. This was not done, especially so after the flood stage had passed. The amount of water in storage as reported by the Reclamation remained the same on August, September and October 1st. at 49,505 acre feet. From these figures it is obvious that the stream stood the natural seepage, and evaporation losses in the reservoir. As was mentioned

In my report last year, I think this is a serious matter for Colorado and some action should be taken by the proper officials before another run-off season. Several requests were made to the Compact Commissioners of New Mexico and Texas during July and the early part of August that at least a part of this stored water be released while the Conejos River was discharging water into the Rio Grande. These requests were refused at a considerable cost of water to Colorado.

In January of this year, the Compact Commissioners for Texas and New Mexico requested that the 3500 acre feet stored in the Platora Reservoir in 1956 be released. Accordingly the gates were opened to release about 300 second feet at first and later 450 second feet. However, due to the ice in the stream channel, this flow of water caused ice jams to develope, causing the stream to overflow its banks with the loss of a considerable part of the water. This necessitated the closing of the gates after three days run. During this period there were released approximately 2500 acre feet.

Special Deputy State Engineer, D. H. Mathias, will report on District No. 20. The reported diversions in this district were 156% of the previous 10 year average. These diversions brought the "sub up", particularly in the closed basin in the area west of Highway #17.

In District No. 21 the season began early and the run off was good, and held up well. The diversions were 167% of the previous ten year average. On July 18th. a leak developed in the dam of the Terrace Reservoir, causing a part of the lower face of the dam to fall off. The gates were immediately opened to lower the water level. After several hours the earth on the lower face of the dam ceased to fall off and after several days the leak, which proved to be not too

big, began to diminish and eventually ceased when the water level was lowered to a point below the leak. Steps are being taken to repair the damage to the dam and to locate the leak. The Soil Conservation Service is providing engineering service and estimates of the cost of the necessary repairs. At this same time some flood damage occurred on the lower Alamosa River. There were three contributing causes for this, being some continued heavy rains, the release of the reservoir water, and the fact that there was very little demand for water for irrigation at this particular time.

The diversions in District # 22 were 152% of the previous ten year average. The run off held up well until late in August. There was some flooding on the San Antonio River, A good part of which was diverted into Cove Lake where it spilled over the spill-way. The Conejos River might have developed into flood proportions for a period of some two weeks except for the operation of the Platora Reservoir.

The reported diversions in District No. 24 were .67% of the previous 10 year average. However, this does not reflect a true picture of the run off, as the water stored in the Sanchez Reservoir is not included in the reported diversions. This amounted to some 29000 acre feet which if added to the reported diversions would show 128% of the previous ten year average. The run off held up well and most demands for water were met without use of reservoir water, there being only 330 acre feet of reservoir water run during the season. The stream did not develope into flood proportions except in one instance which was due to cloud bursts in the area just about the town of San Luis. Water came up into some homes and some business houses in San Luis. However, the flood was of short duration and the damage was not excessive.

All the other districts in this division reported diversions in excess of the previous 10 year average. District No. 25 reporting 111%; District No. 26-260%; District No. 27, 171 % and District No. 35-237%. In all the districts the run off held up well and most demands for water were met. At this time in District No. 25 water is flowing in San Luis Creek past Moffat, which is the first time for many years. In District No. 26 on November 1st. of this year, more water was being diverted into ditches than the maximum amount diverted at any one time in 1956. In District No. 25, Kerber Creek, which is a tributary of San Luis Creek, overflowed its banks just below Villa Grove. The damage was not excessive. San Luis Creek also overflowed several places, due primarily to beaver dams and willows in the creek channel. There was also some flooding on Saguache Creek, principally through the Fullerton Arroya.

Crops were very good throughout the Valley. Pasture and hay crops were exceptionally good. The rains throughout the season, which were much in excess of the normal precipitation, produced good pastures throughout the entire area. The potato crop yield was good and the price is fair. Lettuce has developed into a major crop in the Valley. The acreage being more than double than in 1956. On the whole the price was very good, making that a very profitable crop. The acreage planted to carrots is also being increased every year. Ranges in the mountains were very good and livestock came out this fall in excellent condition. There was some pumping of irrigation water to mature the row crops.

Climotology reports are not included as they can be secured elsewhere in a most more complete report than can be made here. Report of shipments of produce are not made as a very large amount of the shipments are made by truck rather than by rail and these records are not available at this time.

Water was diverted for 321 days in this division. The increase in the number of days is due to the fact that the Rio Grande Canal, in District No. 20 ran water throughout all of last winter. There were few administrative problems, which is usual when there is a good run of water. Special Deputy State Engineer, D. H. Mathias, and the other water officials are/to be complimented for the fine manner in which they did administer the water and in sending reports to me for compilation.

Respectfully submitted,

Roy B. Heilman

Roy B. Heilman,

Irrigation Division Engineer,
Div. # 3,

This is a summary sheet

SUMMARY

WATER COMMISSIONERS' DITCH REPORTS

1957
IRRIGATION DIVISION NO. 3

No. of Water District	Number of Ditches Reporting	First Day Water was Carried.	Last Day Water was Carried	No. Days Carried.	No. of Acre feet carried by all	Total Acres Irrigated.
20	188	1-1	11-17	321	866049	314430
21	71	2-21	10-31	252	145032	49782
22	97	3-10	11-11	246	339634	100976
24	53	3-20	10-31	226	34986	24867
25	64	3-21	10-31	225	46600	18835
26	73	4-1	10-31	214	95060	31638
27	34	4-15	10-31	199	17575	6862
35	71	3-1	10-31	245	110469	23406
Total	651				1655405	570796

1957 Report

TRANSMOUNTAIN DIVERSIONS INTO DIVISION NO. 3.

Weminuche - Raber Lohr	2685.0	acre feet
Weminuche - Fuchs	1261.4	" "
Tabor	787.9	" "
Total	4734.3	" "

1957 RESERVOIR STORAGE REPORT - DIVISION NO. 3

AMOUNTS IN STORAGE IN ACRE FEET.

