11-30-1908

First Biennial Report of the Territorial Engineer to the Governor of New Mexico including Water Supply, 1907-1908

Vernon L. Sullivan

FIRST BIENNIAL REPORT

OF THE

Territorial Engineer

TO THE

GOVERNOR OF NEW MEXICO

INCLUDING

WATER SUPPLY

1907-1908

ALBUQUERQUE MORNING JOURNAL
ALBUQUERQUE, N. M.

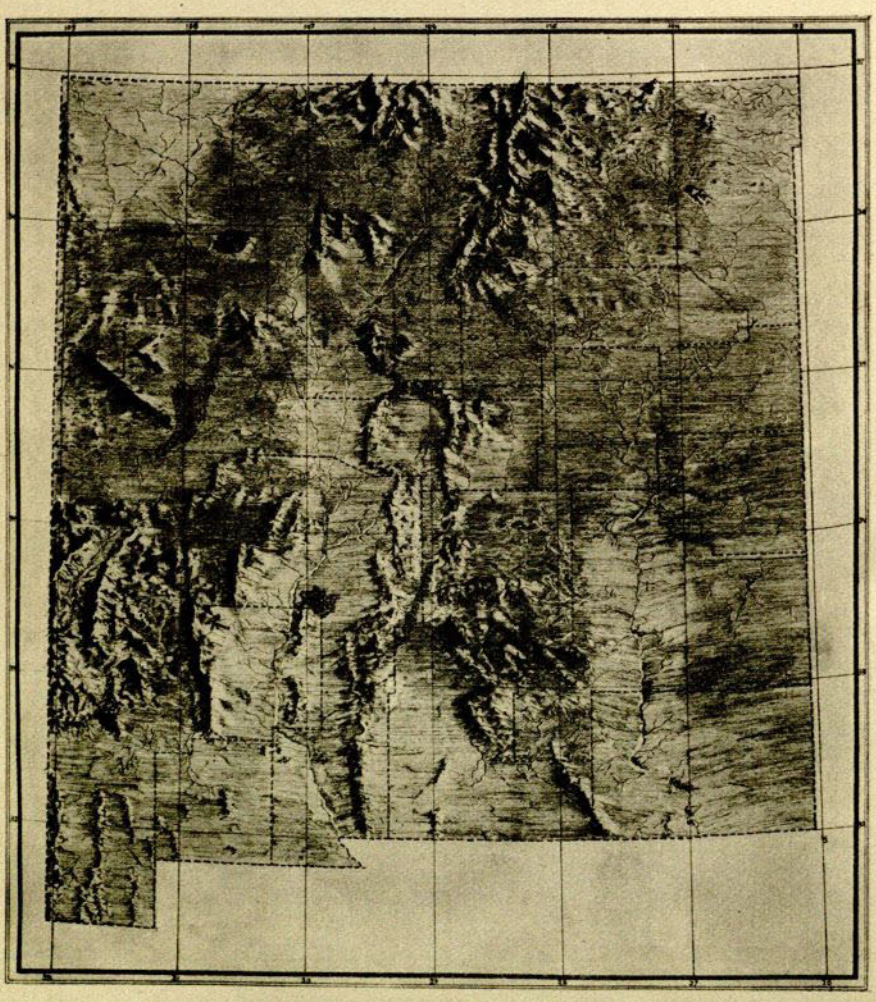
Letter of Transmittal

Santa Fe, New Mexico,
Nov. 30, 1908.

To the Honorable George Curry,
Governor of New Mexico.

Sir:—In accordance with the provisions of Section 8, Chapter 49, Laws of 1907, I have the honor to submit herewith, a report covering the work of this department during the last year and a half.

Respectfully,
VERNON L. SULLIVAN,
Territorial Engineer.



Relief Map of New Mexico Showing Principal Drainage Basins.
Bul. No. 66, N. M. Agri. Exp. Sta.

Acknowledgements

Acknowledgments are due to the United States Reclamation Service for their kindness in loaning this department field instruments, also to the United States Geological Survey for their assistance in co-operating with this office and the furnishing of money for the work connected with the general hydrographic investigations.

I also wish to acknowledge the energetic interest and efficient help of my assistant, Mr. C. D. Miller, in his untiring efforts to assist in promoting the best interests of this department.

Introduction

DURING the past year, development in New Mexico has taken rapid strides. The irrigation side of this rapid growth, under the new law, has been very gratifying and satisfactory to this department. A general awakening to the fact of necessary rules and regulations conserving the water supply and multiplying its productiveness, has increased not only with the small settler on a "homestead", but also largely to the citizens of the Territory who are not connected with irrigation enterprises, but personally realize its value as a resource.

The existence of the Office of Territorial Engineer a year ago was little known to the general public, and water appropriations had been made in the usual indefinite manner. The advisibility of establishing permanent and legal rights to the use of water has accentuated the necessity of applying for same through this office, as the safe means, whereby future controversy and endless litigation would be avoided.

The rapid influx of a farming population, as exemplified in the eastern and northwestern counties, has attracted the attention of men experienced in irrigation matters with a result, that numerous extensive projects have been started or are now contemplated by eastern capital and western men.

The value of these large projects to the Territory is great indeed. The colonization scheme in the larger projects is mainly carried out whereby thousands of industrious, enterprising American farmers are being settled on small tracts of from 10 to 50 acres. With the two million or more acres of land which are being organized for irrigation purposes, to be completed within the next ten years, would, apportioning a family of four on every 40 acres, increase the population of the Territory or State some 200,000 of farmers, not counting the inhabitants of the towns and business centers these agricultural communities would support.

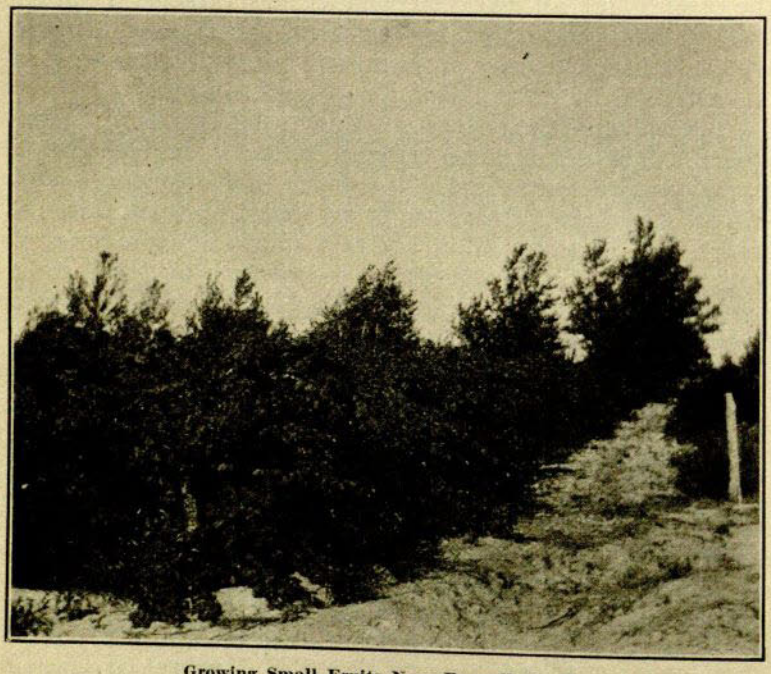
Irrigation works are haply distributed over the entire Territory. In San Juan County one project alone contemplates the reclamation of over a million acres and there is water supply available for nearly that amount. In Eddy County the well-known Pecos Valley district is flourishing. The Carlsbad project of the U. S. Reclamation Service is selling its land rapidly to new comers. In Union County this office has approved an application of 40,000 acres. The Rio Mimbres Irrigation

Company is now ready to push its large proposition in Grant and Luna Counties improving a great many acres of Territorial lands. Work has commenced in a preliminary way on the Engle project of the U. S. Reclamation Service and as soon as a railroad is built from the main line to the dam site, work will be pushed with much energy and accomplishment.

Applications for permits to appropriate public water of the Territory have been recorded in this office in the last year and a half, or under the Laws of 1907, of about 2,000,000 acres of which over 700,000 have been approved by the Engineer. Of course these do not include applications for power rights and for stock purposes.

Office Work

In my last report, covering a period of three months, only a general idea of the business of this department, as conducted during that time, was set forth. In order to convey a thorough understanding of the workings of this office to the general public, the following pages will note in more or less detailed form the routine of office and field work.



Growing Small Fruits Near Roswell, N. M.

APPLICATIONS

To make the procedure uniform in applying for permits to appropriate public water, this office has had printed, application blanks upon which the applicant describes the method, point of diversion, quantity, use, etc., of the water covered in his application. Complete instructions for the making out of same are to be found upon the back of the application blank. Upon the receipt of an application, accompanied by maps of the project complying with rules and regulations gotten up to cover same, the date of receipt is noted on the application and is immediately copied in Water Record books provided for that purpose. Should the application or maps be defective as to form or otherwise non-conformable to our established system, same are returned to the applicant for correction and if properly corrected and returned within sixty days after the date of its original filing, the same date is maintained as to its priority.

When an application calls for the construction of a dam or canals above a capacity of 50 second feet, in many cases it is possible and saves much delay to have the plans and specifications placed upon the original maps, if there is room, or sent in on separate sheets at the same time with the general maps and application. In this connection, the Engineer is obliged by law to examine same, make changes where the safety and welfare of the public makes necessary and to charge a fee, which is turned over to the Hydrographic Survey fund, for such corrections and examination.

CORRESPONDENCE

With the great increase of application filings and the office routine connected therewith, there comes a proportional amount of correspondence, which of late, has become an important item of office duties. Such letters have as far as possible, had prompt attention, copies of same being properly filed and indexed. Mimeograph copies of general letters have been resorted to, to do away with excess of correspondence. This office has many calls for data on different projects and general information which is increasing every day. Reports are made with an idea of covering this last point very concisely and accurately.

HYDROGRAPHIC SURVEY MAPS

The hydrographic surveys ordered by the different courts have thrown a large amount of work upon this department,

both in the field and office. The making of maps and calculations of the areas of cultivated land, the flow of water in many ditches irrigating same, etc., from notes sent in by the field force, has occupied a great deal of time ,to such an extent that lately it was found expedient, on account of other office work, to turn this work over to a draughtsman in the field.

MAP FOR IRRIGATION CONGRESS

A map for the Irrigation Congress held at Albuquerque, N. M., was undertaken. This map showed the location of irrigation projects both approved and projected in the Territory. Among them are shown the location, lands irrigated, etc., of all the projects under the supervision of the United States Government. Dry farming data gotten up from U. S. Weather Bureau reports and all available data pertaining to irrigation in New Mexico was also a part of this map, giving authorative and correct information to all visiting the Congress. Later this map was used extensively by the Clason Map Company of Denver in getting data for their map now being put on the market.

REVISED RULES AND REGULATIONS

The rules and regulations printed last year by this office, giving directions for making maps, etc., in connection with water right applications, were found inadequate with the desire for a higher standard of regulations, and with the growth of irrigation. It was, therefore, found necessary to revise them. These new rules and regulations, copies of which have been sent to all attorneys and surveyors, embody many changes in procedure, detailed information regarding common conditions and directions in cases of protests and appeal. Thus, in a large measure, these rules were designed to lighten the correspondence and to better systematize office regulations and requirements.

STREAM DATA

Previous to the installation of the Department of Territorial Engineer, little or no records had been kept or compiled on the water supply of the Territory. This data on stream flow is the only sure ground upon which the Territorial Engineer can proceed in the distribution of water through application. The United States Government, through the Reclamation Service and the Geological Survey has for a number of years collected data on streams supplying water to its reclama-

tion projects. This data, although forming a very small portion of the whole, has for the past few months been gathered and compiled by this office and all available information placed in book form. Data on water supply as collected by the Engineer will be found under "Water Supply" of this report.

BLUEPRINTING WORK

During the past year many calls have been made upon this office for blueprints of the various projects throughout the Territory from the tracings filed in this office. These have been supplied at a nominal cost. The facilities for this work it might be stated are poor, owing to the cumbersomness of the apparatus and no provisions for such work being made in the building.

INDEXING STREAM SYSTEMS

In order to determine with speed and accuracy the filings made on the various territorial streams, a card index has been gotten up. When this card system is thoroughly arranged, an inquiry as to whether or not and in what quantity there have been filings made on any stream where filings have been made through this office, can be readily answered. In forming this index four different headed cards were used; the first for the main stream, second, for the direct tributaries of these rivers and so on down bringing in every spring or draw, whose waters have been applied for. Under each of these main cards are filed cards showing the date of filing, points of diversion, quantity appropriated, etc., all in a convenient and accessible form.

DETERMINING OLD WATER RIGHTS

New Mexico in establishing a permanency to water rights, finds a great many settlers, who have beneficially used waters for a great many years. Perhaps New Mexico is the oldest irrigated section in the United States. With the coming of the Spanish explorers from Mexico and scattering over the Territory, irrigated farming has been carried on in a more or less primitive way. In order to protect these prior claims of the settlers, the Engineer has used every precaution for their protection. In nearly every application where old rights are believed to exist, a proviso, protecting these prior rights, has been inserted in the approval. The value of hydrographic surveys in substantiating these rights cannot be over-estimated.

The office of the Probate Clerk in the different counties has

been a receptory for these old filings, however, owing to the meagre data given in these filings, the lack of certainty as to whether such filings had actually been carried out, has made the attempt of this office to index such appropriations from the county records practically useless.

BULLETIN FOR GOVERNMENT

The Territorial Engineer, as supervisor over irrigation development in New Mexico has been asked to write a bulletin on same for the Bureau of Irrigation Investigations at Washington. Owing to the value this booklet, when printed and distributed over the Territory and other states of the Union, would add to the growth and advertisement of New Mexico, the Engineer undertook this work personally. When same is printed by the Government the Territorial Engineer will have a number for distribution.

TROPHY CUP

In view of the indifferent knowledge of scientific irrigation, the value of water and the scarcity of same, throughout the Territory, the Territorial Engineer has endeavored personally by means of competition to bring about a more thoughtful and economical use of water. To do this it was thought expedient to personally offer a trophy cup for the best article on the economical use of water. The articles thus received have been sent to the various territorial papers, who have kindly published same. In this way each article reaches out to the farmer and in this manner, it is hoped, more may be done in agricultural achievement. The call being so great, the articles were published in pamphlet form and distributed to those asking for them. A large number was in this manner distributed to the settlers through out the Territory and to the visitors at the Irrigation Congress. The silver cup was awarded to Mr. F. G. Tracy of Carlsbad, New Mexico, by the examining board. Copies of these articles are available upon application to the Territorial Engineer.

Financial Statement

DISBURSEMENTS AND RECEIPTS

The money paid out under the Hydrographic Survey Fund is simply an outlay made by the Territory to conduct the surveys as ordered by the courts. Upon final adjudication of the water rights upon a stream system, the cost of the survey is returned to this fund by the Court. The cost is borne by water right owners according to the amount adjudicated to each party along the stream system and is apportioned by the court upon the basis of their holdings and beneficial use of the water.

Amount Paid out from Hydrographic Survey Fund:

Black River Survey (completed)	$ 789.92
Hondo River Survey	4,482.54
Rayado River Survey (to Oct. 31st)	380.71
	$5,653.17

TRAVELING EXPENSES

Amount Expended by Territorial Engineer on Traveling Expenses

July, 1907	$ 94.05
August	50.46
September	34.03
October	9.60
November	37.20
December	32.55
January, 1908	72.05
February	91.00
March	.....
April	188.15
May	.....
June	14.00
July	222.80
August	205.70
September	22.25
October	68.68
	$1,142.52

CONTINGENT EXPENSE

The amount of Contingent Fund allotted to this office is very limited. There is no means of increasing this fund by the receipts of the office. The salary of an assistant, the printing of the reports, blanks, rules and regulations, the cost of stationery, postage and many other incidentals are all paid out of this fund. Many necessities have had to be done without in order to keep expenses within the amount allotted. All the instruments used by this office have been charitably lent to it by the Reclamation or Geological Services of the Government or by the Territorial Engineer personally. Same are becoming worn out or needed by their owners. Unless some provision

is made towards increasing this fund either by direct appropriation or division of the receipts, the efficiency of this department will necessarily become greatly impaired.

Amount expended on contingent expenses..... $1,727.12

A receipt is taken for all expenses paid out. These receipts or sub-vouchers are all itemized and attached to the main voucher which is forwarded to the Territorial Auditor for payment. Proper books are kept giving dates and items for which money has been expended.

RECEIPTS

1907	
Receipts for Third Quarter	$ 505.13
Receipts for Fourth Quarter	350.85
1908	
Receipts for First Quarter	609.85
Receipts for Second Quarter	385.40
Receipts for Third Quarter	648.40
Receipts for October	317.30
Total paid over to Territory from July 1st, 1907, to October 31st, 1908	$2,816.93

The receipts of the office have increased three hundred per cent, as compared with the first and second quarters of 1907. This amount is turned over by the Engineer in quarterly payments to the Territorial Treasurer where it is credited to the Hydrographic Survey Fund for use in adjudicating water rights only. In this way the working capacity of this fund becomes larger and larger.

Field Work

Where applications are filed for permits to appropriate water, a notice of same is published in a local paper and interested parties are given opportunity to protest against the granting of the application should it be detrimental to their valid interests or claims. Protesting parties usually file in this office affidavits against the application as advertised covering the grounds of their protests against the granting of certain applications. The applicant for water rights is notified of such protests and given opportunity to file affidavits in support of this application. It frequently happens that the above affidavits are opposed and very contradictory to each other. It, therefore, devolves upon the Engineer to examine for himself the conditions as they exist. In view of this fact, dates for oral hearing of the different parties concerned is set by the Engineer in a town in which the controversy arises. Upon this visit the Engineer personally inspects the conditions and his decision is largely based upon the result of such examination.

The uncertainty of prior rights and amounts of water avail-

able for appropriation, calls forth numerous protests and a large percent of the applications recorded in this office have been opposed thereby often causing, in many cases, hearings to be had, entailing much travel and time of the Engineer.

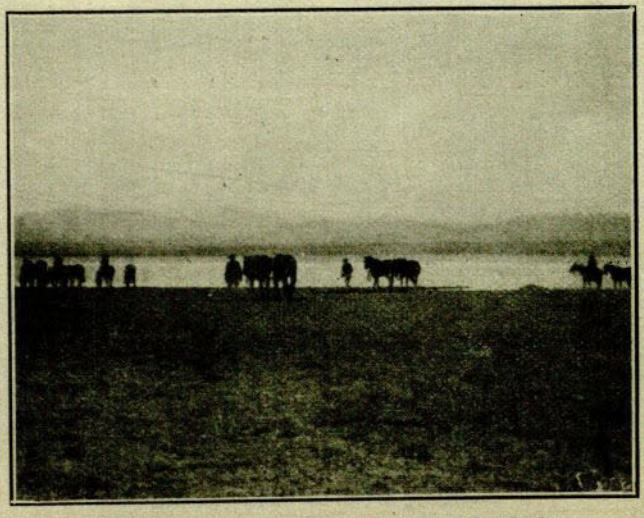
EXAMINATION OF THE PROPOSED PROJECTS

While in the field the Engineer has had occasion quite frequently to go over the ground of proposed projects and has been able by the opportunity afforded to make suggestions to the engineer in charge, regarding the location of reservoirs, distributing ditches, etc. This is done solely with the intent to aid the development going on, by lessening to some extent the difficulties to be overcome which would doubtless increase the outlay of the investors.

DEMAND FOR CONSULTING WORK

During the past year the Engineer has had many calls by private parties to carry on investigations of different nature pertaining to irrigation conditions in certain localities. From the Artesian district a call is made asking the Engineer to supervise the determining of the amounts and places of return waters from the artesian wells to the Pecos River, etc. etc.