	Rio Grande	Santa Maria	Continental	Sanchez	Terrace
12-1-56	1632	1850	1775	2910	685
1-1-57	2540	2248	Est.2100	4124	585
2-1-57	3769	2584	Est.2400	4619	636
3-1-57	4686	2923	Est.2700	5171	1066
4-1-57	5490	3266	3784	5747	1530
5-1-57	6100	3577	3784	7372	2468
6-1-57	6100	5401	1460	11403	4761
7-1-57	52083	18332	9764	27958	17700
8-1-57	48737	18664	11988	32842	14123
9-1-57	35637	14575	9368	33514	7946
10-1-57	35697	14854	9808	34996	6453
11-1-57	35686	13658	9808	34996	4075

	Mt. Home	Smith	Cove Lake	La Jara	San Luis or Beaver Park	Platora
12-1-56	1242	781				3500
1-1-57	1096	871			1048	3500
2-1-57	1841	1121			1740	1000
3-1-57	1968	1411			2011	1000
4-1-57	2280	1666			2155	1000
5-1-57	2929	1937	972		2422	1000
6-1-57	4692	5336	6480	6089	2422	4000
7-1-57	12701	4700	6480	6300	4600	43286
8-1-57	13426	4869	5308	5604	4434	49505
9-1-57	9460	3740	3845	5020	3896	49505
10-1-57	7655	3514	2664	4298	3546	49505
11-1-57	7085	3007	2414	3830	2048	41546

SUMMARY - 1957

WATER COMMISSIONERS' RESERVOIR REPORTS

IRRIGATION DIVISION NO. 3

Name of Reservoir	Water District No.	Capacity in Acre Feet	Acre Ft. in Storage May 1, or amount available	Acre Feet in Storage Nov. 1.	Total Acre Feet Delivered
Rio Grande	20	51113	51113	35686	14156
Santa Maria	20	43560	22266	13658	7799
Continental	20	26716	12768	9808	2664
San Luis - (Beaver)	20	4758	4246	1975	940
Squaw	20	162.2	162.2	162.2	-----
Metroz	20	395	301	250	44
Big Ruby	20	77	77	77	-----
Wee Ruby	20	186	186	186	-----
Regan	20	667	667	667	-----
Sowards# #1-2& 3	20	162	162	162	-----
Meadow Lake (Sowards)	20	199	122	0	110
Loch Laven	20	24	24	24	-----
Streams	20	40	40	40	-----
Downing	20	41	41	41	------
Goose Lake	20	232	232	232	-----
Alberta Park	20	597.5	597.5	597.5	-----
Jumper Creek	20	38.1	38.1	38.1	-----
Mill Creek	20	42.85	42.85	42.8	-----
Humphreys Lake	20	842	842	842	-----
Hunter Lake	20	48	48	48	-----
Lake Cliff	20	-----	-----	-----	-----
Rito Hando	20				Fish Culture.
Bristol Head #1	20	151	-----	-----	-----
Bristol Head #2	20	804	-----	-----	-----
Spruce Lake #1	20	111	111	Est. 25	72
Spruce Lake #2	20	105	105	60	22
Shaw	20	680.6	680.6	593	78
Hermit Lakes #1,#2,#3	20	200	200	200	------
Fuchs	20	237	237	237	------
Troutvale #1	20	299	299	Est. 100	178
Troutvale #2	20	257	257	Fish Culture	
Road Canon	20	1183	900	283	Fish Culture

SUMMARY - 1957

WATER COMMISSIONERS' RESERVOIR REPORTS

IRRIGATION DIVISION NO. 3

Name of Reservoir	Water District No.	Capacity in Acre Feet	Acre Ft. in Storage May 1, or amount available	Acre Feet in Storage Nov. 1.	Total Acre Feet Delivered
Lost Lakes	20	966	966	460	182
Spring Creek (Wrights)	20	145	145	145	-----
Meadow Lake (Wrights)	20	114	114	114	-----
Trout Lake	20	320.4	320.4	0	156
SU Dude	20	120	120	120	-----
Poage	20	261	261	261	-----
Terrace	21	17700	2468	4075	5648
La Jara	21	14050	?	3830	-----
Cove Lake	22	6480	972	2414	9416
Platora	22	60000 ?	1000	41546 #	-----
Sanchez	24	103135	7372	34996	330
Eastdale #1	24	3468	3000 Est.	3000 Est.	-----
Eastdale #2	24	3047	------	------	-----
Salazar #1	24	234	No Report		
Salazar #2	24	35	" "		
Rito Seco	24	----	------	------	-----
Mountain Home	35	20147	2929	7085	10814
Smith	35	5336	1937	3007	6272
Totals		369487	118370	167089	58881

This water is subject to the Rio Grande Tri-State Compact and it is presumed that this water will not be available for use in Colorado.

Rio Grande.

DIVISION NO. 3.

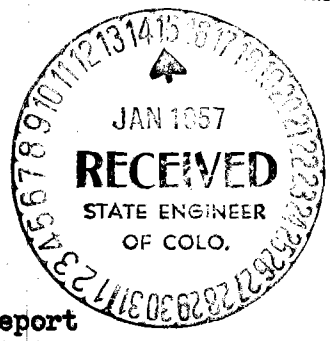
COMPARISON FOR PAST 10 YEAR PERIOD

	No. of Acres Irrigated	Acre Feet of Water Delivered to Ditches
1947	742289	1351229
1948	757041	1320484
1949	789722	1444440
1950	570392	964516
1951	359228	631136
1952	615338	1626360
1953	581441	880377
1954	421406	772333
1955	446690	818004
1956	434445	752538
1957	570796	1655405

D. H. MATHIAS
ENGINEER

1957

PHONES
OFFICE 263
RES. 331



STATE OF COLORADO
Department of Water Resources
OFFICE OF
Special Deputy State Engineer
147 WASHINGTON
MONTE VISTA, COLO.

Jan. 8, 1957

Mr. J. E. Whitten
State Engineer,
Capitol Bldg.
Denver, Colorado

Subject. - Annual Report
D. H. Mathias
Special Deputy State Engineer
Division 3, District 20

Dear Mr. Whitten:-

If we consider the irrigation season as beginning April 1st, it may well be said that the water supply outlook for Water District 20 was most discouraging, but quite comparable to the average of the past seven years.

The February 1st snow report furnished by the Federal and Cooperative Snow Survey at that time was very hopeful.

Quoting from this report, "Snow cover along the Continental Divide to the west and north of the Rio Grande in the San Luis Valley is well above normal for February 1st. The Wolf Creek Pass area has snow fall 50 percent above normal for this date and over twice that for February 1st, the past three years. The snow pack is substantially less than for this date in 1952. At the present time there is no indication of damaging heavy stream flow during the snow melt season. Summer run-off on the Rio Grande, Conejos and Alamosa rivers is expected to be average with a possible run-off well in excess of average."

That which happened to our water supply after February 1st, presents an entirely different picture.

Quoting again, in part, from the same source for May 1st report. "The flow of the Rio Grande and its tributaries will be only slightly improved over 1955 at about 65 percent of normal in the San Luis Valley."

The truth of the matter is that very little moisture fell on the watershed or in the valley from February 1st until the latter part of October 1956, a period of almost nine months.

A report on actual precipitation at a few stations in this area is included with data sheets accompanying this report.

RESERVOIRS-

The total available supply of water in reservoirs was 13 percent of normal. Storage was stopped on March 27 with no later storage possible.

It is interesting to note that the river supply failed at such an early date and so abruptly that the Rio Grande Canal was not able to deliver economically the small amount of reservoir water they owned which accounts for the carry over in Continental and Santa Maria reservoirs indicated in the reservoir report.

There was no new reservoirs constructed the past year in District 20 and little in way of repairs.

The short section of the O. G. crest in the spillway for the Beaver Park dam which was omitted when the enlargement work was completed some three years ago, was put in place this fall. Extensive cutting of timber to 10 feet, measured on the slope, above the high water line in the Beaver Reservoir basin was carried on last winter and the clearing of this fallen timber and other trees and brush has been completed. The steel braces in the man-way at the tower have been installed and the bolt anchors tying the concrete walls to the concrete ribs in the spillway are in place.

The concrete section or spillway crest in the Alberta Park dam was raised this fall the amount of 2.0 feet as was provided in the plans furnished by Engineer Paul Davis, filing C-810, dated September 17, 1956. It is my understanding that Mr. Davis made a resurvey of the reservoir basin and a new capacity table was recently approved in your office for the Alberta Park Reservoir.

In July I visited the Humphreys dam on Goose Creek and found some disintergration of the concrete surface and considerable leakage over a large area of the lower face of the dam. Some photos taken at the time showing some-what the condition of the dam were furnished your office.

On October 8th, Mr. Hezmalhalch and myself visited the Humphreys dam which resulted in a recommendation that the owners be notified of the probable serious condition of the dam, looking to a complete detailed study of the dam by a competent engineer; I am informed that an engineer has been selected and preparations are underway for a complete study of the dam.

The board of directors of the Rio Grande Reservoir have been notified of the very poor condition of the old bridge over the spillway on top of the dam which is used to support and to operate the equipment necessary for raising and lowering the five foot flash gates located on the crest of the spillway. The very old wooden structure is so badly deteriorated that it offers a serious hazzard to the carrying capacity of the spillway should it fail.

Also it will be necessary for the reservoir company to remove a quantity of rock that has sloughed off from the steep right bank of the upper reaches of the spillway partially blocking the section above the crest.

With members of the board of the Rio Grande Reservoir Company this late summer an inspection was made of the gates and adjacent tunnel sections. The gates and guides seem to be in good condition but a new power unit for operating the gates should replace the very old gasoline engine now in use. Some repairs to the concrete wall sections and tunnel supports should be made in the rather near future.

Equipment designed by Dr. Ralph Parshall of Fort Collins was installed at both the Santa Maria and Continental reservoir dams making it possible for the caretaker operating the control gates in the gate house on top of the dams to determine quite accurately the discharge of the gates. This is accomplished by electric connections to floats in the wells at the measuring wiers below the dams to an indicator installed in the gate-house and is correlated to the curve or rating table of the stream below. The installation was used at the Santa Maria this past season and was found to be quite accurate and satisfactory.

CANALS AND DITCHES-

In spite of serious economic conditions in the district, rather extensive repairs were carried on generally by the canals and ditches.

Outstanding new work perhaps, was by the Farmers Union Canal Company in the completion of their head-works structure which was put in, in part, last year. The new work consisting of a concrete diversion dam and control gates together with the radial gates, installed last year, make a very modern installation. It is my understanding that an automatic control gate, radial type, is to be installed in the diversion dam to provide a uniform pressure on the canal gates. This is considered possible due to the fact that the inflow to the channel of the river supplying the canal can be controlled rather closely by use of an up-river diversion.

The Rio Grande Canal continued replacing the old wooden structures with permanent ones. Perhaps the largest being a 10 foot concrete Parshall flume in one of the laterals and a new concrete check in another lateral.

A steel and concrete measuring weir was installed in the Minor Ditch with a new Stevens F. recorder.

The Centennial ditch placed a new concrete structure equipped with drop gates in their diversion dam.

Chemicals for weed control in many of the ditches was used with rather favorable results.

PUMPING-

Due to an unprecedented water shortage for the last 7 years water-users have been forced to increase greatly, I might say alarmingly, the use of the underground watter supply, by pumping.

While it is the duty of State water officials to administer only surface rights, this almost universal use of the under-ground water intermingled with the surface rights, seems to warrant space in my report to you.

Pumping has become so extensive that, rather accurate reports indicate that there were more than 1470 pump wells operating in the San Luis Valley the past season, which produced approximately 390 000 acre feet, at an estimated cost, for power alone, of $2.40 per acre foot.

UNDER-GROUND WATER-

From the preceding statements relative to excessive pumping it only follows to say that the ground-water situation is becoming quite serious.

Many farmers lowered the water locally or adjacent to his pumping unit to the extent that he exhausted the supply at that level so, he was forced to go deeper with the well or in many cases dig a new one near by. Then he had to extend the length of his pump unit which often meant an increase in power. This was not only expensive but was the cause of serious delay and crop damage.