None of these investigations have been undertaken by the Engineer, although the cost incidental thereto would have been borne by the parties themselves, on account of the great amount of work the Engineer is obliged to do in the pursuance of his regular duties.



Scenes on Project of Maxwell Irrigated Lands Co.

Hydrographic Surveys for Adjudication of Water Rights

The Irrigation Law of 1907 provides, that any parties desiring to go into court to have their water rights adjudicated, that they must bring in all other parties who have any right upon that source of supply as a defendant to said suit. This is done to avoid any injustice that might arise in adjusting rights of two or more without considering all of the rights that receive their supply of water from the same stream system.

In order that the court may have sufficient data to adjust all the rights equitably, the law provides that the court shall order the Territorial Engineer to make or furnish a complete hydrographic survey of the stream system under litigation. These surveys include a survey of the land as well as the water thus the court is advised of every acre that is at present irrigated,—of the kind of crop grown, of the land that has been irrigated in the past, the acreage of such land, the alignment of all ditches and canals and the amount of water carried in each ditch, the number of fields, size and shape of same, location of buildings, flow of water in the river at various places, etc.

Measuring Water by "Weir" Method

The first stream system to be surveyed under the new law was the Black river. This river heads in the south central part of the Territory in the Guadaloupe mountains near the Texas line and flows north-easterly, emptying into the Pecos river near Malaga, New Mexico. Only the normal flow of this river has ever been used for irrigation the principal source being in three very permanent springs, namely, the Guiser, Rattlesnake and Blue Springs. However, there are numerous other smaller springs occurring along the river course.

There is considerable flood water at times flowing in the river that should be stored and utilized for irrigation, both the normal flow and the flood water is of a very good quality, being very free from alkali.

In making this survey a reservoir was located which could be used for storing the flood water, such reservoir site being located in a draw some distance from the river.

Weirs were placed and maintained on all ditches carrying water and regular measurements taken on all ditches, springs and the river at different places. The principal spring on Black river is the Blue Spring, the mean discharge being 15.20 sec.-ft. while Rattlesnake Spring has a mean discharge of 4.25 sec.-ft. and Guiser spring 3.18 sec.-ft. The total acreage irrigated under the Black river system, including the lands to be irrigated under the Government ditch, was 2687.7 acres.

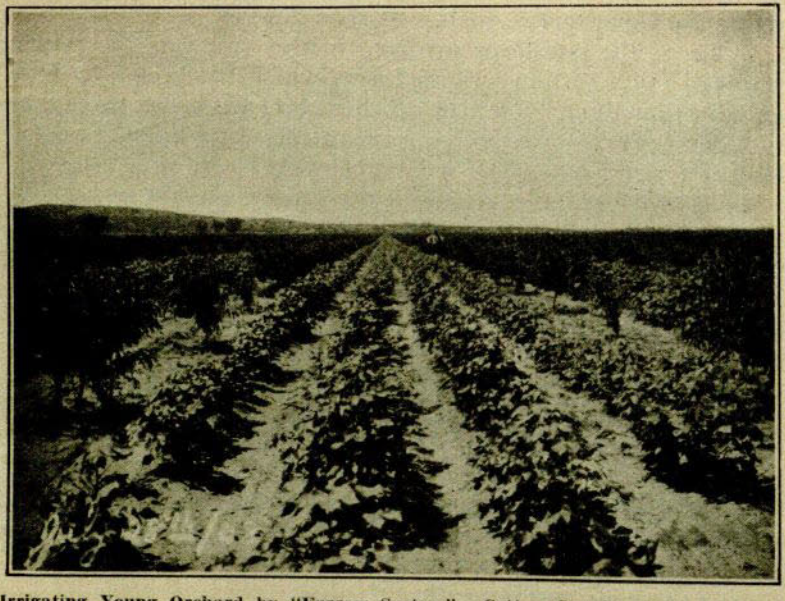
One of the questions involved in this suit was the return waters from a certain irrigated area which has been over-irrigated, using about 15 sec.-ft. on about 800 acres, our investigation showed that over 56 per cent. of the water applied to this land returned to the river or land below.

The hydrographic survey of the Hondo stream in Lincoln and Chaves Counties was ordered by Judge Mann on the 5th day of December, 1907, and soon after the completion of the Black River stream system, the Hondo survey was commenced about the first of April, 1908. The land survey was completed the last of October while the measurements of water will continue for some time.

The survey covers over a distance of approximately 150 miles and in that distance there are over 175 different Weirs and measuring stations on the different ditches and streams. The data collecting and mapping has not as yet been completed, however, this will be pushed as fast as possible and a report, together with maps, will be forwarded to the court at the completion of the hydrograhic work.

The hydrographic survey of the Rayado stream system was ordered on the 24th day of March by Judge Mills and about the first of June, 1908, the hydrographic part of said survey was started at about that time, but owing to the lack of funds for this work, it was necessary before the land survey could be commenced, that plaintiff advance $500 for the completion of said survey, satisfactory progress is now being made.

The question of beneficial use and the duty of water on different areas of irrigated land under a stream system are important factors necessary in determining the amount of rights to the use of water for the specified areas, thus the data included in the hydrographic surveys and reports as to size and condition of ditches, the amount of water used and wasted, the conditions and kind of soil, upon which the water is applied, results gained and crops raised, etc., upon all lands irrigated in the entire stream system are of inestimable value in obtaining a just adjudication.



Irrigating Young Orchard by "Furrow System". Cotton Growing Between Rows

El Camino Real

Or Scenic Highway via Raton, Las Vegas, Santa Fe and South, as provided by Chapter 7, Laws of 1905 and Chapter 56, Laws of 1903.

Much progress is being made on El Camino Real when considering the amount of money available ,and the fact that only convict labor is being used; for which credit should be given to the Superintendent of the Territorial Penitentiary.

Leaving Santa Fe via the Santa Fe Canon the road is practically completed to the Pecos Forest Reserve and on the Las Vegas end coming towards Santa Fe, the road has been practically completed to Pecos Forest Reserve on that side, with the exception of a few miles next to the Pecos Reserve. From Las Vegas south and west the road follows the Gallinas Canon until nearly reaching the reserve.

It is hoped that it is the intention of the Government to continue the line through the Pecos Reserve soon; however, they have done practically nothing excepting the making of a survey of the line and estimating the cost of construction, and we would suggest, that the next legislature call attention to the Government that the Territory has practically completed its portion between Santa Fe and Las Vegas, and ask them to complete its part.

Work at present is confined to the line between Raton and the state line. The route on leaving Raton winds up Goat Hill where glimpses of Raton and valleys below can be had at nearly every turn in the road. On reaching the top of Goat Hill the road follows the divide between Railroad and Coal canons to the state line, furnishing continuous magnificent views in all directions. The feature of the construction on this part of the road, is the climbing of Goat Hill, which is done on a maximum grade of eight per cent. The road after reaching the top of the hill will be easily constructed and cheap to maintain.

The most difficult construction work on the entire road is being done by convict labor, leaving such parts that are more suitable for mechanical construction, thus the counties through which the road traverses can complete such portions with the aid of modern road scrapers at a comparatively small cost.

I am thus including the Scenic Highway in my report as you have called me in as a consulting engineer on the above work.

Rio Grande Improvement

Chapter 60, Laws of 1907, provides appropriation for the improvement of the Rio Grande in a number of Counties. This work is under the supervision of the Territorial Engineer, who is to work in conjunction with the Board of County Commissioners and the County Surveyor of the several counties.

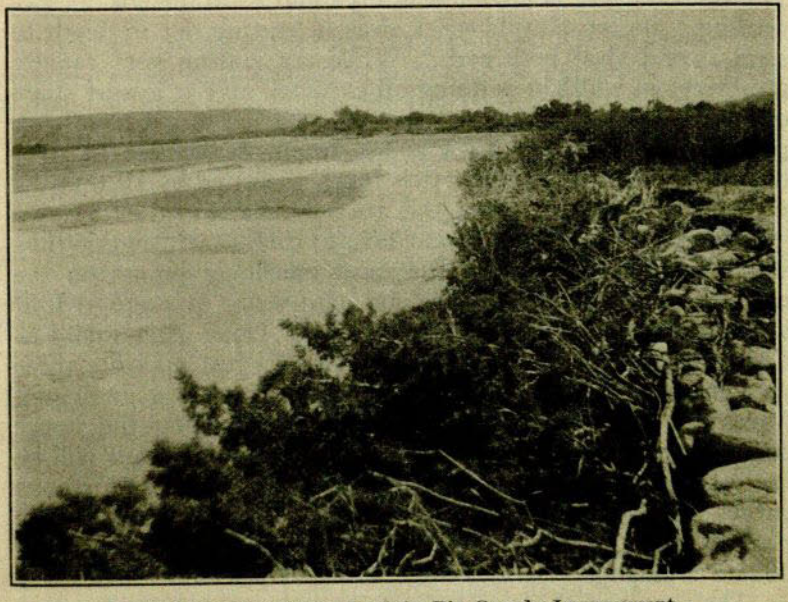
The Rio Grande river flows southerly through a narrow, fertile valley, which has largely been built up by the depositing of silt and, therefore, the bed of the river is nearly as high as the surrounding valley. No bed rock is found for considerable depth, upon which to build protection work and the controlling of the flood water of this river becomes a perplexing problem. Dykes have been built by citizens for protection of property, but at times they are unable to cope with the floods and a number of communities have been inundated.

In the northern end of Bernalillo County the river had followed out an old acequia and was eroding away land very rapidly. In one place the water was within a few feet of the dyke and was giving every indication of continuing right on through, thus endangering the property below for if once on the other side it would have been impossible to control it. All the water had left the natural bed and what was once a quiet little acequia was changed into a raging torrent. A small canal was cut straight up the old bed and brush dams were thrown across the places where the water was running, thus the water was slowly forced back through the little canal, which soon ate itself out and by the time the dams were completed the river was flowing straight down its old course. At a great many other plaecs, where the river was eroding the banks, brush jetties were built to protect them and old dykes were built up to a true grade.

In Dona Ana County considerable work has been done amounting to $1,196.59 Territorial work. The improvements in this county have been the straightening of the river at large bends. This work is done by the constructing of small, straight ditches across the neck of the bends, heading the ditch into the river at the upper end and the water is turned into the ditch. Sometimes it is necessary to build jetties on the opposite side of the river to deflect the water into the ditch and as the water rises the ditch being much shorter route than the river going around the bend the grade is therefore increased, thus the ditch soon cuts out large enough to carry the entire volume of water

and in a very short time, under favorable conditions, the increased velocity of the water will lower the bed of the river not only where the ditch was built, but also a considerable distance up the river, thus by the lowering of the river bed and the increasing of the velocity of water, greater floods can flow down the channel without overflowing the surrounding country.

These facts are substantiated in a report from Gen. V. J. Viljoen as follows: "Experience of three important cut-offs made by interested farmers about four miles below Earlham developed that a large and very fertile section around Chamberino which was constantly subjected to overflow was now absolutely saved from the dangers of high water and thousands of acres are in alfalfa and other crops which were practically abandoned for years past. These cut-offs naturally straighen the river and thereby deepen the channel from two to four feet per mile. Where the old channel was not deeper than eight to twelve inches below the surface it is now four and six feet deep. The bend in the river creates an overflow because of the impossibility of a big body of high water flowing around a curve or bend and therefore forcing overflow



Method of Rip-raping Used in Rio Grande Improvement

or backing the water up and so overflowing into the fields above the river banks."

One of the principal cut-offs in this county is called the "Earlham Cut-off", and regarding this work will copy another section from General Viljoen's report: "The cut-off at Earlham will save from sure destruction all of the many thousands of productive acres of fields east of the river extending over seven miles from above Berino to Anthony or the Texas line. Since the bend in the river where the cut-off is made is gradually cutting towards a low or sunken section and only about 50 feet more caving and cutting will throw the whole river into this low and submerged place which is at least three and one-half feet lower than the present channel bottom and so carry the river along the Santa Fe tracks scattering as it must, broadcast over all of the immense fields along the river. The first highwater will throw the river into the new cut-off and it will take about a few days to wash out the new channel sufficiently large to carry any volume of water that may come."

Other work was done in several different places, the largest work was the finishing of a large cut-off near Dona Ana which had been commenced by private parties. Regarding this work we will copy from a report from Mr. R. P. Birdwell as follows: "There is no doubt in my mind as to the cut-off succeeding. Its most rapid work, was in cutting out in depth to level river bed at both ends. While not cutting very rapidly at present in width it is doing all expected and at lowest stage of river was carrying half the water. I tried to get over with photographer and get a view, but recent heavy rise in river has cut me off for a while. It is much regretted by all that the projected cut-off just above this one was abandoned as the two in connection would be a great help to each other, and as they stand now are considered the most menacing points on the river by all the engineers here and high water of stage of four years ago will seriously endanger both Dona Ana and Las Cruces as the old abandoned ditch mouths just opposite these danger points, offer an easy opening. The more intelligent Mexicans now see their grave error in opposing the upper cut-off and I believe the effort to have it done this fall will be successful. It is getting plainer to all of us that the tortuous curves are the only troublesome places we are having on the river and the straightening of them would save thousands of dollars annually."

The people of this county have put up a good deal of money

and work on different Rio Grande Improvement work, thus enabling greater returns from the money expended by the Territory.

Considerable work was done in Sandoval County amounting to $1,810.80 of Territorial expenditures. The work here consisted in ripraping the banks to prevent further eroding away of farming land, the building of several dikes and constructing several cut-offs. The ripraping of banks was done at several places with satisfactory results. In reference to the straightening of the river will quote from a report from Mr. C. F. Spader as follows: "I take great pleasure in informing you that the canal opened last fall on west side of Rio Grande at a point about four miles above Bernalillo has greatly widened since the rise in the Rio Grande and is now carrying most of the water. We have just completed a small amount of brush and rock work on east side of river at same point and tomorrow start building the dyke near Bridge, all of which you will have a report of in a few days."

In Socorro County considerable improvement work was made. At San Antonio a dyke was built to prevent the flood of the town and lands nearby from overflowing. This dyke was riprapped and built on a substantial manner considerable help and money was furnished by the residents in that vicinity.

Lower down a cut-off was finished in which the citizens had started a mile or so above the town of San Marcial also a drainage ditch was constructed from the town of San Marcial south thus draining the town and reclaiming considerable land and also increasing the flow of the river below to the extent of the water drained into the river.

The results of all of this work were very satisfactory, the residents either putting up money for the work or helping in the work itself.

In Rio Arriba, Toas, and Valencia Counties most of the improvement work was along the lines of confining the river channel to its present boundaries by ripraping the banks, the building of jetties and dykes.

The work connected with improvement of the Rio Grande is so extensive and so difficult that it should be conducted on a system and with great care. This work should, therefore be conducted under commission of competent engineers absolutely free from political, county or community influences.

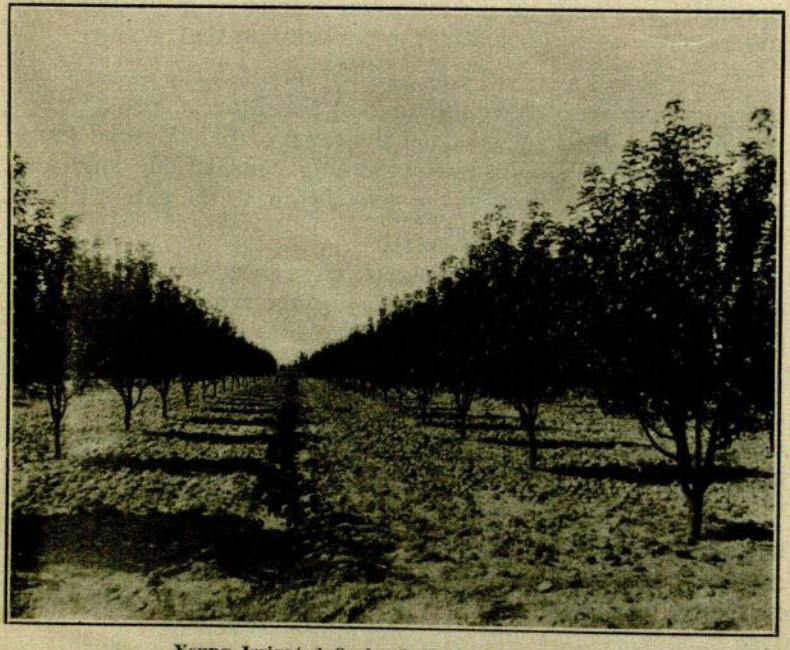
Amount expended on Rio Grande Improvement:

County.	Amount Paid by Territory.	Amount Subscribed by Counties Approx.
Bernalillo	$ 4,000.00	$2,000.00
Dona Ana	1,196.59	2,000.00
Rio Arriba	1,999.67	.....
Sandoval	1,810.80	300.00
Socorro	1,299.87	800.00
Taos	1,000.00	.....
Valencia	1,345.55	.....
	$12,642.48	$4,100.00

DRAINAGE

There is a coming necessity for drainage under the irrigated areas, especially where there is a careless use of water for irrigation. The present law provides that County Commissioners may call on the Territorial Engineer for the making of surveys for drainage ditches, etc., but there is no way of constructing such ditches over lands where there are any parties objecting to same.

It seems necessary that drainage ditches should have the "Right of Eminent Domain" granted them. I would, therefore, suggest that such an act be recommended to the coming Legislature.



Young Irrigated Orchard, Pecos Valley, N. M.

Water Power Possibilities

There are many streams in New Mexico where cheap water power can be developed. The power after such development, could be transmitted by electricity and use for pumping water for irrigation on lower mesa lands. Often the fall is such that the water used for power purposes (which would not interfere with its use for irrigation below) would develop sufficient power to pump from the underflow several times as much water as was used in its production. The demand for power is growing greater every day, besides that used for irrigation.

In order to determine the quantity of available power, it is necessary to have data as to the flow of the various streams and their fall. From this it will be readily seen that hydrographic data is not only necessary for the development of irrigation, but also for the development of power. There are undeveloped power projects known to the Engineer on the following streams: Animas, San Juan, Chama, Red, Vallecitos, Rayado, Cimarron, Ponil, Vermejo, Canadian, Hondo, Taos, Nambe, Santa Fe, Pecos, Mora, Gallinas, San Francisco, Ruidoso, Gila, Penasco, Sacramento, Lucero and many others, but how much and how feasible these propositions are, owing to absence of data, very little definite knowledge is known. It is estimated that there is a half million horse power that could be developed by water in the Territory.

In order to indicate the progress in power development and the need of assisting this industry by the Territory, the following table is given, showing the present power projects in operation that have been built previous to the Law of 1907 as compared with the rapid growth of this industry indicated by the proposed projects filed with the Territorial Engineer within the last year and a half.

List of Water Power Plants Now in Operation in New Mexico

Name of Owner	Location	River	Kind of Wheel	Power Generated	Power used for:
J. D. Judkins	Carlsbad	Blue Springs	Turbine	26 H. P.	Grinding & gen. farm work
Mr. Pitrat	Aztec	Animas		10 H. P.	Grist mill.
Farmington Electric Light & Power Co.	Farmington.	Animas	Sampson Turbine	95 H P.	Electric light plant.
Haynes & Bonney	Roswell	Berendes	Lefel Sampson	55 H. P.	Ice plant.
Carlsbad Public Utilities Co.	Carlsbad	Pecos.	Lefel Turbines	325 H. P.	Electric light pumping.
Santa Fe Water and Electric Co.	Santa Fe	Santa Fe	Pelton Wheel	100 H. P.	Electric light.
La Cueva Ranch Co.	La Cueva	Mora	Overshot	35 H. P.	Grist mill.
Mathew Gordon	Cleveland	Mora	Overshot	25 H. P.	Grist mill.
Macario Gallegos	Mora	Mora	Turbine	25 H. P.	Flour mill.
J. J. Fuss	Cleveland	Rio la Casa.	Overshot	35 H. P.	Grist mill.

Within the last year and a half the following power projects have been applied for:

Applications for Permits to Appropriate Public Water for Power Purposes

No. of Application	Applicant	Location	River	Power to be Generated	Remarks
40	Eden Land & Power Co	Aztec	Animas		Approved
49	M. H. Fisher	Alamogordo	Fresnal	800 H. P.	Approved
71	Chas. Springer	Cimarron	Cimarron		Approved
79	Chas. Springer	Cimarron	Cimarron Springs		
84	M. H. Fisher	Alamogordo	Alamo	2,000 H. P.	
90	J. D. Hand	Las Alamos	Mora		
103	J. P. Annan	Alamogordo	Dog Canyon	800 H. P.	Approved
105	Geo. Carl	Alamogordo	La Luz		Approved
124	Taos Valley Land Co	Taos	Lucaro	50 H. P.	
125	Taos Valley Land Co	Taos	Hondo	50 H. P.	Approved
126	Taos Valley Land Co	Taos	Seco	50 H. P.	Approved
133	H. B. Jones	Santa Rosa	Agua Negra-Chiquita	147.8 H. P.	
136	F. D. Allbright	Camp	San Andreas	130 H. P.	Approved
141	O. M. Lee	Alamogordo	Sacramento	644 H. P.	Approved
142	O. M. Lee	Alamogordo	Sacramento	2,894 H. P.	Approved
147	O. M. Lee et al	Alamogordo	Cedar-Carizo-Ruidoso	15,000 H. P.	
151	E. Krause	El Paso, Tex	Penasco	2,000 H. P.	Approved
161	M. H. Fisher	Alamogordo	Ruidoso	450 H. P.	
167	J. E. Edgington	Alamogordo	Penasco	3,720 H. P.	
166	Jay Turley	Turley	San Juan	5,000 H. P.	
179	Willis Martin & Co.	Farmington	Animas	100 H. P.	
184	Wolcott & Lawson	Alamogordo	Grapevine Canyon	500 H. P.	
185	Wolcott & Lawson	Alamogordo	Sacramento	5,000 H. P.	
194	J. P. Conner	Santa Fe	Pecos	5,000 H. P.	
195	Wolcott & Lawson	Alamogordo	Sacramento	5,000 H. P.	
203	Sacramento Val. and Irri. Co	Alamogordo	Sacramento	5,000 H. P.	

Comparing the above tables the increasing demand for power projects will be readily seen and the need of data for the calculation of same. It is estimated that a half of a million horse-power could be generated from the various streams of the Territory, as nearly all of the perennial mountain streams have good power projects suitable for the development of power for irrigation, electric lighting, running of mills, factories, electric railroads, etc.

For the purpose of showing the power possibilities of the Territory further, we will embody from an approximate report made by Mr. R. L. Cooper, Hydrographer, on the possibilities of power propositions on a few streams:

On the San Francisco river in Socorro County near Glenwood, N. M., a power proposition may be found which, from the mining industry around, would make a good commercial proposition. The river which is for the large majority of its course in New Mexico, in the rough and broken Mogollon range, is a tributary of the Gila. It enters a box canon below

Pleasanton which is a small, narrow valley possibly five miles long and from one-half to two miles wide and possibly one-third under cultivation. Elevation about 4,500 above sea level. The river boxes about Pleasanton and opens again into a small valley at Glenwood or the mouth of the White water and upon which is contemplated a hydro-electric power plant for use in mining development.

The U. S. Reclamation Service has made a survey of a dam site at the upper end of the box between Glenwood and Alma which is six miles above Glenwood. The reservoir here contemplated would cover the town of Alma. At the mouth of the box at Glenwood there is a natural dam site for making a reservoir for combined power and irrigation purposes. The water to be furnished by a high line canal and the river bed to the valleys of Glenwood and Pleasanton, using the river bed through the box between Pleanton and Glenwood a distance of perhaps five miles. The fall of the river from Alma to Glenwood by barometer difference is approximately 43 feet to the mile. There are springs in this canon which make a steady flow of a few sec. ft. the year around at this point.

It seems safe to say that with an equalizing reservoir and dam 200 feet we could depend on a steady flow of fifty second feet (approximately) and easily obtain a head of 200 feet giving us approximately 900 H. P. at wheel.

There are within a radius of 15 miles the mining camps of Mogollon and Cooney with a great deal of contemplated development within a radius of 100 miles the Camps of Silver City, Hanover, several camps in the Burro Mountains and Clifton in Arizona. The camps in the Mogollon Mountains being at a great distance from the railroad could obtain power for mills, etc., at a less cost with a hydro-electric plant than with coal, the freight being so high.

It is possible that by means of auxiliary stations on the Whitewater and Gila at Cliff or near Cliff, N. M., an electric road could be economically built from Silver City to Mogollon.

Mr. R. L. Cooper, while along the Rayado river in Colfax County, found a very probable power project. In a rough manner (Barometer readings only being taken) he views the possibilities of this proposition about as follows

The Agua Fria or Beaver creek, a tributary of the Rayado river, is fed by heavy mountain snows in Agua Fria Park and also by springs at the same location. With the first six miles below Agua Fria Park this stream leaps in three falls approxi-

mately 2,000 feet. Here with a canal or preferably a pipe-line, the water could be led above into a natural reservoir site at Agua Fria Park and a fall of 2,000 feet for power purposes could be obtained. This reservoir could be made to hold fully 9,000 acre feet of water with a concrete or masonry dam not over 50 feet high and probably 300 feet long on top. The flow of Agua Fria creek at July was about four second feet which was very low owing to a continued drought, etc. By saving the spring and winter floods in this manner, thereby equalizing the flow, it is probably safe to assume a continuous flow of ten second feet which with a head of 2,000 feet would give us about 1,800 H. P. at 80 per cent efficiency.

General Hydrographic Work and Co-Operation with the United States Geological Survey

Through the failure to make appropriation for the expense in General Hydrographic work, by the Legislature, this department was handicapped in this work, however, through a co-operative scheme with the United States Geological Survey this handicap has been relieved to a certain extent.

The first gaging stations for streams were established by the Territorial Engineer when making trips on other Territorial duties, the maintenance of same being cared for from the contingent expense, this being inadequate, a contract was entered into with the United States Geological Survey whereby they were to pay the salaries of gage readers, the expenses of travel and subsistence necessary in the operation of said stations, also to provide all forms, blanks and supplies used in connection with said work. The Territorial Engineer to perform the necessary measurements and have local supervision of such work without reimbursement except for the expense of travel and subsistence.

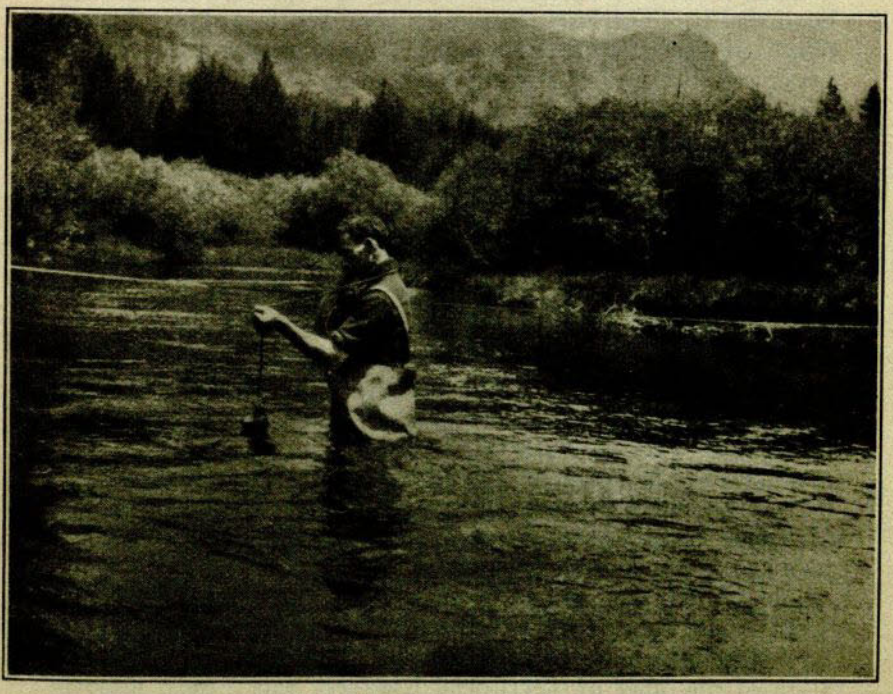
Other necessary duties pertaining to this office increased so rapidly that the Territorial Engineer could not find enough time to properly care for the increased number of stations and a second arrangement was made with the U. S. Geological Survey whereby they were to furnish a hydrographer, the Territory to pay his traveling and subsistence expenses, the other provisions to remain as in the first contract.

Mr. R. L. Cooper, hydrographer, was then sent here by the U. S. Geological Survey and has been practically in the field ever since. We are now carrying on seventeen gaging

stations where daily measurements are recorded and with very little expense to the Territory, however, we are in need of many more and have reached the limit to which the U. S. Geological Survey can assist us.

Under the above arrangement the United States is paying the salary of all of the observers, salary of hydrographer and furnishing all of the necessary stationery, including postage, and instruments used in connection with the work. The approximate cost of maintaining and recording these daily records is approximately $200 per annum per station. This includes approximately total expenses, of which the Territory has expended about $65 per station in traveling expenses generally.

The value and necessity of this work in assisting the development of our natural resources cannot be over-estimated. To illustrate this necessity, a copy of a statement on "The Necessity of Stream Flow Record in New Mexico," by W. B. Freeman, of the United States Geological Survey, is appended herewith:



"Studying the Rivers"

The Necessity of Stream Flow Records in New Mexico

By W. B. FREEMAN, District Engineer, U. S. Geological Survey

"The rapid development which is being made in New Mexico along the line of irrigation and utilization of water supply is placing the Territory in a prominent position among the western states. It is only now that the wealth and value of her natural resources are being realized. Projects are now being considered, or are now in course of actual construction, which will result in the reclamation of countless acres of the most fertile lands in the United States. Neither are the power possibilities of New Mexico's streams being overlooked, and it will not be many years before these waters will be harnessed and producing many thousands of electrical horse power.

"It is very unfortunate at this time that we are not better acquainted with the amount and character of New Mexico's resources because we would be in a much better position to conserve and utilize them most economically. In this respect, however, the Territory is not so very much worse off than many of the neighboring states. The investigation of the water supply of all of them has been very much neglected and New Mexico is a very particular example.

"Since 1894 the Water Resources Branch of the U. S. Geological Survey has been maintaining more or less extensive records of the water supply of the United States, while some records go several years back of that date. In New Mexico some twenty streams only have been investigated to any extent and the majority of these records have been taken within the last five years. On the Rio Grande alone have we any long records which are at all continuous. Just think of it! After all these years we have reliable data on the flow of a mere handful of streams and many of these have been investigated only during the last two years.

"The U. S. Geological Survey can hardly be blamed for this unfortunate lack of information. The value of New Mexico's resources were not brought to the attention of the public and the appropriation set aside for the work in the whole United States has been small. The money has been spent where the results have been most appreciated.

"New Mexico is now alive to her opportunities. The creation of the office of Territorial Engineer was a most import-

ant move in the right direction and has resulted in systematization of all matters pertaining to water supply and irrigation. This occasion is taken to mention the remarkable progress made along these lines by the present Territorial Engineer since he came into office a year and a half ago. Among other things he has not neglected the question of determining the amount of water supply. Realizing the necessity of these investigations he has proceeded at once to establish gaging stations to obtain the stream flow and these stations have since been maintained in co-operation with the U. S. Geological Survey.

"Records at seventeen stations are now being carried on in this manner, but it is desirable that many more be established. This is a matter of vital importance to the Territory, but at the present time no specific funds are provided by the Legislature for carrying on this work. Is there any reason why two or three thousand dollars should not be set aside each year to be spent in co-operation with the United States Geological Survey? Other states are doing it. California has appropriated about $10,000 annually for several years and this appropriation has been met with an equal one by the U. S. Geological Survey. The Survey is interested in the progress of this work, but has very limited funds at its disposal; it is, therefore, up to the Territory to help.

"For records of stream flow to be of the greatest value it is essential that they extend over a long period of years on typical creeks and rivers in every drainage station. This is particularly true of the New Mexico streams, many of which are perennial in character and subject to great floods. It is only in the course of several years that conditions or flow will occur from which there can be deduced even a reliable estimate of the average run-off of a stream. This applies especially to streams upon which reservoir systems must be constructed to store the flood waters of the high month for use during low months and of the high years to tide over years of low water flow. No record should be less than five years in length and much longer ones are desirable.

"It is therefore, necessary that we proceed without delay to secure this data. Five years from today the waters of the New Mexico rivers will be much more valuable than they are today and at the end of that period we should know considerably more about them than we do at present. We now have prac-

tically no data whatever on the flow of power streams in the mountains, many of which will be very important in the near future.

"Records of stream flow are of value for many reasons. In the adjudication of water rights they are indispensable and for storage propositions they are very necessary. In connection with water power propositions the records of low water flow are valuable while flood flow records are very desirable in the construction of bridges, culverts and similar structures and in the design of works for flood protection.

"Unless considerable is known of the flow of a stream, capital is not disposed to invest in power and irrigation schemes and this fact frequently results in this money being invested on other propositions or in other states.

"As is the case in every western state the water supply of New Mexico is her greatest natural resource, irrigation is in a comparatively early stage of development and water power development is still in the primitive stage. To illustrate, recent computations show that it is possible to develop over twenty-five thousand horse power in the Pecos River and its tributaries, over seventy-five thousand in the Canadian River drainage, one hundred thousand in the San Juan; three hundred thousand in the Rio Grande, all within the borders of the Territory. Out of all this power less than eight hundred horse power is now being utilized. The San Juan River has an average annual run-off of one and three-quarter million acre feet. Only a mere fraction of this supply is being used either for power or irrigation.

"We are really then just commencing to make use of our water supply. While there is still time measures should be taken to carefully conserve and intelligently distribute it. How can this be done effectively, unless the amount of the supply is known?

In addition to the stations already established as many more should be established in the near future and I take pleasure in stating that the U. S. Geological Survey, through Mr. Freeman, has offered to continue their co-operation provided the Territory should assist by paying half of the expenses incurred in this work. In other words, if the Territory will appropriate $2,500 for such work, the United States Geological Survey would give a like amount as per the following letter, thus continuing the hydrographic work already started, but on a larger scale.

Santa Fe, N. M., Nov. 24, 1908.

Mr. Vernon L. Sullivan,
Territorial Engineer,
Santa Fe, N. M.

Dear Sir:—I realize, as you do, the importance of increasing the stream gaging work in New Mexico. Your co-operationtion with the Water Resources Branch during the past year and a half has been very much appreciated, especially since I know that you have had to exercise great economy to obtain money for this work from your limited funds. I do not know a better way of expressing my appreciation than of increasing the allotment which our department makes to the New Mexico work. However, as I have frequently stated to you, it seems to me that the Territorial Legislature should make a specific appropriation for stream gaging.

I have no hesitancy in stating that the Water Resources Branch of the Geological Survey will meet halfway any appropriation up to $2,500 made by New Mexico for this work during the calendar year 1909; provided, of course, that Congress sees fit to set aside any appropriation for the work throughout the United States. As they have made such an appropriation since 1894, I do not think there will be any doubt on that score, especially in consideration of the recent movement toward the Conservation of Natural Resources.

Very respectfully,

(Signed) W. B. FREEMAN,
District Engineer.

U. S. Geological Survey,
429 Commonwealth Bldg.,
Denver, Colorado.

Applications filed with Territorial Engineer since May 13, 1907

Name of Applicant	Source of Appropriation.	Use.	Acres to be Irrigated.	Disposition.
Monte Alto Irrigation Company	Dickey Canon	Irrigation	1,090	Approved Dec. 9, 1907
Frederick Whitney	Cimarroncito Creek	Irrigation	.....	Withdrawn
Rayado Land and Irrigation Co	Rayado River, Canyada Arroyo, Moro Creek, Maquina Creek	Irrigation	7,500	Pending
Jesse J. May	Trujillo Creek	Irrigation	200	Approved Aug. 23, 1907
John C. Gage and John E. Enfield by Will Benson.	Sacramento River	Irrigation	30,000	Approved Jan. 10, 1908
Eden Canal and Power Company	Animas	Irrigation	60,000	Approved Dec. 11, 1907
Charles Springer	Vermejo River	Irrigation	6,000	Approved Sept. 4, 1908
G. W. Rogers	Penasco River	Irrigation	160	Rejected
Charles Springer	South Ponil Creek	Irrigation	2,800	Approved Sept. 24,1907
Taos Valley Land Co	Rio Lucero	Irrigation	1,000	Failed to Complete
Taos Valley Land Co	Rio Hondo	Irrigation	1,000	Failed to Complete
Taos Valley Land Co	Arroyo Seco	Irrigation	1,000	Failed to Complete
Sacramento Valley Irrigation Co	Sacramento River, Box Canon, and Grape Vine Canon	Irrigation	.....	Failed to Complete
Edward O. Brown and Dovie Brown	Rito de la Plana	Irrigation	1,000	Approved Oct. 14, 1907
Merrill H. Fisher	Fresnal Creek	Power	.....	Approved Jan. 9, 1908
Citizens Ditch & Irrigating Co	San Juan River	Irrigation	7,000	Approved Aug. 13, 1907
J. L. Lawson	.....	.....	.....	Failed to Complete
George Irving	Animas River	Irrigation	25,000	Failed to Complete
Palo Blanco Land & Irrigation Co	Palo Blanco Creek	Irrigation	18,400	Approved Feb. 14, 1908
Emilio Valdez	Sweetwater Creek	Irrigation	1,000	Approved Apr. 7, 1908
D. R. Harkey and R. C. Price	Blue River Spring	Irrigation	640	Pending
Alamogordo Improvement Co	Caballero Springs	Irrigation	.....	In litigation
Tucas Peak Gold & Copper Mining Co	Vallecitos	Power	.....	Failed to Complete
Albert B. Fall, by W. A. Hawkins, Agt	Three Rivers	.....	.....	Failed to Complete
Alamogordo Imp. Co., by W. R. Eidson, V. P	La Luz and Fresnal Canon	Irrigation	1,600	Approved Dec. 10, 1907
Geo. H. Webster, Jr	Cimarroncito Creek	.....	1,646	Approved Sept. 14,1907
Jno. W. Glidden	.....	.....	.....	Rejected
St. Louis, Rocky Mt. & Pac. R. W. Co	Red River	Domestic	.....	Approved Mch. 17, 1908
T. Banks	Felix River	.....	100	Approved Jan. 13, 1908
Chas. Springer & Co	.....	.....	5,000	Failed to Complete
Oscar W. McCuiston	Dry Cimarron	Irrigation	400	Approved Feb. 14, 1908
Farmers Development Co	Rayado River (South Fork)	.....	10,000	Pending
Farmers Development Co., per M. N. Mikesell, G. M.	South Fork Rayado River	.....	10,000	Pending
Charles W. Thuringer	Animas River	Irrigation	5,280	Approved Apr. 28, 1908
Merrill H. Fisher	Alamo Creek	Power	.....	Withdrawn
Charles Springer	Cimarron Creek and Tributaries, Cienegilla, Moreno, etc	Power	65,000	Approved July 3, 1908