CROPS-

The water supply out look April lst. was so poor that farmers were forced to make some serious decisions. Thus large areas, as the crop report indicates, lay idle with about 70 percent of normal actually seeded and irrigated.

At seeding time, the prospect for a fair price for potatoes in the fall seemed quite favorable, thus the potato acreage was near normal with a yield of about 10,000 cars. The price for potatoes up to now has been very low with the out-look for any considerable increase in the near future not favorable.

The County Agent of Rio Grande County reported the grain crop to be about 60% and alfalfa about 70% of normal, with the garden truck acreage somewhat increased but the yield about normal. The total acres irrigated in District 20 was 256,483 which is about 65% of normal.

PROSPECTS FOR 1957-

With little reservoir storage, the mountain areas extremely dry, the snow cover far below the normal, the ground water almost out of reach and the top moisture on the valley floor nil, the out-look for 1957 is most discouraging.

Knowing something of the determination of the farmer and his will to carry on in the face of seemingly impossible circumstances, he will go on, seed his crop and try again.

It is with regret that I report the death of Water Commissioner for District 20. Joel Goodman who passed away Friday evening January 4, 1957. With one of his broad experience in irrigation, over a period of more than 50 years, his integrity and his fine cooperative spirit, his place will be difficult to fill.

Respectfully submitted,

D. H. Mathias

D. H. Mathias
Special Deputy State Engineer.

Irrigation Summary for Water Dist. 20. 1956.

Units in Acre Feet and Acres.

Name of Stream	Direct From Stream	From Reservoir	Trans. Mt. Div.	Total Ac. Ft.	Acres Irrigated
Rio Grande	326,674	13,340	2,673	342,687	247,854
Creeks Pinos & Frisco	8,870			8,870	3,984
Creeks Rock & Spring	4,531			4,531	1,785
Misc. Creeks	5,628			5,628	2,860
TOTAL	345,703	13,340	2,673	361,716	256,483

Reservoir Report District 20. 1956

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Total Capacity of all Reservoirs	131,570	Acre Feet.
Total Stored and Available	17,580	"
Total Discharged	14,859	"
Total left in Storage	2,721	"
Total Delivered to Ditches	13,340	"
Total for River	1,519	"

Fish culture reservoirs not included in this report.

Trans-Mountain Diversions

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NAME OF DIVERSION	DIVERTED	DELIVERED
Weminuche Raber-Lohr	23355.6	1665
Weminuche George Fuchs	903.6	784
Tabor (Spring Creek)	223.0	161
Squaw	174.5	149
Treasure Pass	128.9	80
Piedra	82.0	77
TOTAL	3867.5	2916

PRECIPITATION DATA 1956

Month	In the Valley			In the Mountains				
	Alamosa	Monte Vista	Del Norte	Platoro	Wolf Creek	Rio G. Res.	S. M. Res.	Wrights Ranch
Jan.	.58	.55	.41					1.15
Feb.	.06	.15	.35					.80
Mar.	.19	.31	.38				.60	.40
April	.58	.29	.21					1.20
May	.19	.69	.78	.23	.95	.85	1.00	.75
June	.16	.54	.42	.72	1.15		.75	.25
July	.19	.34	.19	1.81	2.15		.35	.60
Aug.	1.18	.93	.82	1.62	1.46		1.25	1.00
Sept.	.T	.00	.04	.09	1.70		.05	.20
Oct.	.18	.26	.58	2.81	3.35	1.75	1.00	1.15
Nov.	.09	.24	.71		1.40	.50	.50	.40
Dec.	T	.01	.03			.40	.65	.45
TOTAL	3.40	4.31	4.92					8.35
YEARLY MEAN	6.23	7.1	7.5/					
% of Normal	54	60		65				

NOTE--- Wolf Creek record is for station at Hiway camp about 2 miles from top on west side.

UNDER-GROUND WATER STUDY

Data furnished by the Bureau of Reclamation.

Well Number	Approximate location	Distance in feet from ground level to water surface	
		Date measured	
		1-1'49	11-1'56
2632	10 miles S. & 8 miles E. Monte Vista	2.0	5.2
2610	10 miles S. & 2 miles E. Monte Vista	3.1	8.5
2692	6 miles S. of M.V. on Gunbarrel Road	2.3	6.0
2624	7 miles S. & 3 W. of Alamosa	1.4	6.2
2664	3 miles S. & 3 E. of Alamosa	5.1	5.5
2500	16 miles due E. of Monte Vista	4.7	7.4
932	12 miles due E. of Monte Vista	6.6	9.6
926	6 miles due E. of Monte Vista	5.4	6.9
711	6 miles North & 12 E of Monte Vista	7.2	8.2
707	6 miles North & 8 E. of Monte Vista	4.5	5.9
582	6 miles North & 5 West of Monte Vista	18.5	39.2
624	12 miles due north of Monte Vista	4.6	Dry 9.2
518	12 miles North & 5 East of Monte Vista	4.6	9.2
677	12 miles North & 8 East of Monte Vista	4.0	6.0
167	12 miles North & 12 East of Monte Vista	11.1	18.2
T 7	Just south of the San Luis Lakes	2.4	10.7
226	18 miles North & 3½ West of Monte Vista	30.2	56.0
623	18 miles Due North of Monte Vista	4.8	7.0
227	18 miles North & 3 East of Monte Vista	2.4	4.4
630	18 miles North & 6 East of Monte Vista	4.4	3.6
	Average	6.46	11.65
	Total Average Drop 5.19		

State of Colorado.

Department of Water Resources. Div. 3 - Dist. 20.