Trustees Maxwell Land Grant Co.	Cimarron River	Irrigation	16,000	Failed to Complete
John J. Laubach, Wm. Harper, W. G. Benjamin and W. B. Bunker	Headwaters Rio de la Casa	Power	.....	Failed to Complete
J. C. Dunn, Milton Phillip, H. A. Morgan, C. W. Morgan	Dry Canon and Torrential waters of Red Arroyo	.....	800	Approved Oct. 29, 1907
The Rito de la Lama Irrigation Co.	Rito de la Lama	Irrigation	680	Approved Mch. 16, 1908
Cabresto Lake Irrigation Co.	Cabresto Lake and Creek	Irrigation	1,504	Approved Apr. 18, 1908
Harvie Duval	Arroyo de las Mulas and two tributaries	Irrigation	3,000	Failed to Complete
Rio Puerco Irrigation Co.	Rio Puerco	.....	19,200	Approved July 21, 1908
Chas. Springer & Co.	Springs and lands Agua Fria Fork	Power	2,000	Pending
R. H. Bailey and other citizens and water users La Union, N. M.	Rio Grande	.....	7,000	Pending
French Land and Irrigation Co.	Ponil Creek	Irrigation	21,000	Approved Mch. 17, 1908
French Land and Irrigation Co.	Cimarron	Irrigation	21,000	Approved Mch. 17, 1908
French Land and Irrigation Co.	Cariososo Creek	Irrigation	21,000	Approved Mch. 17, 1908
Merrill H. Fisher	Headwaters Alamo and Caballero Creeks	Power	.....	Pending
D. N. Hartley	Pinabetas	Irrigation	3,320	Approved Mch. 23, 1908
Cerro La Asociacion de Mutua Beneficio y Mutua Proteccion	Rito Later	Irrigation	3,000	Approved Feb. 19, 1908
William H. Lambert	Tenaja Creek	Irrigation	840	Approved Feb. 25, 1908
Jay Turley and H. L. Hollister	Florida River	Irrigation	130,000	Approved July 21, 1908
William H. Lambert	Eagle Tail Mesa Creek	Irrigation	250	Approved Feb. 25, 1908
James D. Hand	Mora River	Irrigation	1,220 to 1,500	Pending
Placita Ranch Co.	Sapello River	Irrigation	8,000	Pending
M. C. Hinderlider	La Plata River	Irrigation	14,000	Rejected
Chas. Springer & Co.	Cimarron and Cimarroncito River	.....	2,660	Pending
Chas. Carter, James W. Hale, Henry R. Rasmussen	La Plata and Living Springs	Irrigation	1,520	Approved May 2, 1908
Red River Land and Water Co.	Red River	Irrigation	45,000	Pending
Jay Turley and H. L. Hollister	La Plata River	Irrigation	30,000	Approved July 21, 1908
Chas. Springer	Moreno River	Power	400	Failed to Complete
Chas. Springer	Moreno River	Power	200	Failed to Complete
Wm. Meader (for the Nebraska Reservoir)	The Sugarite	Irrigation	320	Pending
Wm. Meader for the Oasis Reservoir	Sugarite	Irrigation	320	Pending
C. L. Hortenstein and C. E. Hartley	Ocate River	Irrigation	10,000	Approved Feb. 4, 1908
Clyde C. Wiltse	La Plata River	Irrigation	55	Approved May 2, 1908
J. P. Annan	Dog Canon Springs	Power	.....	Approved Apr. 7, 1908
John W. Glidden	Coppis Creek	.....	1,0[illegible]	Approved July 1, 1908
George Carl	Meroochee Springs	Power	.....	Approved May 29, 1908
Chas. A. Wheelon	Vallecitos	Irrigation	1,000	Rejected
John D. Young and George N. Norton	La Plata River	.....	5,000	Approved July 20, 1908
W. A Williams	Rio Galisteo	Irrigation	320	Approved May 20, 1908

Applications filed with Territorial Engineer since May 13, 1907

(Continued)

Name of Applicant.	Source of Appropriation.	Use.	Acres to be Irrigated.	Disposition.
The French Land and Irrigation Co	Van Bremmer Creek	Irrigation	30,100	Approved July 21, 1908
The French Land and Irrigation Co	Vermejo River	Irrigation	30,100	Approved July 21, 1908
James A. Cottingham, Mathew L. Cottingham and Hannah S. Rose	Lake Francis	Irrigation	640	Approved Mch. 20, 1908
James A. Gregory	Alamosito Arroyo	Irrigation	230	Approved Aug. 1, 1908
Seferina v. de Canchez	Two arroyos (un-named)	Irrigation	265	Pending
Luis A. Sanchez	An arroyo (un-named)	Irrigation	105	Approved Sept. 24, 1908
John J. Brophy	Sloan Canon	Irrigation	140	Approved July 22, 1908
T. E. Ezell	Pecos River and Delaware Creek.	Irrigation	15,000	Lost by default
L. E. Martin, N. W. Almon, W. M. McAnnis, Grey McAnnis, T. A. Hilburn, B. L. Hilburn, J. B. Neff	La Luz Creek	Irrigation	960	Approved Oct. 19, 1908
Blanche I. Major	Spring Lake	Irrigation	120	Approved Mch. 21, 1908
Citizens Ditch Co. (E. S. Redding, Pres.)	Rio Colorado	Irrigation	800	Approved Jan. 22, 1908
Eugene Van Patten	Maple Grove Canon, Ice Canon	Irrigation	25	Failed to Complete
John H. Culley	Rain water from hills	Watering stock	.....	Approved Mch. 16, 1908
Chas. E. Blattman	Ocate River	Watering stock	.....	Approved Apr. 28, 1908
J. J. Gross	Arroyo (not named)	Irrigation	230	Approved May 20, 1908
Taos Valley Land Co	Rio Lucero	Irrigation	5,000	Pending
Taos Valley Land Co	Rio Hondo	Power-Irrigation	10,000	Approved Apr. 21, 1908
Taos Valley Land Co	Arroyo Seco	Power-Irrigation	5,000	Approved Apr. 21, 1908
John G. Stewart	Marble and Stewart Canons	Irrigation	60	Approved Mch. 16, 1908
Fred J. Lukins	From a draw ditch	Irrigation	140	Approved Apr. 28, 1908
Stephen Price and C. H. Bower	La Luz Creek	Irrigation	320	Approved July 24, 1908
William E. Rogers	Cottonwood draw	Irrigation	180	Approved Apr. 28, 1908
Edward T. Baird	La Preston Canon	Irrigation	60	Approved Sept. 4, 1908
W. A. Coe	La Luz Creek	Irrigation	960	Approved July 23, 1908
H. B. Jones	Agua Negra Chiquita	Power-Irrigation	1,300	Pending
Wm. H. Lambert	Tenaja Creek	Irrigation	840	Approved Feb. 25, 1908
Antonio J. Ortiz	Rio San Antonio and Arroyo San Antonio	Irrigation	200	Pending
F. D. Albright and W. O. Albright	San Andreas Canon	Power	.....	Approved Aug. 1, 1908
H. M. Letts	Crow, Little Crow and Prairie Creeks	Irrigation	5,000	Withdrawn

S. C. Hawthorne	Arroyo Hondo	Irrigation	5,000	Withdrawn
Oliver M. Lee	Kid Bluff Spring and groups of springs in Grape Vine Canon	Irrigation	160	Approved Aug. 10, 1908
Oliver M. Lee	Scott Able Canon and Sacramento River	Power	.....	Approved Aug. 10, 1908
Oliver M. Lee	Sacramento Ditch Lee pipe Line	Power	.....	Approved Aug. 10, 1908
J. C. Roseborough	Mimbres	Irrigation	33,920	
Julia F. Morgan	Andreas Canon and Springs	Irrigation	320	Approved
Wylie Farm & L. S. Co	Pecos River	Agricultural	717	Approved May 29, 1908
Mule Spread Irrigation Ditch Co	Mule Spread Canon	Irrigation	5,440	Pending
O. M. Lee, C. E. Mitchell, J. L. Lawson	N. Fork, S. Fork, M. Fork Ruidosa Cedar, Carizo Creeks and Ruidoso River	Power	.....	Pending
Clinto N. Cotton, John D. Bland, S. E. Wood, R. B. Lanigan, J. W. Rains, Reese Beddow, F. C. Heigh, C. A. Carrington, John Arms, H. C. Shultz, J. N. Benson, W. D. McKinney	Watershed of Defiance Canon and Rio Puerco	Irrigation	19,000	Pending
H. W. Wolcott	Sacramento River	Power-Irrigation	Dependent on amt. of seepage water saved.	Failed to Complete
L. B. Furman and R. E. Burke	Animas River	Irrigation	80,000	Rejected
E. Krause and W. E. Fletcher	Penasco River	Power	.....	Approved Aug. 10, 1908
James M. Gaar	Mimbres	Irrigation	9,880	.....
Frances McDonald	Carrizozo Creek	Irrigation	320	Approved Sept. 4, 1908
Fred Vanderwork	Vanderwork Ditch and Reservoir	Irrigation	103	Approved Aug. 5, 1908
Guadalupe Miera and Onofre Akers	Rio Puerco	Irrigation	500	Approved Sept. 4, 1908
The Vermejo Ditch Co	Salt Peter Creek	Irrigation	22,000	Pending
Luman H. McNett	Apache Tejo Springs	Irrigation	240	Pending
M. B. May	Tortilita Creek	Irrigation	160	Pending
H. M. Letts	Cow Creek and tributaries	Irrigation	15,000	Approved Sept. 4, 1908
Wm. Dooley and Denis Dooley	Cottonwood draw	Irrigation	240	Approved Aug. 1, 1908
Merrill H. Fisher		Power	.....	Pending
Geo. W. Cox	Robinson's Springs	Irrigation	80	Approved Aug. 1, 1908
J. P. Crutsinger, S. Price, A. J. Buck	Waste waters Alamo Water Wks.	Irrigation	1,680	Approved Aug. 1, 1908
H. P. Cameron	North Arm of La Luz Creek	Irrigation	80	Approved July 23, 1908
Emma S. Kilburn	Mimbres River	Irrigation	210	Rejected
Jay Turley	San Juan River	Irrigation	1,225,100	Withdrawn
J. D. Edgington	Rio Penasco	Power	.....	Pending
J. Damian Duran	Canada de Montoya	Watering stock, etc.	None	Pending
Ft. Sumner and Pecos Land Co	Pecos River	Irrigation	659	Pending
F. D. Crandall for self and associates	Animas River	Irrigation	1,700	Approved Oct. 15, 1908
R. L. Porter and John W. Porter	Torreon Arroyo or Draw	Irrigation	178.6	Approved Sept. 24, 1908

Applications filed with Territorial Engineer since May 13, 1907

(Continued)

Name of Applicant.	Source of Appropriation.	Use.	Acres to be Irrigated.	Disposition.
Sam. R. Edwards	South Fork of Manzano Creek	Irrigation	360	Approved Sept. 4, 1908
D. R. Britt	Chain Lakes	Irrigation	240	Pending
W. Elmer Sperry	Holkeo Creek	Irrigation	200	Approved Sept. 24, 1908
C. H. Bond and W. R. Martin	Ute Creek	Irrigation	140	Approved Sept. 25, 1908
W. E. Washington	Grapevine Creek	Irrigation	540	Pending
Daniel J. Splane	Arroyo Hondo	Irrigation	5,000	Approved Oct. 14, 1908
Willis Martin & Co	Animas River	Power	.....	Pending
The Aztec Ditch, M. J. Fifield, Sec	Animas River	Irrigtaion	2,200	Approved Sept. 24, 1908
Louis Clausing, Executor of the Frederick Roth Estate	Tenaja Creek	Irrigation	620	* * *
Milton Spencer Lee	Eagle Draw	Irrigation	220	* * *
Ventura Gallegas	Gallegos Creek	Irrigation	70	* * *
Herbert W. Wolcott and J. L. Lawson	Grapevine Canon and Watershed.	Power-Irrigation	2,000	* * *
Herbert W. Wolcott and J. L. Lawson	Sacramento	Power	.....	* * *
Hagerman Irrigation Co	Miller Drain Ditch	Irrigation	.....	* * *
L. D. Pointer, Vida Weborg, John Stocks, R. P. Cooper, W. R. Zufeldt	San Juan River	Irrigation	1,200	* * *
Fred H. Miller	Pecos River	Irrigation	800	* * *
John W. Glidden	Canadian or Red River	Irrigation	259.5	* * *
Ft. Sumner and Pecos Land Co	Pecos River	Irrigation	1,432	* * *
Wm. H. Harris	Palo Blanco and Holkeo Creeks	Irrigation	13,000	* * *
Hugh F. Duval	Santa Fe River	Irrigation	600	* * *
A. M. Jackley and Geo. T. Kemple	Dog Canon, (flood waters and surplus waters)	Irrigation	500	* * *
John P. Conner	Pecos River	Power	.....	Approved Oct. 19, 1908
Herbert W. Wolcott and J. L. Lawson	Sacramento River watershed	Power-Irrigation	20,000	* * *
Baca Development Co	San Mateo Creek	Irrigation	6,000	* * *
W. T. Wells	Headwaters of San Andreas, Arroyo Canon and surface waters.	Irrigation	640	* * *
W. W. Jernigan	Cuevo Canon	Irrigation	105	* * *
The Atchison, Topeka & Santa Fe Ry. Co	Rio del Apache or Indian Cr	R. R. station purposes	.....	Approved Nov. 24, 1908
Cat-Claw Canal Co	Cat-Claw draw and watershed	Irrigation	4,000	* * *
Livinius DeSmet and Martin DeSmet	Chico Creek	Irrigation	480	* * *

The Denver & Rio Grande R. R. Co.	Las Animas River	Round-house Locomotives and shops	.....	* * *
Sacramento Valley Irrigation Co.	Sacramento and watershed	Irrigation-Power	100,000	* * *
G. W. Pritchard and J. W. Raynolds	Santa Fe Creek	Irrigation	18,000	* * *
The Ute Creek Ranch Co.	Ute Creek	Irrigation	940	* * *
Frank M. Quinn	Las Animas River	Irrigation	640	* * *
Jay Turley	San Juan River	Irrigation-Power	1,225,100	* * *
Thos. McMurdo	South Fork of Salado Arroyo	Irrigation	320	* * *
James Cowan	Red River or Canadian River	Irrigation	25,000	* * *
J. H. Potter	Bonito Canon	Domestic	.....	* * *
Roscoe Rodgers, Chas. B. Erbacher, G. M. Williams	Cameron or Lone Mountain Creek	Irrigation	120	* * *
James D. Hand	Mora River	Irrigation Power	.....	* * *
Julius Appel and W. R. Winburn	Cimarron River	Irrigation	600	* * *
Dell J. Holson and Fred H. Wing	Whiskey Creek	Irrigation	100	* * *
Benjamin G. Randall	Rio de San Fernando de Taos	Irrigation	142	* * *
Socorro Mines	Whitewater Creek	Mining-Power	.....	* * *
J. W. Lewis	Cass Draw	Irrigation	400	* * *
Merrill H. Fisher	Flood waters Fresnal Creek	Irrigation-Power	2,000	* * *
Wm. L. Aubrey and A. M. Crozier	Gila River	Irrigation	10,000	* * *
Frank W. Beach	El Paso Canon	Irrigation	30,000	* * *
Gila Farm Company	Gila River	Irrigation	283,000	* * *

* * * Remainder of applications pending.