Run-off of - Rio Grande near Del Norte - Colo. Unit 1000 ac. ft. Drain. area 1320 Sq. Miles.

year	Jan.	Feb.	Mar	apr.	May	June	July	Aug.	Sept.	Oct	Nov	Dec	Total	Percent Mean.
1936	9.3	10.0	13.9	67.3	141.2	89.2	39.6	37.6	27.1	15.1	12.4	9.7	472.4	
1937	9.8	9.4	11.7	54.6	173.0	129.4	79.8	50.2	17.7	18.7	13.1	10.4	577.8	
1938	10.2	11.7	15.4	65.8	149.3	270.0	118.1	70.8	43.5	41.8	22.1	15.9	829.6	
1939	14.8	14.2	27.9	49.8	156.9	120.5	53.9	19.0	25.0	16.4	13.0	7.9	519.3	
1940	8.0	8.8	14.2	32.8	102.8	48.2	16.7	12.6	18.1	28.8	10.9	10.3	312.3	
41	9.8	8.9	13.4	25.3	233.3	301.7	175.3	88.9	41.7	72.6	42.9	12.0	1025.8	
42	8.9	7.9	14.1	66.9	201.9	280.5	117.1	75.0	25.9	20.2	16.2	13.1	847.7	
43	13.4	14.4	13.1	63.9	115.2	116.1	48.5	43.1	26.3	19.6	13.9	11.4	498.4	
44	10.8	10.7	17.1	30.0	217.8	286.3	130.9	80.2	21.4	20.7	13.3	11.5	850.7	
45	9.9	9.6	12.7	29.3	135.7	160.7	82.0	41.7	17.7	20.6	11.0	7.4	538.3	
1946	8.2	9.0	13.3	61.2	85.3	119.5	37.2	25.6	18.4	21.2	16.5	12.7	428.1	
47	9.4	9.7	14.7	31.4	155.9	168.9	87.7	49.2	44.4	35.3	18.1	15.1	639.8	
48	11.7	11.7	13.9	64.7	249.8	299.5	123.0	68.7	22.4	19.2	12.2	11.2	908.0	
49	11.5	10.7	16.7	53.7	166.7	346.3	156.5	80.4	27.6	21.8	16.2	11.4	919.5	
50	12.3	12.1	17.4	66.9	113.6	122.6	55.6	25.1	13.5	14.5	8.6	8.2	470.4	
1951	7.8	8.1	11.1	18.8	78.3	95.0	26.7	20.1	13.2	10.5	9.9	9.7	309.2	
52	9.7	9.5	9.6	62.0	187.0	273.3	131.6	70.2	27.2	20.5	13.6	12.2	826.4	
53	11.2	9.8	15.4	32.8	78.2	146.9	41.3	21.8	12.0	11.8	10.4	9.9	401.5	
54	9.1	11.9	10.2	45.7	108.1	65.6	40.4	28.6	19.1	22.7	11.7	9.0	382.1	
55	8.3	8.5	10.6	22.5	84.6	125.6	34.9	31.0	14.2	10.5	8.9	8.9	368.5	
1956	9.9	8.4	13.5	25.2	107.9	106.5	21.2	11.7	8.0	8.2	6.8	6.4	333.7	

State of Colorado

Department of Water Resources - Div-3. Dist 20.

Run-off of Rio Grande - near Del-Norte Unit 1000 a/ft.

Year	Jan	Feb	Mar	apr.	May	June	July	Aug	Sept.	Oct	Nov.	Dec.	Total	Percent Mean.
1913	10.0	8.5	15.0	48.0	144.0	126.0	65.7	42.2	29.2	34.6	22.8	18.6	564.6	
14	16.0	14.0	15.0	18.7	172.0	230.0	129.0	66.7	48.6	54.2	16.5	10.6	791.3	
1915	11.1	12.4	15.9	37.2	106.0	206.0	116.0	62.1	39.3	33.0	17.4	12.5	668.9	
16	17.0	16.6	34.1	56.5	181.0	176.0	129.0	99.0	38.1	100.0	47.8	20.0	930.1	
17	18.0	16.0	18.0	37.9	114.0	359.0	184.0	65.2	33.8	25.2	17.6	10.8	899.5	
18	11.7	10.8	16.4	28.7	116.0	143.0	64.0	48.6	34.2	22.4	15.6	12.0	523.4	
19	12.6	11.7	18.0	61.9	223.0	162.0	116.0	77.5	31.7	24.9	18.3	15.1	772.7	
1920	14.6	15.6	16.6	30.2	250.0	355.0	158.0	68.2	29.2	26.6	21.4	15.6	1001.0	
21	15.5	13.7	24.9	43.0	183.0	371.0	156.0	99.0	50.9	42.6	23.3	15.6	1038.5	
22	15.9	15.2	18.1	39.8	274.0	305.0	119.0	81.8	33.4	20.0	15.0	13.9	951.1	
23	12.8	10.6	16.0	38.6	188.0	214.0	115.0	83.0	53.9	50.6	33.6	22.2	838.3	
24	17.8	15.5	17.2	68.4	227.0	202.0	103.0	58.2	18.0	19.1	11.4	12.4	770.0	
1925	11.9	11.9	22.3	61.3	141.0	160.0	97.2	58.6	45.8	42.7	24.1	25.8	702.6	
26	17.8	13.3	14.8	34.3	138.0	198.0	103.0	71.9	27.0	20.2	16.3	14.1	668.7	
27	11.7	11.7	13.5	54.0	179.0	217.0	161.0	80.6	119.0	75.0	25.1	18.8	966.4	
28	18.1	17.3	22.4	49.0	168.0	165.0	108.0	48.8	25.0	22.1	17.9	15.1	676.7	
29	13.8	12.2	16.0	50.6	186.0	220.0	117.0	104.0	82.7	57.7	23.4	14.1	897.5	
1930	12.3	12.2	15.4	56.6	108.0	140.0	75.6	58.6	23.6	24.5	12.7	12.1	551.6	
31	8.3	9.3	12.3	28.2	73.8	99.4	35.4	18.7	23.1	30.4	12.2	10.2	361.3	
32	11.4	11.3	16.5	66.6	214.0	236.0	146.0	106.0	30.6	26.3	10.9	9.5	885.1	
33	10.2	8.6	14.8	23.6	81.2	169.0	79.3	39.4	27.1	24.2	14.7	12.9	507.6	
34	13.2	11.1	15.1	67.2	103.0	28.3	14.7	15.9	17.9	14.4	11.3	8.3	320.4	
1935	8.5	9.1	15.3	37.1	81.9	263.0	128.0	72.2	27.9	19.5	12.7	8.3	683.5	

Dtm.