TABULATED LIST OF IRRIGATION PROJECTS IN NEW MEXICO—COMPILED FROM STATEMENTS BY OWNERS

of work pleted 0, 1908.	Soil.	Cost of Water Right Per Acre	Cost of Land with Water Right	Cost of Total Project	Charge per Yearly Maint'ne Year	No. Acres with Water Right for Sale	Amount of Water to be Delivered per Acre per Annum	Altitude in Feet	Rainfall in Inches	Maximum Temperature Degrees Fahr.	Minimum Temperature Degrees Fahr.	Principal Crops to be Raised	Railroads	Nearest Towns	When Project is to be Completed
25%	Sandy gravelly adobe			$ 1,250		None						Fruit and alfalfa	Rock Island	Alamogordo	
....	Sandy loam	$14.00	$ 30.00					5,000				Alfalfa	Colorado Southern, El Paso S. E.	Alamogordo	Oct. 4th, 1910
20%	Loam and gravel	12.50						3,600				Alfalfa, Indian corn, kaffir corn, oats, sorghum, potatoes	P. V. & N. E. R. R.	Roy, Des Moines, Clayton and Springer	1910
....	Sandy	23.00	80.00					3,500	10	100	Zero	Alfalfa, kaffir corn, orchards, etc	P. V. & N. E.	Ten miles Artesia	About 2 or 3 years
....	Sandy adobe, silt loam	20.00	50.00	1,300	$ 3.00			4,380				Corn, sweet potatoes, vegetables of all kinds	E. P. S. W.	Hagerman	About 1911
14	Black, sandy loam	7.00	20.00	1,400								Oats and alfalfa		Alamogordo	
25%	Sandy, gravelly loam		75.00	500,000	2.00	1,700	1-5/10 ac. ft.	6,000	7	104	10	Alfalfa, sugar beets, oats, wheat, all vegetables, apples, cherries	Main line A. T. & S. F.	Wagon Mound	By 1909
12%	Sandy and adobe	30.00	Average 75.00	125,000			2 ft. for 80 A.	5,400	12-38			Alfalfa and fruit	D. & R. G. R. R.	Bluewater, 107 miles W. of Albuquerque	As soon as possible
00%	Adobe and sandy loam	5.00		7,500				8,000	15	98	—10	Wheat, oats, corn, beans, peas, alfalfa and hay	D. & R. G.—40 miles	Questa, Cerro and Costilla	April 1st, 1909
All	Loam and adobe											Alfalfa, oats, millet, and cane		Santa Fe	
....	Clay loam			1,000				3,600	15	90	20	Fruit, alfalfa, kaffir corn	E. P. & N. E.	Raton	
07	Red sandy	1.50	30.00	12,000	1.00			5,500	12	95	42	Feed crops	E. Ry. of N. M.	Alamogordo	1911
....	Sandy loam	10.00		2,000	14.25			3,300	16⅔			Sorghum, corn	El Paso & Southwestern	Roswell	July, 1910
....	Sandy loam and gravel	4.00	15.00	840			3 ft.	5,600	12	100	5	Alfalfa and apples	P. V. & N. E.	Springer	
....	Sandy loam, clay loam	40.00		600,000	1.00		one cubic ft.	5,700	11" at Sp'nger	92	—20	Alfalfa, corn, potatoes, fruits, etc	D. & R. G. R. R.	Lake Arthur and Artesia	Oct. 1st, 1910
20	Sandy loam	26.00	37.00	1,200,000	.75	43,000	1 ac.ft.at land	6,000	16	91	3	Oats, wheat, barley, sugar beets, peas, beans, celery cabbage, and fruits	A. T. & S. F., St. Louis R. M. & P., El Paso S. W.	Aztec and Cedar Hill	Dec. 11th, 1911
52	Sandy loam		40-70	170,000		7,000	1 s'd ft., 80A.					Alfalfa, oats, and other small grains; fruit, especially apples	A. T. & S. F.	French, Dawson, Cimarron	1911
....		2.70		150		1,740	1½ acre ft.							Miami, Springer, Cimarron	1913
....	Loam, partly sandy			54,000				5,000	19	98	— 8	Alfalfa, sugar beets, wheat, oats, cane	C. & S., and Santa Fe	Grande 25 miles, Springer 40	
....	Loam and adobe							4,000	21	94	10	Alfalfa	C. & S.		
10%	Sandy loam	3.50		85,000				6,000	12			Wheat, corn, alfalfa, and oats	D. & R. G.	Clayton	In three years
veyed	Black dirt, some gravel			5,000								Corn, cane, rye, oats, alfalfa, etc	Nearest, Cloudcroft	Aztec and Farmington	Jan. 1st, 1911
15%	Silt and adobe			50,000				4,500				Alfalfa fruit, cane and kaffir corn	E. P. & S. W.	Cloudcroft, Hope and Artesia	
neering	Loam	20.00	40.00					4,500	17	100	0	Alfalfa, apples and other fruits	R. I.	Dog Canon P. O. Camp	1909
....		50.00	125.00	60,050	2.00	About 3,000							A. T. & S. F. and N. M. Central	Santa Rosa, Puerto De Luna	
ished	Sandy, some adobe	3.00		600				6,000	15	98	—16	Corn and hay	A. T. & S. F.	Santa Fe	1910
t any	Sandy, some adobe	9.50		5,705				6,000	15	98	—16	Hay	A. T. & S. F.	Raton, Maxwell City	Finished
one	Sandy loam	40.00	60.00	7,500	1.50			5,800	14-20	90	0	Oats, alfalfa, wheat	A. T. & S. F.	Raton, Maxwell City	1912
one	Part gravel, adobe	1.25	63.25	250			No contracts	3,300	15	103	8	Fruit and alfalfa	A. T. & S. F.	Colmor, Nolan, Springer	1910
ut 50		None sold	50-75	300,000		18,500	1-5 acre ft.	5,700	14			Alfalfa, wheat, oats, beets, apples and other fruits	P. V. & N. E.	Artesia	As soon as possible
omplete	Sandy loam	2.00	65.00	900	1.00			6,000	12	90	34	Corn, oats, kaffir corn, sorghum and beans	A. T. & S. F. and S. Western R. M. & Pacific	Maxwell City	1910
1/5	Sandy and clay							4,300	11	105	11-5 Above	Field crops, alfalfa, kaffir corn, sorghum	El Paso & South Western	Abbott, 3 miles	Completed
....	Sandy loam			10,000				5,800	11			Alfalfa, cane, millet, oats, and peas	E. P. & S. Western	Alamogordo	March 1st, 1909
37	Sandy loam	5.00	20.00	4,000	2.00	800	30 in.	3,750	16	100	0	Alfalfa and apples	Colorado Southern	Des Moines	1910
1/10	Part sandy and part adobe	10.00	Homestead					6,650	14	92	—10	Oats, wheat, rye, alfalfa, barley, and hay	Eastern Ry. of N. M.	Lake Arthur	June 1st, 1909
00	Some of each	15-25	20.00	2,000			5.7 sec. ft.	4,000		100	20	Alfalfa, kaffir corn, native hay	A. T. & S. F., S. F. Raton & Eastern	Raton	About 3 years from date
75%	Sandy loam	1.00	75.00	120	25.00		3 ft.	3,200	15	100	0	Kaffir corn, and alfalfa	C. & S.	Kenton, Okla.	Aug. 1st, 1911
50%	Loam and silt	10.00	11.25 per acre	450				5,000	13-14	105	15	Corn and potatoes	Santa Fe	Artesia and Dayton	March 21st, 1910
7%	Heavy dark loam	Not complete	None for sale	Not complet'd	About 1.00			4,500	16	102		Alfalfa	A. T. & S. F.	Hillsboro and Lake Valley	Aug. 15th, 1909
5%	Gravely loam			2,000				6,000				Fruit, corn, oats, barley, rye, millet	El Paso & S. W.	Roy, on El P. & S. W.	Within 2 years
....	Sandy loam	20.00	25.00	160,000				5,400	10				E. P. & S. W.	Carrizozo	
10%	Sandy loam	1.90	35.00	3,500	1.25		3 acre ft.	6,500	16	90	—18	Potatoes, sugar beets, alfalfa, Indian corn	D. & R. G.	Farmington	1910
25	Sandy loam	12.50	50.00	15,000	.50			5,200				Fruits, grains, and vegetables	New Mexican Central	Estancia, Willard, Torrance	April 15th, 1909
20%	Sandy loam			2,400			1 ft.	4,300	13	102	15 Above	Corn, milo maize, vegetables	None	Farmington	1911
....	Loam and silt	25.00	35.00	40,000	1.00	3,000		5,000	15	70		Oats, wheat, fruit of all kinds	E. P. & S. W.	La Luz, Tularosa, Alamogordo	July 23rd, 1910
00%	Adobe and sandy loam							5,500	15				C. & S., R. Mountain P.	Springer	1911
20%	Sandy	5.00		50,000				8,000	10	78	—10	Wheat, oats, corn, beans, peas, and alfalfa and hay	A. T. & S. F. R. R.	Domingo, 7 miles	
50%	Sandy loam	3.00	10.00	1,600			1 ft.		14			Oats, corn and hay	D. & R. G.—40 miles	Questa Cerro and Costilla	Completed
1/3	Sandy loam	40.00	60.00	30,000	1.50	1,000		5,800	14-20	90	0		None	Maxwell City	1911
....	Sandy loam	20.15	20.00	900	1.00			5,000	11			None; destroyed by storm	A. T. & S. F.	Colmor and Springer	One year
12%	Clay loam	15.00	20.00	550	1.00			5,000	11			Crop destroyed by storm		Clayton	April 2nd, 1911
14%		10.00	50, 75, 1.00	500,000	1.00	50,000		5,000	15	95	10	Crop destroyed by storm		Clayton	By Oct. 10th, 1910
2/3	Clay loam	10.00	50-1.00	500,000	1.00	50,000	1 sf. per 100A	6–7,000	15	95	10	Wheat, oats, beans, peas, alfalfa, potatoes, apples and corn	D. & R. G.	Taos	1911
ust begun	Heavy loam to sandy loam	5.00	50-1.00	500,000	1.00	50,000	1 sf. to 100A	6–7,000	15	95	10	Wheat, oats, corn, rye, potatoes, peas, apples, cherries, pears, plums	D. & R. G.	Arroyo Seco	1911
of 1%	Sandy loam to clay loam	30.00		200,000	Actual cost	Land owned	No con. made	6–7,000	15	95	10	Wheat, oats, corn, potatoes, peas, apples, cherries, pears and plums	D. & R. G.	Arroyo Seco	1911
of 1%	Sandy to clay loam	20.00	50.00	10,000,000	About 50c			5,300	14	100	10	Fruit, apples, peaches, plums, cherries, etc	D. & R. G.	Farmington, Flora Vista, Aztec	Jan. 1st, 1910
60%		15.00	50.00	20,000,000	About 50c	None	No con. yet	5,400	12–16			All crops grown in a temperate country	Branch of the D. & R. G.	Aztec and Farmington	
....	Loam and silt	15.00	40.56	3,000	.50			6,800	2–12			Oats, barley, alfalfa, wheat	One branch of D. & R. G.	Aztec and Farmington	
....	Sandy adobe	12.00	50.00	12	.50			5,000	10–14	100	4	All fruits, cereals, vegetables, etc	St. Louis, R. M. P.	Cimarron	In two years
....		5.00	50.00	38,500			8 cu. ft.	3,200	15	110	—10	Alfalfa, kaffir, milo maize and Indian corn	E. Ry. of New Mexico	Lakewood and Dayton	Aug. 1st, 1909
25%	Sandy loam	30.00	35.00	32,000				4,000	12	120	— 8	Indian corn, kaffir corn, milo maize, alfalfa and cane	A. T. & S. F.	Sunnyside and Elkins	Oct. 1st, 1911
....	Mostly silt	15.00		2,000				6,600	20	100	5	Oats, alfalfa, kaffir corn, wheat	St. L., R. Mt. & Pacific	Cimarron	
....	Mostly silt			250,000				6,000				Fruit and alfalfa	A. T. & S. F. and N. M. Central	Kennedy	March 1st, 1909
80	Sandy loam			150,000				4,000				Fruit and alfalfa	E. P. S. W. Ry.	Alamogordo	
....	Fertile Alluvium	8.75		475			3 a.-f. yr.**	4,000	26				E. P. S. W. Ry.	Alamogordo	
....	Fertile Alluvium		50-150	600,000†			2½ a.-f. yr.**	5,250	10	97	0	Fruit and alfalfa	One	Farmington, 4 miles	December
....	Fertile Alluvium		80-150	360,000†			2½ a.-f. yr.	3,100	15	110	0	Alfalfa, corn, cotton, fruit	P. V. & N. E. R. R.	Carlsbad	
....		40.00		7,200,000				3,900	18	100	10	Alfalfa, corn, cotton, fruit	P. V. & N. E. R. R.	Roswell	
....								3,850	9.4	110	0	Alfalfa, corn, vegetables and fruit	A. T. & S. F.	Las Cruces, El Paso, Tex	
....	Sandy and chocolate loam	50.00	100-500	250,000	1.25	None		3,500	15	112	—12	Alfalfa, corn, fruit, etc	P. V. & N. E.	Roswell and Artesia	Done
....	Red Gravelly loam & adobe							4,000	12	110	12	Alfalfa, sorghum, milo maize	E. P. & S. W.	Alamogordo	1911
....													A. T. & S. F.	Albuquerque	1912
5%	Black loam			200,000									D. & R. G.	Taos, Red River, etc	
20%	Silt loam												P. V. & N. E.	Lake Arthur	1910
25%	Mostly silt	10.00	35.00	600	.50			5,500	14			Kaffir corn, fruit, alfalfa		Hope	1909
								5,500–65,000				Hay, grain, all kinds; sugar beets, fruit	D. & R. G.	Espanola, El Rito	Within two years

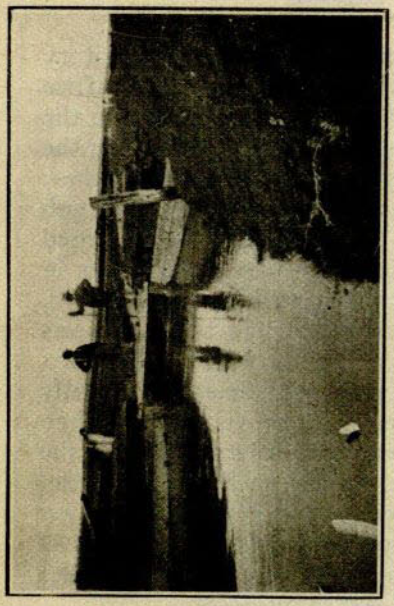
ent.

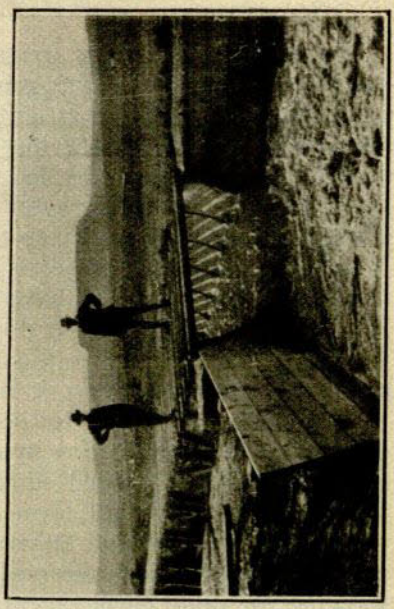
Irrigation Projects

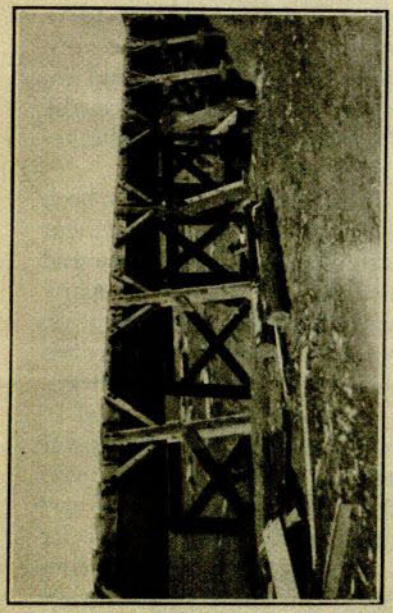
In listing the various irrigation projects in the Territory that have come under the general supervision of this office since the passage of the Irrigation Act of 1907, or within the last year and a half, the writer has, in order to distinguish the degree of development, divided them into the following classes: *First,* projects in which water is now being applied, through already constructed works, to the land and crops being raised from same. *Second,* projects which have filed applications in this office, some of which have been approved by the Engineer, and others pending. This division represents those projects where the development work is not as yet started or, as in a few cases, the construction work is not yet completed sufficiently for the delivery of water to the land. *Third,* community ditch systems under construction by a body of settlers. *Fourth,* the small filing for a limited acreage, merely to show active development on the small farms, being land generally filed on through Homestead and Desert Entries. *Fifth,* a partial list of the power applications received and approved by the Engineer showing the rapid development of power interests.

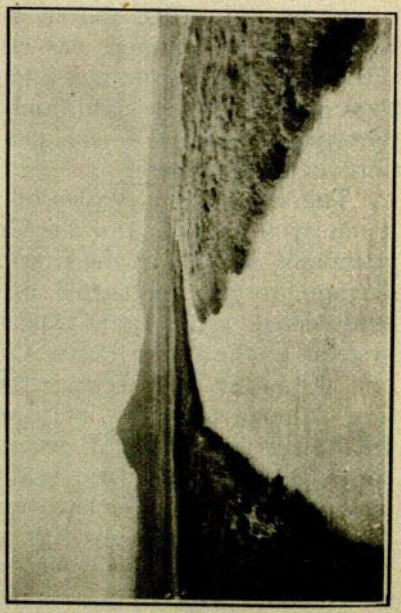
The data for the majority of these projects has been received by this office and each project written up from these reports. The Engineer has endeavored to represent the conditions in these write-ups as he believes them to be, and on those projects whose conditions are but faintly remembered, the description is based solely upon the material given in the reports of their owners.

The lower Pecos Valley of New Mexico has virtually been made by the projects of the Pecos Irrigation & Improvement Company, which was the first operated upon a large basis and acreage, to be constructed in the Territory. This company constructed, with a great expenditure of capital, two irrigation systems in the lower Pecos Valley. Of these two enterprises one, the lower, later became the property of the Pecos Irrigation Company and this later, as a result of the heavy flood of 1904 aggregating 80,000 second feet washing away the lower dam of this company, was sold to the U. S. Government and is now one of the five Reclamation Projects in the Territory and also the farthest advanced of any of the Reclamation Service Projects. When this project was constructed in 1890 it contained about 60 miles of irrigating canals and two large storage reservoirs, having a capacity of over 100,000 acre feet. In









1904, at the time of the above-mentioned washout, over 13,000 acres were in actual cultivation and irrigation.

The upper of these two projects became the property of Hon. J. J. Hagerman, under the name of "Northern Canal." This system is, however, now under the ownership of the water users under this canal. This project today is one of the best managed systems, and the land owners under it the most prosperous, of any project in the West, being the result of skilfull management and a careful study of local conditions.

The Northern Canal derives its supply of water from the Hondo River, near its mouth, and has about 30 miles of canal in operation, successfully irrigating some 8,000 acres of the most fertile soil in the Territory. Under the management of this system the duty of water is about 200 acres per second foot. This is the highest standard for continued economical use in the Territory, however, other enterprises are now doing close to this mark.

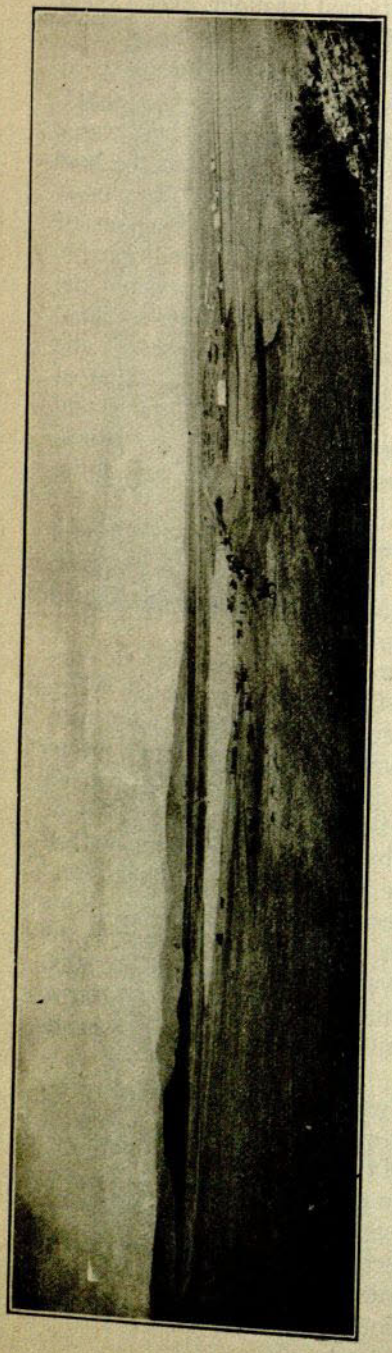
One of the oldest propositions in the northern portion of the Territory is the irrigated land on the Maxwell Land Grant. This land of 22,000 acres is operated by the Maxwell Irrigated Land Company, of Maxwell City, N. M.

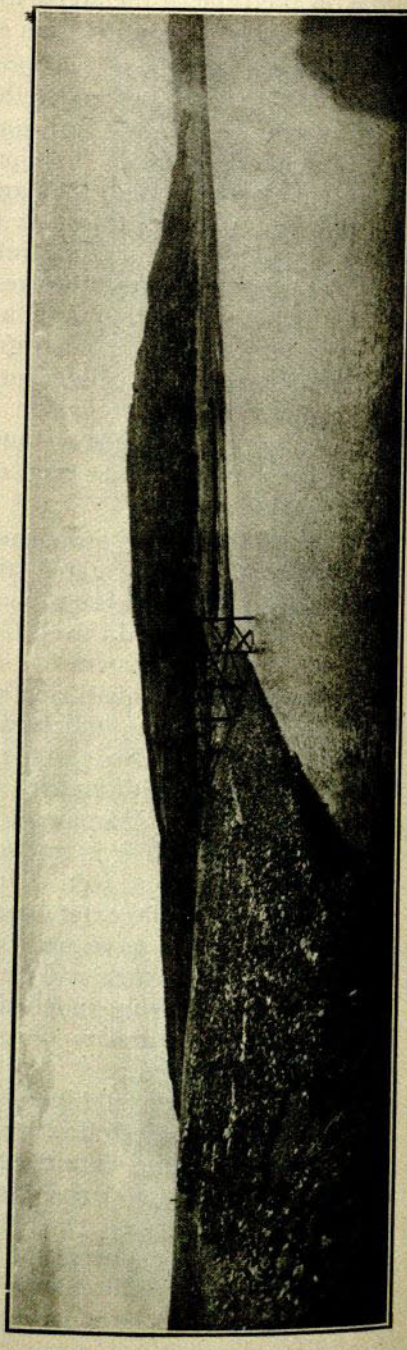
This irrigated system has a number of reservoirs in connection, acting as equallizing and storage reservoirs. When the Low Line system, which has a capacity of 300 second feet, reaches Reservoir No. 5, the water can be diverted on to Reservoir No. 2, with an area of 324 acres, or can be diverted into Reservoir No. 7, an area of 190.7 acres; thence into No. 8, through into which it is carried by a small steel flume with a capacity of 70 second feet. There are a number of other reservoirs of considerable extent connecting with this system. This company claims to have sufficient data at hand to warrant the expectation that water will be available for, probably, 20,000 acres. Water is being supplied this year to the Maxwell Farm, some 3,840 acres, and to farm lands on the property covering some 3,000 acres more.

From a report submitted to us by the above company regarding the soil, the following is quoted:

"The soils in the vicinity of Maxwell City are practically all alluvial, having been derived from the rocks of the surrounding mountains and mesas. As there is a great deal of lava rock in that part of the country, the decomposition of this rock has contributed materially to the soil formation. Soils derived from volcanic rocks are usually fertile, being rich in potash and

Scenes on Project of Maxwell Irrigated Lands Co.





phosphoric acid, and this seems to be the case with the soil of the Maxwell City District. They are fairly well supplied with humus, that are rich in nitrogen, in their virgin state, and their nitrogen contents can be easily maintained and increased by the use of leguminous crops, such as peas and alfalfa, in a crop rotation."

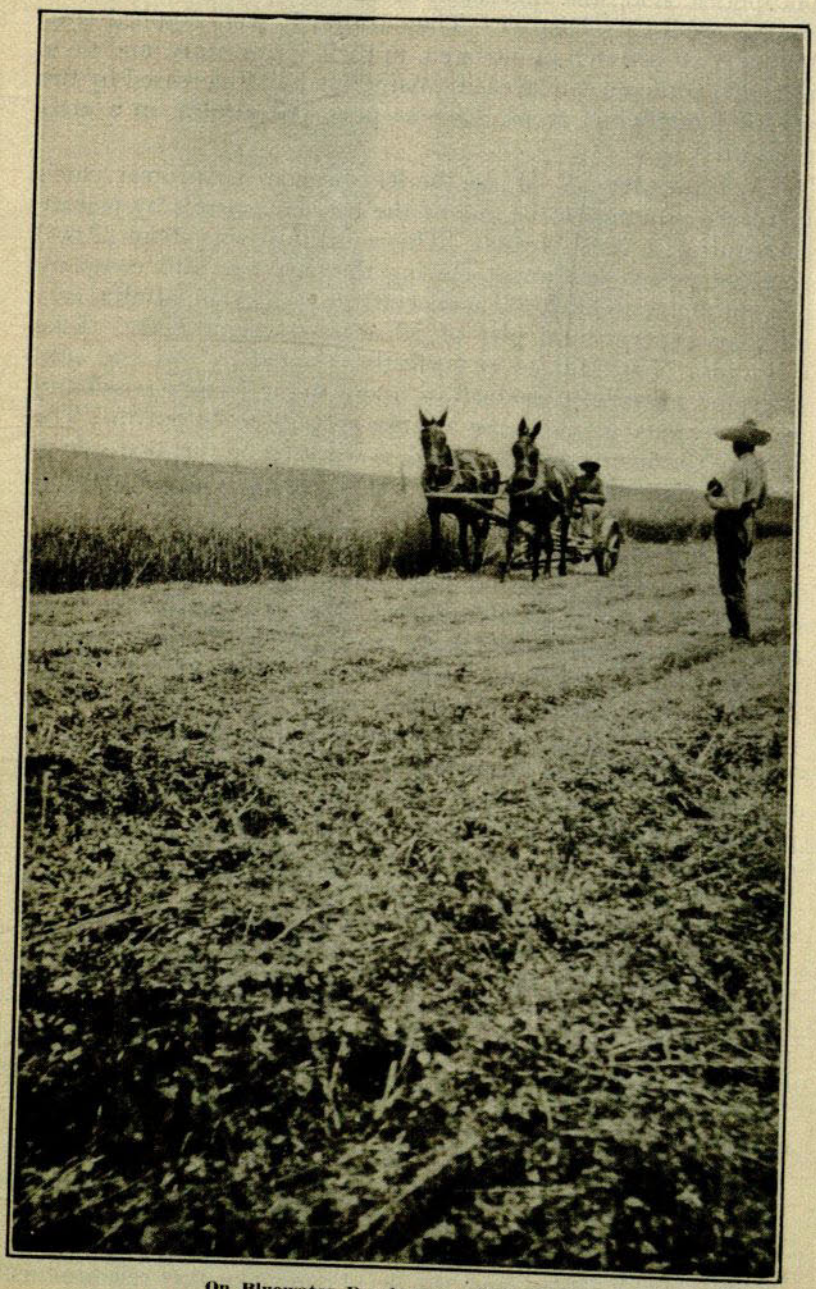
At Elmendorf, N. M., on the Rio Grande, is a project which in future promises to be one of the best enterprises by private corporation in New Mexico. This company owns about 22,000 acres of rich valley land. During the past year this company has put under about 2,000 acres cultivated to grain, alfalfa, etc., with an experimental plat of 50 acres to sugar beets. Like Colorado, New Mexico is perfectly adapted by soil and sunshine for sugar beet production, and a sugar factory possibility in any locality would cause a large acreage to be put in. The Socorro Company, as it is named, is working on the west side of the Rio Grande, where about 20,000 of the 22,000 acres is located.

The Farmers' Development Company, of Springer, N. M., is one of the best irrigation propositions in New Mexico. This company has made rapid headway with its construction work and it is being carried on with much energy and accomplishment, as the accompanying cuts will illustrate. Already there are 35 families located upon this land, water being delivered to the same. An enterprising community is being started at Miami, postoffice of the new district. Public school facilities and other municipal interests are being worked up. The company sells their land upon the colonization scheme and endeavors to do much for the benefit of its settlers.

The construction of their system, reservoirs, etc., involved an outlay of some $80,000. The main dam of the reservoir is 1,100 feet long, 200 feet wide at the base and 45 feet high. The outlet consists of a line of 30-inch vitrified pipe laid in concrete. The capacity of the reservoir is estimated at one billion gallons. The supply of this project is derived partially from Heck Arroyo, a large portion, however, comes from the Rayado River through an inlet canal 1¼ miles long, which has a capacity of 250 second feet.

The quality of soil of the land owned by the Farmers' Development Company is of the best and is common to the northern portions of the Territory. The section is adapted to the growth of fruit, grains, sugar beets, etc., in fact, the intention of this company is to push the development of this last product

Construction Work on Reservoir Farmer's Development Co.'s Project



On Bluewater Development Co.'s Project

with the final aim of a beet sugar factory for the disposal of this crop.

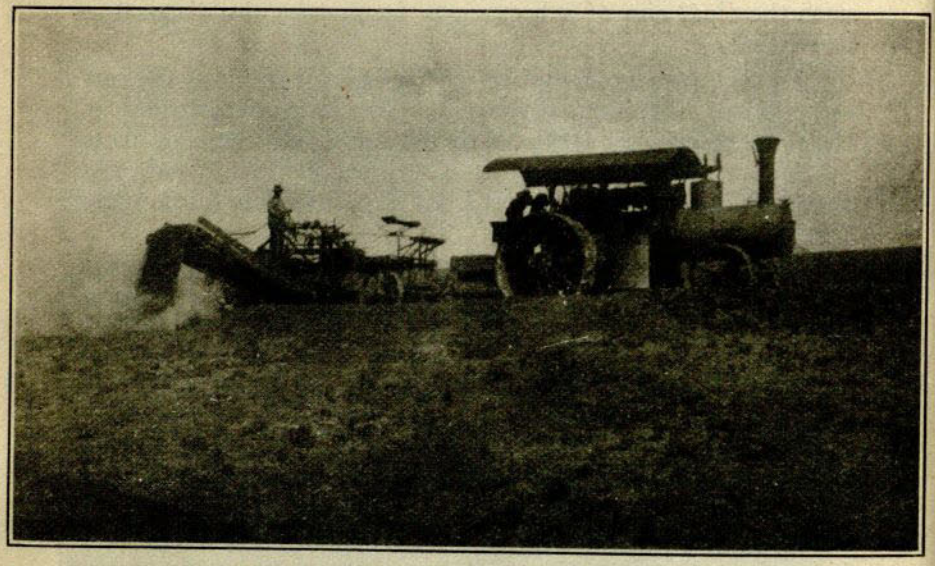
The company contemplates enlarging its service by the construction of additional reservoirs. The combined capacity of the three reservoirs, as shown by plats and field notes, is about 10,000 acre feet. This district is well supplied with coal, coke and lime rock, which makes it an ideal location for a sugar factory, as above mentioned.

The Bluewater and San Mateo Valleys, comprising about 21,000 acres, owned by the Bluewater Development Company of Albuquerque, are located 107 miles west of Albuquerque, on the main line of the Santa Fe Railroad. There are two railroad stations within these valleys—Bluewater and Toltec. The soil in these valleys is exceptionally rich, being decomposed lava, mixed with loam and is continually fertilized by wash from the limestone hills and lava beds surrounding the valleys, and their development means much to New Mexico. For stock and sheep feeding they offer an ideal combination of cheap grazing lands in the surrounding foothills and immense yields of forage crops in the valleys under irrigation.

The reservoir is located some twelve miles from the valleys and drains over 240 square miles heavily timbered water shed with an average rainfall of approximately 18 inches. The out let from the reservoir is by means of a tunnel approximately 400 feet long and six feet square, driven through the solid rock at one side and not connected in any way with the dam. The dam is 386 feet long and when it reaches its full height will be 100 eeet above datum. The first section is already completed.

The French Land & Irrigation Company of Springer, N. M., contemplates the irrigation of 43,000 acres of land that has been acquired by this company in Colfax County. The A. T. & S. F., El Paso and Southewestern and Rocky Mountain & Pacific railways pass through or near the property and with these facilities the products raised are easily delivered and shipped to the leading markets.

The preliminary work of surveying was begun during July, 1907, and active construction commenced in November. The plans of the project contemplates the conservation of the flood waters of the Cimarron and Vermejo rivers, and the Ponil, Cerresoso and Van Brimmer creeks. This company claims, in a report to the Engineer, from which this data is taken, that the flood waters of these creeks and drainage



Constructing Canals. French Land & Irrgation Co.

area will afford sufficient supply for the 43,000 acres to be developed. A system of seven reservoirs sites, is intended, which after filling twice each season, will amount to 129,000 acre feet. The soil is rich and fertile, anything can be grown common to the temperate regions, when water is applied to the soil. Fruit, grains, alfalfa and sugar beets do exceptionally well in this locality.

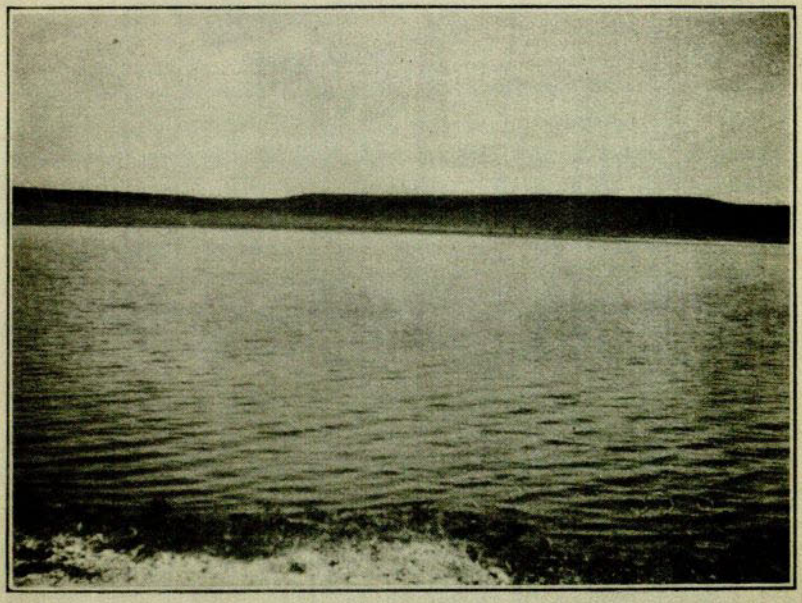
The Lake Charette Reservoir and Ditch Company of Springer, N. M., seeks to appropriate the flood waters of Ocate Creek, which it is estimated during flood times, affords a flow sufficient to irrigate from 18,000 to 20,000 acres of land. In planning this irrigation scheme a diversion dam 43 feet in height is provided, with a length of crest of 165 feet. This dam is to be of the over-fall type with a concrete core, and earth filling, and faced in a manner as to make it thoroughly secure. The intake ditch is about 4½ miles long with a carrying capacity of 626 cubic feet per second.

The reservoir is ideally fitted in every way for storage purposes. It is the crater of an extinct volcano and the ages that have transpired since it was in eruption have rendered its bed and slopes impervious to water. The reservoir has an 18,000 acre feet capacity when supplemented by a masonry

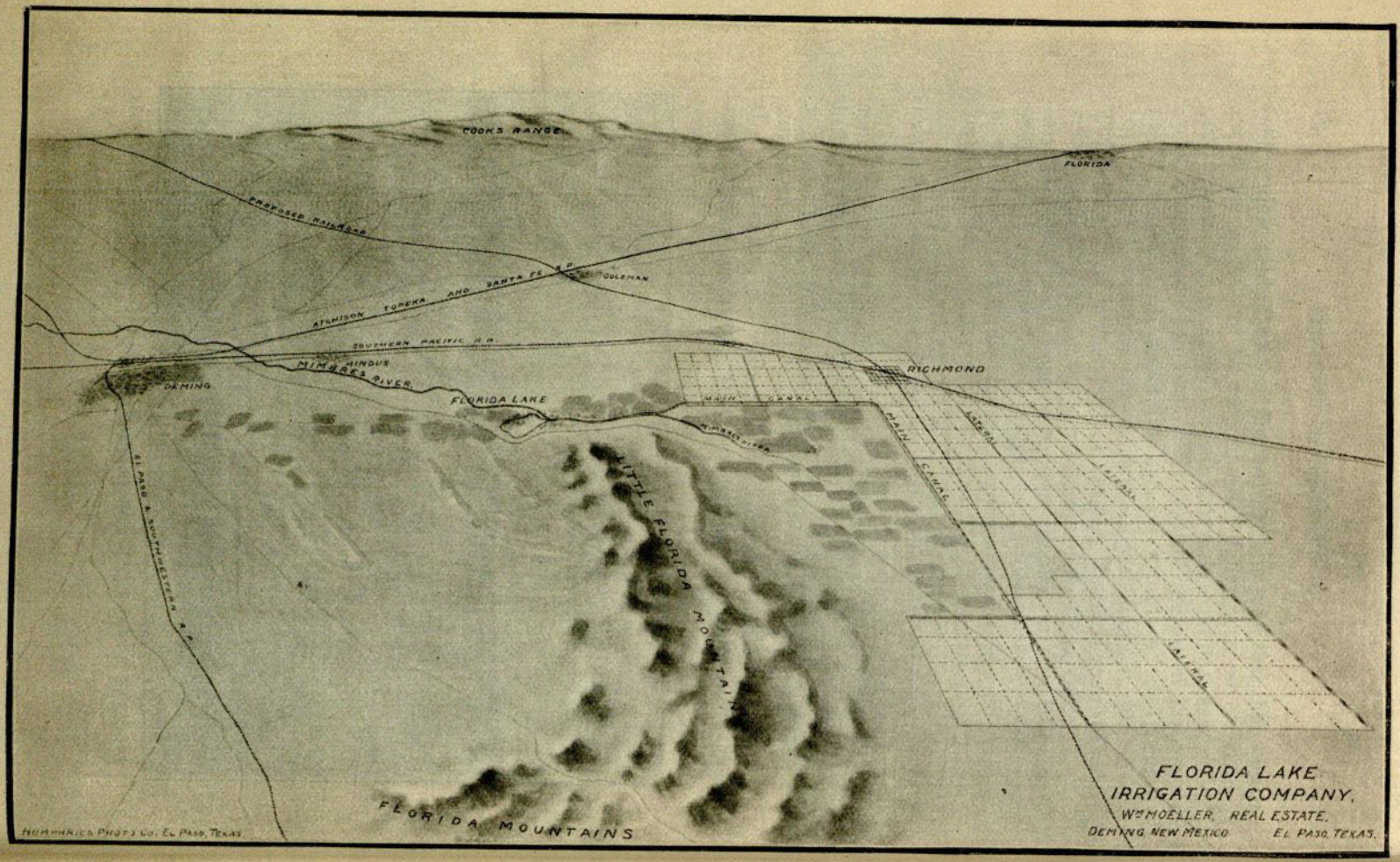
dyke 460 feet long and ten feet high at its highest point. The lands to be irrigated by this project lie in Colfax and Mora Counties, and have that easy slope so pleasing to the eye of the practical irrigation farmer. The land lies immediately adjacent to the Atchison, Topeka and Santa Fe Railroad, which will afford ample transportation and shipping facilities for the farmers. Total cost of this enterprise will be $60,000.

The above listed projects are a few of the principal enterprises that have actually applied water to the land as appropriated to them within the provisions of the last law. The following, however, are propositions which have not, or at least four months ago, put the water to use upon the land. This list also includes some of the most important projects for which permits to appropriate water have not, as yet, been granted by this office.

The Taos Valley Land Company of Taos, N. M. has under its project 15,000 acres of land in one of the most beautiful valleys in New Mexico. The climate of this place adapts it nicely to the production of fruit more particularly, but grains of all kinds and vegetables are produced in abundance. It was from this section that the first Mormons bought their



Lake Charette Reservoir


COOKS RANGE
FLORIDA
PROPOSED RAILROAD
COLEMAN
ATCHISON TOPEKA AND SANTA FE R.R.
SOUTHERN PACIFIC R.R.
MIMBRES RIVER
DEMING
FLORIDA LAKE
RICHMOND
MAIN CANAL
LATERAL
EL PASO & SOUTHWESTERN R.R.
LITTLE FLORIDA MOUNTAIN
FLORIDA MOUNTAINS
FLORIDA LAKE
IRRIGATION COMPANY.
Wm MOELLER. REAL ESTATE.
DEMING, NEW MEXICO
EL PASO, TEXAS.
HUMMINBIRD PHOTO CO. EL PASO, TEXAS

seed grain for the planting of that rich section in Utah. The purpose of the Taos Valley Land Company, is, to plant several thousand acres in fruit trees, principally apples and pears, reserving sufficient open spaces between these orchards for the cultivation of sugar-beets, wheat, barley and other grains, together with the other products appertaining to intense farming and dividing the land into small tracts of from twenty to forty acres, to suit the purchaser. The farming lands of the company are located at an altitude of from six to seven thousand feet, the soil is a rich red color, consisting of sandy loam and volcanic ash to a depth of from three to six feet, with a clay subsoil. The project consist largely of the combining of several old small ditches into one system.

The largest underflow project in the territory is the one contemplated by James M. Gaar, of Deming, N. M. This proposition is located in the Mimbres Valley about 15 miles east of Deming, N. M., adjacent to the Southern Pacific, Rock Island and A. T. & S. F. and will reclaim, by the development of the underflow, as many acres as possible of the best land in this section. The water supply is secured from Florida Lake which gives its name to the project. This lake covers about 1,500 acres of land. Experimental wells show the presence of an enormous quantity of water which can be developed and utilized for irrigation. The water supply will be developed by dredging a large part of this basin and a storage reservoir created by the construction of a sub-surface dam. The products of this region which are common to the temperate zone are shipped by the fine railroad facilities into Arizona, Texas and New Mexico. The land is a rich sandy loam varying from eight to 15 feet in depth and lies so ideal that practically no leveling is required. Altitude of this section is 4,200 feet and climate is typical of New Mexico. Water of the Mimbres is exceptionally free from impurities. Figure on opposite page represents the location, etc., of this proposed project.

Geo. H. Webster, Jr., of Cimarron, N. M., general manager of the Uracca Ranch Company, a private enterprise, is now constructing an irrigation project which is probably the largest single handed proposition in the territory. This proposition would probably not appear large to an irrigation company but undoubtedly is quite an effort for private investment.