State of Colorado.

Department of Water Resources. Div. 3 Dist. 20.

Run-off of Rio-Grande near Del-Norte. Unit 1000 ac. ft.

Year	Jan	Feb	Mar	apr.	May	June	July	aug	Sept.	Oct	Nov	Dec	Total	Percent Mean
1890	13.5	11.1	27.4	54.3	266.0	227.0	93.2	37.6	22.8	28.9	20.2	18.4	820.4	
91	16.9	13.9	26.7	83.9	202.0	247.0	107.0	40.8	31.7	51.9	22.3	19.1	859.9	
92	16.9	14.9	19.4	62.3	160.0	130.0	45.5	27.3	15.6	15.9	14.3	10.8	532.4	
93	9.8	9.7	15.4	31.7	120.0	104.0	29.3	19.9	16.1	16.2	14.3	10.8	392.2	
94	10.8	9.7	18.4	54.9	147.0	63.7	22.7	23.6	21.1	22.1	16.8	13.8	423.4	
1895	12.3	10.6	26.7	119.0	141.0	139.0	67.6	45.2	26.7	25.8	20.4	18.4	649.7	
96	16.9	15.5	30.7	91.0	151.0	51.6	29.3	16.5	29.7	27.9	18.1	13.8	487.0	
97	13.8	11.1	27.1	63.5	217.0	202.0	68.1	29.2	37.5	90.5	39.6	27.0	823.4	
98	20.0	16.7	27.7	114.0	167.0	261.0	101.0	31.3	19.0	16.0	13.1	11.1	797.9	
99	11.1	10.0	18.4	36.8	89.7	69.9	43.2	36.7	22.0	29.2	23.8	12.6	393.4	
1900	9.2	10.6	15.4	24.9	175.0	160.0	33.6	14.0	15.2	21.0	14.9	12.3	506.1	
01	12.3	9.7	13.8	42.2	158.0	116.0	36.5	28.5	26.5	16.1	16.8	10.8	487.2	
02	9.8	8.3	14.1	38.0	71.9	36.8	9.4	11.1	12.3	14.9	12.9	9.8	249.3	
03	3.5	5.0	10.0	44.5	174.0	309.0	102.0	32.3	30.6	21.5	17.0	11.0	760.4	
04	6.5	7.0	12.0	38.8	71.2	42.6	20.7	42.4	41.2	89.1	21.0	13.0	405.5	
05	15.0	12.0	27.0	45.2	210.0	362.0	67.1	35.5	22.4	26.4	17.6	12.3	852.5	
1906	11.0	10.0	18.8	64.9	236.0	296.0	116.0	47.7	42.8	54.8	32.5	18.4	949.0	
07	20.0	17.0	25.0	95.0	161.0	261.0	279.0	92.8	48.4	30.4	29.8	14.0	1164.4	
08	11.0	10.0	21.0	45.0	104.0	174.0	65.8	57.2	20.5	16.7	12.2	12.0	549.4	
09	13.0	13.0	19.0	49.0	196.0	284.0	93.5	53.1	98.8	40.6	24.9	24.4	909.3	
10	19.7	16.3	39.7	83.3	210.0	177.0	38.0	30.3	19.8	22.3	18.1	13.4	654.9	
1911	15.2	13.3	20.7	57.0	204.0	287.0	172.0	59.5	39.7	151.0	32.3	25.0	1076.7	
12	20.9	15.7	17.1	37.4	229.0	260.0	108.0	49.9	26.6	23.7	15.6	10.8	811.7	

DHM.

D. H. MATHIAS
ENGINEER

PHONES
OFFICE 263
RES. 331

STATE OF COLORADO
Department of Water Resources
OFFICE OF
Special Deputy State Engineer
147 WASHINGTON
MONTE VISTA, COLO.
December 13, 1957

Mr. J. E. Whitten, State Engineer
State Capitol Building
Denver, Colorado

Dear Mr. Whitten:

Following is my Annual Report for the Irrigation Season 1957 for Water District 20 - in Division No. 3.

The irrigation season for 1957 for Water District No. 20 was one of the best on record.

Without going into detail, the snow supply on the water shed furnishing water to District #20 was far above normal, with an indicated stream flow at the Del Norte station forecast being at least twice the annual amount discharged the last four previous years or about the same as for 1952, which was 826,400 acre feet.

The total discharge of the River January through September at Del Norte was 779.7 acre feet; same period 1956 was 327.3 acre feet.

The tabulation, though not complete, indicating percipitation by the month covering weather stations both in the Valley and in the Mountains, proves further the adequacy of our water supply.

With what was near an abundant surface water supply, naturally it can be stated that, very little pumping was necessary. Figures furnished by the R.E.A. last year, the total use was 17,242,873 KWH while this year is 2,118,858 which actually indicates ~~only about~~ 12% of the amount of water taken from the ground as was pumped in 1956 and other similiar years just previous to 1956.

This brings us to the subject of under ground water. Further study of the tabulation furnished you last year in my Annual Report and showing a decline in water table for 25 wells over the San Luis Valley from January 1, 1949 to November 1, 1956 as being 5.66 feet. Now this year, 1957, the average rise is 5.31 feet or almost the same rise in one year as the drop in the seven years drough period. Tabulation covering this date is attached to this report.

Some fear is being expressed that damage may result in the Valley from the many so-called deep wells, 200 to 400 feet deep, which tap the artesian basins and have not been sealed off from the top or sub-irrigated ares; these wells furnishing excess water to the already too high, in places now, sub water.

RESERVOIRS:

The total available supply of water in all reservoirs in District #20 was 98,691 acre feet compared with 17,580 acre feet last year. The total delivered to Canals and Ditches was 26,484 acre feet compared with 13,340 acre feet in 1956. Total left in storage November 1, 1957 was 67,392 acre feet compared with 2,721 acre feet for 1956.

It is a fact that not a reservoir in District #20 used all the water in storage, only if it was released for repair purposes.

The above information is furnished in detail and tabulated under heading of "Irrigation Summary".

RITO HONDO RESERVOIR:

One new reservoir, The Rito Hondo, has been added to the list in District #20. The Game Fish Department constructed an earth dam some 300 feet in length, 38' high with storage capacity of some 561.5 acre feet, for fish culture only. The reservoir is located on Rito Hondo Creek, a small feeder to North Clear Creek, between the Continental and the Santa Maria Reservoirs.

I made frequent inspections of the work on the dam as it was carried on and wish to report that I consider both the earth work and the concrete work to have been done in a quite satisfactory manner. The dam is provided with a concrete spillway. My only criticism perhaps would be in regard to the rip-rap used on the front face of the dam; the stones were some what smaller than commonly used and thus might be more easily dislodged.

ROAD CANON RESERVOIR:

The Game and Fish Department purchased the Road Canon Reservoir to be used only for fish culture and this summer completely rebuilt the dam and installed new pipes, discharge gates and a new spillway structure. The old capacity of the reservoir was about 1330 acre feet, depending whether or not flash boards are in use on the old concrete spillway crest. While frequent visits were made to the project during construction, final inspection has not been made, certainly the new structure is a decided improvement over the old dam which was in use some 45 years accoring to filing map #9410.

RIO GRANDE RESERVOIR:

The Rio Grande Reservoir filled easily this year having a capacity of 51,113 acre feet but only about 30% of it was used for irrigation with a carry over of 35,686 acre feet. The old wooden bridge over the spillway used mostly for operating the 5' flash gates on the spillway crest was reinforced by some large logs and cable, but a new structure of steel or concrete should be installed as the old one is in bad repair. Reservoir Board agreed to hold storage this winter to 4500 acre feet.

At the time the bridge is rebuilt the concrete walls on both sides of the spillway at the crest location should be raised 3 to 4 feet in height

thus raising the bridge a like amount to allow more clearance between maximum spillway crest and the under side of the bridge; this increase of wall height would bring them to about the level of the top of the dam.

SANTA MARIA AND CONTINENTAL RESERVOIRS:

The Santa Maria and the Continental Reservoirs did not fill but stored a total of 35,034 acre feet with 24,466 acre feet in storage November 1, 1957. To my knowledge the dams, spillways and discharge gates are in satisfactory condition, the dams not being subjected to any great pressure this year.

SMALL RESERVOIRS:

Small reservoirs were little used and in most cases, as the reservoirs report will indicate are full.

BEAVER RESERVOIR:

The Beaver Reservoir which was filled and spilled over the new spillway gage height 850 has caused considerable concern and presents rather serious problems. Leaks have developed at least in two places, one starting at elevation near the highwater line and in the flat area immediately in front of the spillway crest. At a point some 20' out from the spillway crest and opposite the right end of the spillway or away from the dam and at elevation around 77 feet a sump hole appeared with dislodgement of some materials both the earth and rip-rap were displaced.

The other noticable leak area appeared at a lower elevation or at about gage height 70' some 25' to the left of the tower, looking down stream. This is a pronounced sump hole an inverted cone about 10' in diameter on top and approximately 5 feet deep. This may have been a break through into a very open rock section near the tower, which was given special attention when the earth blanket was being placed in front of the old structure; quantities of bentonite were used at the time at or near this point.

It is to be pointed out that excessive leakage did not appear at any time at the lower toe of the dam, but a very heavy stream perhaps 20 to 25 c.f.s. developed about 400 to 500 feet below the dam on the right bank, this water had to travel through the old stone mountain which furnished most of the material when the dam was first built.

History has it that practically all of the material first used in the dam was placed there by the explosion of one massive blast of dynamite, practically filling the canon at the site with broken stone of all sizes.

It is quite conceivable that such an explosion shattered this mountain making it possible for water to pass through it quite freely.

It was hoped that the earth blanket recently placed in front of the dam would seal off any leaks to this previous area. Some work will have to be done in the tunnel below the gates, for a study indicates some breaking down of the concrete lining as well as in the old rock section.

Although it has been discussed many times, a vent pipe to relieve the vacuum caused by heavy releases through the gates, has never been installed; this might solve some of the problem in damage to the tunnel lining below.

Storage in the Beaver Reservoir will be carefully studied from elevation about 65' and on up.

It is my opinion that there is little danger of dam failure, but to hold water in storage for late delivery presents a real problem.

No definite proceedure as to repairing the leaks on the dam has been made.

HUMPHREYS RESERVOIR:

As you know the Humphreys Dam, used for fish culture only, a concrete arch about 90 feet in height on Goose Creek, had developed many areas of leaks and demanded some serious study as mentioned in my report to you last year.

During last winter an Engineer, Mr. Robert Blank, of Denver was employed to study the matter and make recommendations.

The contractor employed to make repairs was the Prepakt Concrete Company, who use a unique method of placing materials, known as the Intrusion prepakt. A diver was employed to repair the defective gates and remove materials on the trash rack; so the water in the reservoir could be lowered. Total draw down was about 37 feet or to a point where it was believed the concrete below that line was in good condition. Later developements proved the findings to be accurate.

Essentially the method employed was a study of the affected areas, both by observation and core sections being taken and thus the removal of inferior concrete found.

This defective concrete was removed by use of jack hammers, in many instances over large areas and I know in one instance entirely through the dam and the sections filled with prepack concrete. On the lower face of the dam one section required 40 cubic yards of concrete and other places required similar amounts.

Without going into detail the method of application of the first procedure consisted of very carefully cleaning off the old concrete and fitting rigidly anchored forms to the area then filling the section with washed stone - 3/4" to 3 1/2" size. After the form was completely filled with the stone, grout consisting of sand, cement and a secret chemical is pumped into the form under pressure through holes in the forms at rather close intervals.

The process insures very dense concrete and quite smooth surfaces.

Work was completed on the front face of the dam but some additional repairs is anticipated to be done on the back of the dam to protect the old concrete in various areas.