Mr. Webster is now constructing his reservoir for the impounding of the flood waters of the Cimarroncito, water

being conveyed one-half mile through an inlet canal to the reservoir. By the construction of a storage dam some 50 feet high and 600 feet long, this water will be held until it is needed for irrigation on the lands within the borders of the Uracca ranch.

On the Rio Puerco west of Albuquerque, the Rio Puerco Irrigation Company of Albuquerque has a project which a number of years ago was started with a large expenditure of money, but was washed away by a very disastrous flood of that time. It is now, however, ready to commence new construction work on their project. This project contemplates the irrigation of 19,000 acres of land in the Bernabe de Mantano Grant.

On the western side of the territory in the vicinity of Gallup, N. M., the Defiance Reservoir Company is working up a proposition to irrigate some 19,000 acres from the drainage area of the Rio Puerco of the West. The principal feature of this proposition is the construction of a storage reservoir, storing water from this river, capacity of same being about 20,000 acre feet. This proposition is in a locality where there has practically been no irrigation development. The mining interests in this section are very extensive, maintaining a good market for any agricultural products that may be raised under this proposition.

John G. Gage and John B. Enfield of Artesia own the project, the development of which, has been undertaken by the Oasis Development Company. This proposition is in the Sacramento Valley in Otero County taking most of its water supply from the stream of that name. Owing to the torrential character of this stream, a storage scheme is necessary. A canal diverts this flood water several miles to a reservoir site out on the plains where same is stored for irrigation of a large tract of government land, and is located in a portion of the territory where there has been no previous development. Cost of this project is estimated at $76,000.

Charles Springer of Cimarron, N. M., owns probably the majority of the projects in Colfax County. Some of the most important storage projects in New Mexico are the Cimarron, Ponil and Vermejo reservoir enterprises. The topographical feaures of these reservoir sits are practically ideal and are of such extent that large capacities ban be secured. By means of the location at such a high altitude, as these reservoirs are usu-

ally located, in the mountains where the evaporation is less and the rainfall is greatest. It is the opinion of the writer that if the greatest possible duty of water is desired, same can be better obtained by the application of the water to lands near its source thereby conserving the water best on its first use and also permits of the use of the return waters several times over.

Probably the best known of Mr. Springer's projects is the "Eagle's Nest" which has probably the most ideal natural facilities for a reservoir site in New Mexico. This almost perfect reservoir is formed by the Cimarron River passing into a natural basin surrounded on all sides by high mountains. Undoubtedly at one time this formed a lake but gradually the river worked its way out cutting a steep narrow canyon which it is contemplated the erection of a dam closing this basin up, making a lake as originally formed. This dam will be 130 feet high and in this manner impounding 113,700 acre feet for the irrigation of 65,000 acres at a cost of $100,000.

The Eden Land & Power Company with headquarters at Aztec, N. M., is now, at this writing, making active preparations for the carrying out of its project. Heretofore money has been somewhat scarce owing to the financial stringency but now that election is over this company has secured their necessary funds and the project will go forward with rapidity. The engineering feature of this project is rather difficult but under the supervision of Geo. G. Anderson, C. E., of Denver, Colo., and Blair Burwell, C. E., of Durango, Colo., consulting engineer, this will be overcome with the best of engineering skill. The intake is one the Las Animas River in Colorado, a stream which has its head in the mountains 14,000 feet in height and is, therefore, fed by almost perpetual snow, the source of supply is exceptionally steady and certain. In "Water Supply" of this report will be found the discharge of this stream supplying water for the irrigation of 30,000 acres at a cost of $500,000. The main canal of this company is 35 miles long together with two other canals of ten and 15 miles each which will carry about 300 feet per second.

Another important feature of this project is the production of power by utilizing a drop of 50 feet occurring in its system. The estimated amount that can be generated is 400 horse power, and with the addition of $20,000 the capacity of the ditch can be increased thereby increasing the horse power to some 3,000. It is the aim of the company to furnish elec-

tricity for domestic purposes to present and future towns. The land under the Eden Canal has all practically been signed up and the dirt will fly before the first of the year.

The Turley-Hollister proposition located in San Juan County derives its water supply from the San Juan River. This is the largest proposition that has ever been undertaken in the United States and much credit should be given to Jay Turley, C. E., in bringing this proposition to the position where capital has become interested.

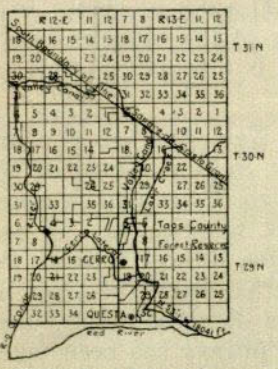
The discharge of the San Juan River for 1907 according to records in the Territorial Engineer's Office was 1,475,855 acre feet. At the intake of the canal there is proposed a reservoir with a capacity of over 1,000,000 acre feet. The alignment of the canal is very good and, with the exception of a short distance near the intake, there is but little heavy construction. The land covered by this proposition lies south of the San Juan River and with the exception of about 5,000 acres is government land. A large portion, however,, lies within the boundaries of the Navajo Indian Reservation.

The character of the soil is ideal for irrigation. The land lying largely in sloping mesas with arroyos at convenient intervals for drainage. The soil varies in density in different localities but the surface is never heavier than a loam. The mesas are of a characteristic reddish color and show a loam to clay loam with a sandy surface underlaid with a heavier soil. This is an ideal condition of the conservation of moisture, and a high duty of water. . The altitude of this body of land varies from about 5,000 to 5,800 feet. The temperature seldom falls below zero and the daily range is not great. The precipitation falls principally during the summer months which makes it possible to raise a light crop in favored spots at the present time without irrigation. The climatic conditions and soil make it adapted to the production of a great many crops including cereals, legumes and fruit. Owing to the topographical conditions of these mesas the late killing frosts in the spring of the year are unknown, thus making this section particularly adapted to the fruit industry. The San Juan apple is to be found in the fancy markets of Chicago which has caused this section to be known as the land of the "Big Red Apple."

In addition to the above project, Turley and Hollister have another proposition already approved by this office, on the north and west side of the Animas River in San Juan

County. The propose to irrigate about 130,000 acres of land in New Mexico. This proposition can be extended to cover about 700,000 acres if the water is available. The natural conditions of this proposition are similar to those on the San Juan. These two proposition will bring under irrigation and cultivation some of the most fertile lands in New Mexico.

MAP OF IRRIGATION PROJECT OF THE
RED RIVER LAND & WATER COMPANY
Shaded Areas are Territorial Lands



The Red River Land & Water Company is located in Taos County, deriving its water supply from the Red River. This project itself is located about 25 miles north of Taos and about 15 miles from the south of Coltilla. The project contemplates the irrigation of 50,000 acres, 30,000 of which is territorial land which the company is under contract to irrigate. The remainder of 20,000 is made up of public and private land. The altitude of the land is about 7,000 feet but apples, pears and plums have been raised in this district with marked success.

Palo Blanco Irrigation Company is another of the most important private enterprises in the territory. Although this proposition is not the largest in size, it will easily irrigate about 8,000 acres of fertile land in Colfax and Union Counties. It is claimed that the run-off of the Palo Blanco Creek affords a constant flow in the stream and during flood times the volume is sufficient, as estimated by their engineers, if properly stored, to irrigate from 12,000 to 15,000 acres. Two dams are required, the first one across Palo Blanco Creek 885 feet long and 58 feet high at its greatest height, the other 1,700 feet long and with a height of 48.6 feet. The capacity of the reservoir is 7,500 acre feet of water. Work on these dams was started last fall.

Community Projects

Besides all of the above projects there are a number of propositions throughout the territory that are now operated or contemplated, along the main river systems that are carried out on the community plan. Communities composed

of farmers on desert claims band together to construct irrigation works to irrigate their land and form a company for the construction of same. These systems are controlled or governed in a similiar way to the old acequias and community ditches built by the earlier settlers as the cost of maintenance is borne according to the holdings each farmer has under the ditch. One or two of such systems are given herewith.

The Citizens Ditch and Irrigating Company of Aztec, New Mexico, is a community proposition which is now constructing a canal to reclaim some 7,000 acres of choice fruit land in San Juan County. The intake of the canal is on the San Juan River near Blanco. Work is now being done on this project.

Young & Norton of Fruitland, New Mexico, contemplated the irrigation of 5,000 acres or more of some of the best land in New Mexico. The land so designated is called "The Meadows" and is located in the western part of San Juan County. The water source of this project is from the La Plata River and the water is diverted from the river by a ditch to a natural storage reservoir of some 12,000 acre feet capacity. All the land under this project has been taken by squatters pending the survey of the townships. The land formerly came under a proposed project of the United States Reclamation Service in connection with its Animas-La Plata Project but was relinquished and thrown open to entry on the first day of September 1907, and was rapidly settled up by a progressive community.

The lower Animas Ditch Association of Aztec, New Mexico, is a community proposition extending the present Animas ditch and reclaiming about 1,700 acres owned by the members of the Association. The major portion of this extension is now completed having tunnelled considerably in is construction. The Animas Ditch itself covers about 2,500 acres and is one of the oldest ditches in San Juan County. This also is a community system.

Small Projects

The following briefly described projects are only a small part of the list of individual projects having a small acreage. These are given herewith to partially represent the growth of the small projects as well as the larger ones above described.

T. E. Mitchell, of Albert, New Mexico, has quite a large project in Union County. The water supplying the project is diverted from Tequesquite and Carrizo Creeks by means of three ditches which cover several thousand acres, some of which can be supplied, if necessary, from the underflow of which there is considerable. This is one of the largest projects in Union County and will be of great benefit to that section.

The Wylie Farm & Live Stock Company, of Roswell, New Mexico, has installed a pumping plant raising water 18 feet from the Pecos River and irrigated 700 to 1,500 acres of which most has heretofore been waste land.

Fred J. Lukins of Artesia, New Mexico, has a novel system of drain ditches connecting with other farmers and ridding his and their land from swampy places and then using the water for irrigation. The land so drained is drying out and will in time be of value.

For a small project of 160 acres that J. J. May of Hillsboro, New Mexico, will probably rank among the best with regard to intense cultivation and economical use of water. Mr. May now has about one-half in cultivation, being planted to fruit, corn, potatoes, etc.

L. E. Martin of Alamagordo, New Mexico, is irrigating his homestead from La Luz Creek supplying this with careful cultivation and perserving the moisture in the soil. This claim was once an old Mexican farm and the silt deposited there through irrigation has made it a rich black, sandy, loam soil.

The ditch of Julia F. Morgan of Alamogordo, N. M., takes water from the San Andreas Canyon above the point where same has previously sunk and was lost. This project makes the best use of opportunities at hand and offers an example of using waters heretofore considered insufficient and unimportant.

J. A. Cottingham, whose address is Roswell, New Mexico, with his water appropriation from Lake Francis will eventually reclaim his land by the appropriation of water heretofore unused for irrigation purposes. This ditch is owned by three or four other settlers and together they will devote same to the production of corn, oats, etc.

There are numerous small projects in the territory, many

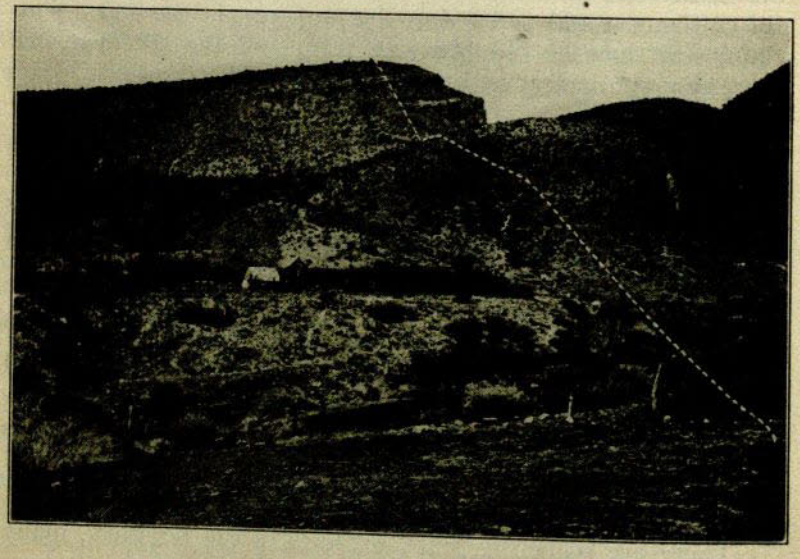
of which are now by this time under cultivation, but time and space prevent the further description of this line of progress in the territory.

Power Projects

The movement of the Territorial Engineer to develop the many power possibilities throughout the Territory and the money to be made and the beneficial results to the territory is exemplified in the power proposition of Merrill H. Fisher, C. E. of Alamogordo, New Mexico.

It is the present aim of this company to provide power for pumping water for about 40,000 acres of the finest land in the Alamogordo section of the country. Experiments have determined the location of underground waters varying from 18 to 110 feet below the surface. This power for pumping water for irrigation will increase the possible irrigated area of 3,000 acres to 40,000.

To make cheap power Mr. Fisher has filed on water power sites in Fresnal Creek in Box Canyon, where he is now engaged on the preliminary work of installing a hydro-electric



Site of Merrill H. Fisher's Power Project

plant. The power plant will consist of two or more Pelton water wheels direct connected to three phase 60 cycle alternating current dynamos. Step up transformers will be used to raise the voltage to 16,000 volts for transmission to La Luz, Tularosa and Alamogordo. The location of the power house will be ten miles from Alamogordo and 18 miles from Tularosa. The estimated cost of the hydro-electric plant alone is about $100,000 aside from the cost of real estate, etc.

Cheap power for irrigation work is the key to the development of this locality. The Alamogordo Light & Power Company is making developments that will from the start be immensely beneficial to the surrounding country and profitable to itself as well.

J. P. Annan of Alamogordo, also has a power proposition located on Dog Canyon using water derived from springs in the canyon. This project will cost $22,000 and will generate approximate 800 horse power.

O. M. Lee of Almagordo, New Mexico has a number of power plants under a couple of projects on the Sacramento River and Scottable Canyon. The total amount of power to be generated under five plants is approximately 3,538 horse power with a cost of about $80,000.

The combination proposition of F. D. Allbright of Camp, New Mexico for irrigation and power is one of the best small propositions around the San Andreas Canyon. A fall of 250 feet can be secured for power purposes generating 150 horse power. The cost of the plant is estimated at $16,000 and the land to be irrigated eventually will aggregate 5,000 acres. A large wall has already been completed and the rest of the work is not far from final construction.

Another fine power proposition is owned by the New Mexico Power Company of Plaza Block, El Paso, Texas, on the Penasco River in Otero County. The waters of this stream are diverted four miles from its natural channel and there returned to the river at place where a drop of 386 feet is to be secured and will furnish about 1,300 horse power.

Illustrating the value of this power project the company says in part:

"A horse power produced from coal costs here in the West three cents per hour, 72 cents a day or $262.80 in a year. Suppose it were taken by a transmission wire to either the

Pecos Valley or to El Paso, Texas, approximately 100 miles in either direction, the loss by transmission would reduce the power to 1,100 horse power, and this would cost produced from coal $289.080.00 a year. The operating expenses are nominal and the estimated cost is $250,000.00. Here is an instance, where $292.00 a day have gone down this river for centuries and nobody has received any benefit."

United States Reclamation Projects

The Reclamation Service has five projects under consideration, two of these have been waiting for sometime on account of lack of funds. The Las Vegas, which is one of these, contemplated the irrigation of 10,000 acres near Las Vegas, New Mexico, and the other, the Urton Lake, covers 60,000 acres north of Roswell, New Mexico. The Hondo will eventually reclaim 10,000 acres and the Carlsbad Project has practically irrigated from 12,000 to 20,000 acres. This latter project was formerly owned by the Pecos Irrigation Company, from which it was purchased by the United States Government and $600,000 has been spent on this project. The farmers under this proposition are prosperous and contented. The large project, the Elephant Butte or Engle, is to reclaim 110;000 acres in New Mexico. Preliminary work has already been in operation for the past few months. This proposition embraces the largest artificial lake in the world and will cost $7,200,000. At Leasburg, a part of this system now in operation, $200,000 has already been spent.

Board of Water Commissioners

The Territorial Board of Water Commissioners, created under the Act of 1907, has filled an important place in the affairs of the Department of Irrigation. This body consisting of three members, who act as a judiciary body upon appeals from the decision of the Territorial Engineer upon water right applications, convenes every three months and goes over the grounds of the appeals, generally in a legal capacity, and hears oral argument brought before it, through the attorneys of the respective defendants and appellants.

One object obtained by the Board in this capacity is that

quick action and service may be obtained upon questions arising under the Territorial Engineer. Should the parties interested be adverse to the verdict returned by the Board, either confirming or reversing the acts or decision of the Territorial Engineer, an appeal may then be taken to the District Court where final judgment is secured.

The Board since its creation, March 19, 1907, has convened and held regular meetings on the first Mondays of May, August, November, 1907, and February August and November, 1908.

The first meeting of the Board in May, 1907, was called for the purpose of organizing and other routine work of its department. Mr. Charles Springer of Cimarron, New Mexico, was elected president and Mr. Malaquias Martinez of Taos, secretary. The other member of the Board being Mr. O. C. Snow of Mesilla Park.

In November, 1907 the first appeal was heard by the Board that being upon the approval of the Engineer of the application of the Farmer's Development Company of Springer, New Mexico, for water from the Rayado River in Colfax County. The action of the Board in this particular case was to revise the Engineer's approval to conform to a stipulation entered into by the appellants and the Development Company and to extend the time to beneficial use of the water.

The important case of the El Paso and Rock Island Railroad Company to change its point of diversion on the south fork of the Bonito Creek in Lincoln County was taken up at the February meeting in 1908 for consideration. The action of the Board was to confirm the decision of the Territorial Engineer and use. The case has later been appealed to the District Court but owing to the prosecution of a hydrographic survey of the Hondo stream system, of which the Rio Bonito is a part, action by the court has been withheld. Mr. Venceslao Jaramillo of El Rito succeeded Mr. Martinez at this meeting. The usual routine business was transacted by the Board as at the previous meetings after which it adjourned.

The appeal of Judge A. J. Abbott, representing the Pueblo de Taos (Indians) from the decision of the engineer approving applications Nos. 125 and 126 of the Taos Valley Land Company for permits to appropriate water from the Arroyo Seco and Rio Hondo in Taos County constituted a part of

the business before the Board at the August meeting. After hearing oral argument by the attorneys representing the parties to the appeal and after careful examination of the papers filed with the engineer, the Board considered the grounds insufficient for appeal and the case was ordered dismissed. The action of the Board has been appealed from the Pueblo de Taos to the District Court.

The November meeting of the Board was postponed from the first Monday to the 30th of the month. The appeals brought before the Board at this time were three in number and probably the most important that have been brought into its jurisdiction.

The appeal of Furman & Burke of Farmington, N. M., against the approval of the Turley-Hollister Project in San Juan County was considered and dismissed.

Owing to the incomplete attendance of the Board meeting, the appeals of E. O. Dean, et al, vs. Fred Vanderwork and the Hinderlider vs. Young & Norton were postponed to a specially called meeting for Jan. 13th, 1909. Evidence, however, was heard by the Board from representatives in both appeals. The appeal of Mr. M. C. Hinderlider will be heard in Farmington in January owing to the number of witnesses to be heard.

Viewing the last year and a half's work of the Board, it appears very satisfactory and the importance of such a Board in the administration of territorial waters has become strongly apparent.

Good Roads

One of the essential features for the development of a new country is a means of easy access to same, and while the development of the territory has been phenomenal the past few years, it has been largely due to its natural resources.

It has been the object of this department not to follow in the wake of development, but rather to be one of its agents in assisting its advancement.