I am pleased to report that an inspection of the Dam on October 24, with the water within about 4 feet of spilling, that there was no leakage or wet spot apparent on the back of the dam; I consider this a fine piece of work.

TERRACE RESERVOIR:

Much publicity developed from what threathened to be a failure of the Terrace Dam. While not in my district, with Mr. Heilman away at the time, many of the worries in connection with the near break and threathened flooding on the lower reaches of the Alamosa River, fell to me.

On July 18, at about 6 A.M. the wife of the Caretaker, who lives within sight of the dam, heard a roaring noise coming from the direction of the dam and observed also the sloughing off of large quantities of materials from the back of the dam.

Calls went out of the impending danger and within an hour many people were at the sight, few believing that the structure would hold. The reservoir was filled to capacity gage height 170.4 feet, and spilling some 800 to 900 c.f.s. over the spillway.

Naturally the gates were opened immediately to relieve the pressure. It was estimated by many that the leak was never more than 3 to 4 cubic feet per second.

The sloughing of materials lasted from about 6 A.M. to 10:30 A.M. when the breaking away of materials practically ceased, with only clear water coming from the leak area, which was later determined to be about 71 feet below the crest of the dam or at gage height about 110 feet or 61 feet below the high water line; a rough survey of the cavity left by the sloughing indicated between 8000 and 9000 cubic yards of materials had moved out in a period of about 4 1/2 hours.

What caused the leak or where it originated has not yet been determined, but it is apparent that the effected area was saturated previous to the failure which accounts for the very rapid sloughing of materials.

Orders from your office to lower the reservoir to point of leak was carried out as quickly as seemed practical; even then some difficulty was encountered on the lower Alamosa River for the channel had so filled up with vegetation there actually is very little stream bed apparent, east of Hiway 285, this condition caused some flooding of crops, especially pasture and meadows in that area; added to the release from the reservoir, the inflow was excessive reaching 696 cubic feet per second on July 27, 9 days after the gates were ordered open.

Little has been done to provide for necessary repairs to the Terrace Dam to date.

Two prominent engineers on earth dam construction from the Bureau of Reclamation visited the project after the sloughing occurred.

The area adjacent to the dam was inspected and the materials found in and near the old pits were considered of good quality and ample in supply.

The only recommendation offered by the two engineers was the placing of an earthen blanket some 20 feet wide on the front face of the dam extending into a trench cut into the berm on the dam, which I would say is at elevation about gage height 120.0 feet.

The U.S. Soil Conservation Service has been employed to make cross sections of the dam and make test borings at intervals along the axis of the dam to study the moisture content of the materials encountered - looking for any indication of wet spots, or saturated areas.

It may be said now at elevation, about 82', there is a very slight leak perhaps 15 or 20 gallons per hour.

CROPS:

Crops generally in District #20 were good with about average acreage of potatoes planted with average yields and of good quality; the cost of production was considerably cut due to little pumping requirements.

The hay crop, both native and alfalfa, was good but due to excessive rains, especially the first cutting, was of poor quality.

A large acreage of small grains was planted with good yields reported generally.

PROSPECTS FOR NEXT YEAR:

It is almost needless to say that the water out-look for 1958 is unusually good.

With over 67,000 acre feet carry-over in the reservoirs, above normal rain fall in the mountains this summer and fall, and the water table in the Valley back to about normal, we should look forward to a good water supply next season.

Respectfully submitted,

D H Mathias

D. H. Mathias
Special Deputy State Engineer

DHM:rc

GROUND-WATER LEVEL STUDY
SAN LUIS VALLEY-COLORADO WATER DIVISION 3.
Records by Bureau of Reclamation

Well Number	Approximate Location	Distance in feet from Ground Level to Water Surface — Date Measured 1-1-1949	11-1-1956	10-1-1957
2632	10 miles S & 8 E of Monte Vista	2.0'	5.2'	4.9'
2610	10 miles S & 2 E of Monte Vista	3.1'	8.5'	4.2'
2692	6 miles S of Monte Vista on Gunbrl Road	2.3'	6.0'	2.7'
2624	7 miles S & 3 W of Alamosa	1.4'	6.2'	5.2'
2664	3 miles S & 3 E of Alamosa	5.1'	5.5'	4.3'
2500	16 miles due E of Monte Vista	4.7'	7.4'	3.8'
202	4 miles N & 1 E of Monte Vista	4.1'	12.2'	3.4'
926	6 miles Due E of Monte Vista	5.4'	6.2'	5.4'
711	6 miles N & 12 E of Monte Vista	7.2'	8.2'	6.1'
707	6 miles N & 6 E of Monte Vista	4.5'	5.9'	3.8'
582	6 miles N & 5 W of Monte Vista	18.5'	32.2'	13.8'
210	8 miles N & 1/2 W of Monte Vista	4.3'	25.4'	2.6'
954	10 miles N & 8 W of Monte Vista	6.9'	10.9'	3.3'
624	12 miles Due N of Monte Vista	4.6'	dry 9.2'	3.8'
518	12 miles N & 5 E of Monte Vista	4.6'	9.2'	4.0'
677	12 miles N & 8 E of Monte Vista	4.0'	6.0'	3.7'
167	12 miles N & 12 E of Monte Vista	11.1'	18.2'	8.7'
661	14 miles N & 3 E of Monte Vista	4.5'	7.8'	3.1'
658	14 miles N & 6 E of Monte Vista	4.3'	5.9'	2.9'
77	Just South of San Luis Lakes	2.4'	10.7'	10.3'
226	18 miles N & 3½ W of Monte Vista	30.2'	56.0'	44.7'
623	18 miles Due N of Monte Vista	4.8'	7.0'	4.5'
227	18 miles N & 3 E of Monte Vista	2.4'	4.4'	2.9'
932	12 Due E of Monte Vista	6.6'	9.6'	6.6'
630	18 miles N & 6 E of Monte Vista	4.4'	3.6'	3.5'
	Average Depth to Water	6.14'	11.8'	6.49'
	Average Decline 1949 to 1956 Inc.		5.66'	
	Average Rise 1956 to 1957			5.31'