The need and the benefits to be derived from good roads are so well known that we will not mention those points; however, the condition existing in the territory are not so much the need of legislation in short cross roads if our present laws were carried out, as the need of more good roads to connect the different cities and villages.

We are fortunate in having conditions most favorable for cheap construction of roads, as we have good material for road construction and our climatic conditions are most favorable for a cheap after maintenance.

The cost of construction of good roads depends a great deal on the location of such road and the systematizing of the work in construction to suit the natural conditions.

Developing of Irrigation and Dry Farming

The time has come when not only the individual farmer but the whole public begins to see the value and necessity of proper handling of water and soil in irrigation and dry farming. New Mexico is favored with the best climate in the world and is abundantly supplied with the most fertile soil, and our only limit in irrigation farming is controlled by the water supply and the extent to which we are able to make our supply of water cover. This last condition is practically controlled by the water user himself.

Today, the beneficial results obtained from the amount of water being used is less than thirty per cent of what it should be or is about ten per cent of the duty received in California. Even in our territory some irrigators are gaining five hundred per cent better results from a given quantity of water than others. May I ask the cause for this marked difference of the one over the other. It is simply on account of the lack of general knowledge of the one of how and when to irrigate, how to care for the soil and crops and what kind of crops are suited to the natural conditions. The same conditions as to conservation of moisture, care of soil and kind of crops to raise, arise under dry farming as well as irrigation farming.

The question then arises what is the best way to assist our farming people to obtain better results. Of course the individual himself is anxious to do as well as possible, but oftimes he is unable from various causes to experiment and observe the results.

New Mexico will ultimately irrigate 2,000,000 acres of land and there is approximately 10,000,000 acres where the rainfall is generally sufficient and the soil suitable for dry farming of which the territory owns over 2,000,000 acres.

With such agricultural resources and the prospects of statehood, it is apparent that the time is approaching when New Mexico should take the lead in the developing of irrigation and dry farming.

In order to obtain the development desired with any degree of success and speed, it will be necessary for the territory to do all in its power to assist the farming class in learning proper methods with which to care for the soil and water and the kind of crops best paying and best suited for local conditions. The most optimistic person cannot hope to make a success of agricultural pursuits if they pursue the ordinary methods of farming and many of the farmers now coming into the territory without the proper guidance, will make failures where successes ought to have been, especially in the dry farming districts.

Development of the Underflow

It is the intention of this department to publish for distribution, a bulletin on the underflow possibilities in different valleys in the territory. This office has been looking into the underflow supply for the past few months and data has been slowly collected when the duties of the engineer and the opportunity would permit.

The geological formation or stratification of New Mexico is more or less broken up thereby admitting a considerable amount of surface waters to sink into the underground passages. This fact is illustrated very strikingly in the extensive artesian belt in the eastern part of the territory and within recent months another artesian district has been discovered about 100 miles east of Albuquerque. We also believe that from the disappearance of the rainfall in the area surrounding and comprising the Estancia Valley much could be done in underflow development in that section. The same conditions exist in what are known as the Alamogordo and Mimbres Valleys. In these valleys there are streams flowing towards the valleys whcih disappear entirely and doubtless go into the underflow. In the dry farming districts especially the systematic use of underground waters will be of inestimable value.

The Carey Act

It has been the earnest desire of this department to have the provisions of the Carey Act extended to the territory and at the present time there is a bill pending in Congress extending the provisions to the territories of New Mexico and Arizona. In addition to the possibilities of getting the provisions of the Act extended to New Mexico in this way, there is the probability of the Territory's becoming a state and in such a case the provisions would then become applicable to New Mexico.

If we are successful in this matter it will assist in bringing about several large irrigation projects and in that even it would be quite necessary that the Territory have some appropriation for the classification of lands that would come under these irrigation projects and also there are numerous reservoir sites that should be investigated.

Altho quite well known, it might not be out of place to briefly outline the intent of the Act above mentioned. This Act of Congress gives to the semi-arid or arid states a million acres of land by the Federal Government. The states then through the Legislatures enact and pass laws to carry out the provisions of the Act. The laws generally provide for a charge of fifty cents an acre by the state for the handling of the business connected with the lands. The land is then segregated under the best irrigation projects by the state and is then held for the cost of construction of the irrigation works by private individuals who do this work under the supervision of the State Land Board and the State Engineer. The farm unit under these propects is 160 acres although quite frequently in many of the states the limit is placed at 80 acres. In this way the individual settler or land owner has to pay only fifty cents to the state plus the cost of the water right per acre to the irrigation company.

Appropriations

The cost of the work in connection with the duties of the office of Territorial Engineer, as provided for through the Irrigation Law of 1907, is continually increasing, and the work and expense at the present time, as compared with that of a year ago, is several times larger. All applications for permits to appropriate public water approved in the past will in the future require an examination of the project on the ground to determine the capacity, safety, etc., of the project and the issuance of a certificate of construction, also the lands irrigated will necessarily have to be examined in order to know the extent of the license to grant to that project.

It has been the object of this department not to follow in the wake of development but rather to be one of its agents in assisting this development and with that in view we have taken up the investigation of various important subjects kindred to irrigation development. The cost of printing bulletins, reports, stationery for the office, etc., as well as postage and correspondence is increasing daily. In view of this certain increase of expenses, as indicated above which must be met if this office is to remain efficient in the administration and development of all matters pertaining to public interests and public waters, I would, therefore, respectfully urge that the coming session of the Legislature appropriate as a minimum amount of $4,500 for the running or contingent expenses of this office per annum, otherwise it will be impossible for the office to properly handle the increased work of this department as it will be necessary to have extra assistants and a stenographer.

The appropriation of the last Legislature of $1,900 per annum for the traveling expenses of the Territorial Engineer and assistants will be ample for the coming two years.

INDEX

BULLETIN NO. 3

DEPARTMENT OF

TERRITORIAL ENGINEER

SANTA FE, NEW MEXICO

Records

OF

New Mexico Water Supply

TO

OCTOBER, 1908

Water Supply

PART I.

From the very beginning it has been the earnest desire of the Territorial Engineer, to bring up at some time the scattered records or data upon the various creeks and rivers in the territory into some compact form and all available records presented at the same time. The aim has been to search all available reports, records, etc., kept by the U. S. Geological Survey or Reclamation Service and compile all data pertaining to New Mexico in such a form as its distribution would be of value to water users of the territory. Taking the opportunity offered by the printing of the First Biennial Report, the engineer has added this data in very concise and intelligible form as an appendix to his report.

Much labor and time have been expended in bringing these records up to one common form, owing to the lack of discharge measurements on many of the streams so gaged by the Geological and Reclamation Services. In these cases where measurements were insufficient to construct suitable curves, the monthly discharges are more or less approximate. In a large number of cases, however, the monthly discharges have been found in the records to have been computed and these have been with some changes inserted as they were given the location of the old gaging stations have also been taken from these reports.

The First Part is a compilation of all known records upon territorial streams up to June or July of 1907, if same have been extended up to that date when the Engineer took up the work in New Mexico. Many of these records are for only a short period of years ranging from one to five years with the exception of the records upon the Rio Grande which have been recorded for a much larger period.

The absence of any data what ever which was readily available for the people in the territory has long been felt. The work of the Engineer too, has been greatly handicapped by the lack of data. It was the desire of the Engineer upon taking up the work of this department to place the measuring of streams and collection of general hydrographic data upon a permanent and working basis. With this in view the office has co-operated as far as possible with the United States Geological Survey taking up the stations maintained by them in the middle of 1907, re-establishing a few old abandoned stations, putting in a number of new ones where information was most desired and having general supervision of the New Mexico work from

that time. The Second Part of this pamphlet contains the data as collected by the Department of Territorial Engineer up to the 30th of September, 1908.

The records which have been compiled in Part I have been taken from the Water Supply Papers of the U. S. Geological Survey which has also kindly supplied us with missing years when same were available. A number of years record on the Rio Grande were taken from the reports of the U. S. Boundary (Water) Commission.

ANIMAS RIVER AT AZTEC, N. MEX.

This station was established June 21, 1904, by M. C. Hinderlider. It was located at the wagon bridge about three-eighths of a mile west of Aztec, New Mexico.

Estimated monthly discharge, in acre feet, of Animas river at Aztec, New Mexico:

Month	1904
June 21-30	12,020
July	14,450
August	56,380
September	41,090
October	105,800
November	18,920
December 1-14	4,830
The period	253,400

ANIMAS RIVER NEAR FARMINGTON, N. MEX.

This station was established June 18, 1904, by M. C. Hinderlider. It is located at the highway bridge about one mile northeast of Farmington, New Mexico.

Estimated monthly discharge, in acre feet, of Animas river near Farmington, New Mexico:

Month	1904	1905
June 20-30		
July	12,830	.....
August	6,888	.....
September	42,240	.....
October	24,640	.....
November	80,000	.....
December	14,580	.....
January	9,715	.....
February	.....	10,820
March	.....	10,330
April	.....	42,730
May	.....	79,620
June	.....	243,600
July	.....	455,500
August	.....	89,030
September	.....	32,830
October	.....	16,360
	.....	35,420
The period	190,900	1,016,000

CAMERON CREEK NEAR FORT BAYARD, N. MEX.

This station was established by Wm. A. Lamb on January 19, 1907. It is located 50 feet above crest of old dam at Fort Bayard, N. Mexico.

Estimated monthly discharge, in acre feet, of Cameron creek near Fort Bayard, New Mexico:

Month	1907
June	59
July	57
August	87
September	32
October	32
November	32
December	32
The period	331*

* Approximate.

Continued under Part II, page 21.

Estimated monthly discharge, in acre feet, of Chama river at Abiquiu, New Mexico:

Month	1895	1896	1897
June 23-30	3,964	.....	.....
July	39,917	.....	.....
August	15,956	.....	.....
September	13,911	.....	.....
October	5,495	.....	.....
November	5,988	.....	.....
December	4,666	.....	.....
January	.....	.....	7,944
February	.....	.....	3,140
March	.....	.....	37,323
April 1-7	.....	.....	20,889
The period	89,897	.....	69,396

CANADIAN RIVER NEAR LOGAN, N. MEX.

This station was established June 29, 1904, by W. G. Russell. It is located at the bridge of the Chicago, Rock Island and Pacific Railroad, one mile west of the depot at Logan, New Mexico. The station was discontinued February 26, 1905.

Estimated monthly discharge, in acre feet, of Canadian river near Fort Logan, New Mexico:

Month	1904	1905
July	22,691	.....
August	53,880	.....
September	290,806	.....
October	1,150,358	.....
November	23,485	.....
December	17,167	.....
January	.....	22,137
February	.....	18,167
	1,558,387	40,304

CIMARRON RIVER NEAR KENTON, OKLA.

This station was established April 5, 1904, by W. G. Russell, and was discontinued July 31, 1905. It was located at the highway crossing on the main road, one-half mile north of Kenton, Okla.

Estimated monthly discharge, in acre feet, of Cimarron river near Kenton, Okla.:

Month	1905
January	1,822
February	1,471
March	1,921
April	5,014
May	3,358
June	1,976
July	697
The period	16,259

GALLINAS RIVER AT HOT SPRINGS, NEAR LAS VEGAS, N. MEX.

This station was established August 13, 1903, by E. G. Marsh. The station is located at the Hot Springs, six miles from Las Vegas, New Mexico.

Estimated monthly discharge, in acre feet, of Gallinas river at Hot Springs, New Mexico:

Month	1903	1904*	1905	1906	1907**
January					
February			738	566	836
March			2,227	516	828
April			5,737	1,590	1,700
May			10,530	5,870	3,590
June			12,670	6,210	5,610
July			3,773	1,890	3,810
August (14-31, 1903)			1,051	2,370	.....
September (29 to Oct. 7, 1904)	133	.....	1,642	1,350	.....
October (8-31, 1904)	52	16,570	833	875	.....
November	21	1,551	215	1,050	.....
December	30	815	1,910	934	.....
	30	627	1,150	2,800	.....
The year or period	266	19,563	42,476	26,100	15,374

* From Jan. 1 to Sept. 27, 1904, the discharge was practically nothing. Discharge from Sept. 29 to Oct. 8, 16,570 acre feet.

** Continued under Part II, page 24.

GILA RIVER NEAR CLIFF, N. MEX.

This station was established September 9, 1904, by W. A. Farish. It is located one-half mile below the mouth of Mangos River and 40 miles from Silver City, New Mexico. The station is best reached by stage from Silver City to Gila Store, thence by private conveyance to the station.

Estimated monthly discharge, in acre feet, of Gila river near Cliff, New Mexico:

Month	1904	1905	1906	1907
January	.....	.....	14,500	108,637
February	.....	.....	31,900	57,780
March	.....	.....	65,200	35,961
April	.....	.....	35,100	24,523
May (23-31, 1905)	.....	10,230	14,600	12,365
June	.....	16,180	4,130	11,173
July	.....	8,178	5,480	10,144
August	.....	11,190	28,300	37,586
September	1,233	11,420	5,370	37,584
October	1,372	9,162	5,120	11,762
November	491	82,830	5,860	15,716
December	713	40,890	28,200	10,157
The period or year	3,809	190,100	244,000	373,388

HONDO RIVER AT HONDO RESERVOIR SITE, N. MEX.

This station was established March 9, 1903, at the first New Mexico reservoir dam site, 12 miles southwest of Roswell, New Mexico.

Estimated monthly discharge, in acre feet, of Hondo river at Hondo Reservoir Site, New Mexico:

Month	1903	1904	1905	1906
January (19 days, 1904)	.....	503	432	4,140
February	.....	000	2,194	1,200
March	.....	000	13,037	191
April	.....	000	9,343	1,450
May	.....	000	11,567	6.1
June (5 days, 1904)	11,001	163	12,768	000
July (22 days, 1904)	309	3,059	9,371	19.7
August (13 days, 1904)	746	5,279	13,098	160
September	176	4,006	5,370	311
October	339	45,645	4,303	450
November	725	1,244	4,125	857
December	570	1,373	8,653	445
The year or period	13,866	61,372	94,721	9,230.8

Note.—Values are rated as approximate.

HONDO RIVER AT ROSWELL, N. MEX.

This station was established April 25, 1903, and was discontinued March 2, 1906. It is located at the bridge at the intersection of Main and Vegas streets, Roswell, New Mexico.

Estimated monthly discharge, in acre feet, of Hondo river at Roswell, New Mexico:

Month	1903	1904	1905**	1906
January	.....	.....	.....	1,680
February	.....	.....	.....	305
March	.....	.....	.....	.....
April	.....	.....	.....	.....
May (2 days, 1904)	.....	17	.....	.....
June (8-24,* 1903)	3,775	.....	.....	.....
July (8 days, 1904)	.....	535	.....	.....
August (10 days, 1904)	.....	1,051	.....	.....
September (5 days, 1904)	.....	1,469	.....	.....
October	.....	7,399	.....	.....
November	.....	503	.....	.....
The year or period	3,775	10,974	.....	1,980

* No water after June 25th.
** No gage heights and discharge measurements available from which to estimate discharge.

INLET CANAL AT HONDO RESERVOIR, NEAR ROSWELL, N. MEX.

This station was established August 7, 1906, for the purpose of determining the amount of water diverted into the Hondo reservoir. It is located 12 miles southwest of Roswell, just below the sand check at the lower end of the Inlet Canal.

Estimated monthly discharge, in acre feet, of Inlet Canal at Hondo Reservoir, near Roswell, New Mexico:

	1906	1907
January	.....	10,200
February	.....	1,280
March	.....	000
April	.....	000
May	.....	000
June	.....	30
July	.....	240
August	.....	1,240
September	772	476
October	76	1,700
November	143	3,270
December	83	892
The year or period	1,527	19,328

* Dry after September.

SCOUR GATE NO. 1, HONDO RESERVOIR, NEAR ROSWELL, N. MEX.

This station was established for the purpose of determining the amount of water flowing down Hondo river past the reservoir. It is located just below the opening of the scour gate.

Estimated monthly discharge, in acre feet, of Scour Gate No. 1, Hondo Reservoir, near Roswell, New Mexico:

Month	1906
August	100
September*	17
The period	117

LA PLATA RIVER NEAR LA PLATA, N. MEX.

This station was established June 1, 1905, in connection with investigations relating to the La Plata Project. It is located on the single-span wooden highway bridge one mile southeast of La Plata postoffice, New Mexico, in sec. 3, T. 31, R. 13 W., below all points of diversion.

Estimated monthly discharge, in acre feet, of La Plata river near La Plata, New Mexico:

Month	1905	1906
January	.....	1,353
February	.....	666
March	.....	2,275
April	6,179	11,663
May (25-31, 1905)	21,660	15,864
June	799	9,997
July	..... *	922
August	2,380	738
September (29-30†, 1905)	3,566	666
October	227‡	.....
November	615	.....
December	.....	.....
The period	35,426	44,144

* Standing in pools.
† Remainder of September standing in pools.
‡ Flowed six days during month.
Continued under Part II, page 26.

MORA RIVER AT LA CUEVA, N. MEX.

This station was established August 25, 1903, by M. C. Hinderlider. It is located at the wagon bridge in the town of La Cueva, New Mexico, in the Mora land grant 26 miles north of Las Vegas.

Estimated monthly discharge, in acre feet, of Mora river at La Cueva, New Mexico:

Month	1903	1904	1905	1906	1907†
January	.....	.....	.....	.....	1,250
February (22-28, 1905)	.....	.....	218	.....	1,170
March	.....	.....	1,734	.....	1,600
April (13-30, 1906)	.....	.....	5,183	3,330	1,870
May	.....	.....	10,760	7,190	4,200
June (15-30, 1904) (25 days, 1905)	.....	72	3,600	4,260	8,330
July	.....	175	1,402	4,020	.....
August (27-31, 1903)	* 28	.....	2,152	1,860	.....
September	269	.....	1,380	1,320	.....
October	255	.....	1,562	2,120	.....
November	241	.....	1,654	1,690	.....
December	451	.....	1,200	2,420	.....
The period	1,244	247	30,840	28,210	18,420

* Approx.
† Continued under Part II, page 27.

MORA CANAL AT LA CUEVA, N. MEX.

Mora canal diverts water from Mora river a short distance above the gaging station maintained on Mora river at La Cueva, New Mexico.

Estimated monthly discharge, in acre feet, of Mora Canal at La Cueva, New Mexico:

Month	1906	1907
January	.....	47
February	.....	31
March	.....	209
April (9 days, 1906)	207	637
May	953	664
June	1,080	744
July (14 days, 1906)	222	443
August	467	197
September (28 days, 1906)	305	571
October (12 days, 1906)	100	215
November	.....	184
December (9 days, 1906)	80	161
The year or period	3,420	4,103

Note.—The values are rated as approximate.

Estimated monthly discharge, in acre feet, of Mora river at Watrous, New Mexico:

Month	1894	1895
January	.....	40
February	.....	55
March	.....	44
April	.....	30
May	.....	297
June	.....	257
July	.....	416
August	.....	743
September	.....	139
October	59	50
November	40	79
December	40	119
The year or period	139	269

* Approximate.

MORA RIVER AT WEBER, N. MEX.

This station was established August 21, 1903, by M. C. Hinderlider. It is located at the highway bridge 150 feet north of the postoffice at Weber, New Mexico, and is about 15 miles west of Watrous.

Estimated monthly discharge, in acre feet, of Mora river at Weber, New Mexico:

Month	1903	1904
March	.....	536
April	.....	438
May	.....	438
June	.....	452
July	226	856
August	551	946
September (†, 1904)	1,032	487
October	608	.....
November	733	.....
December	.....	.....
The period	* 2,550	4,153

* Approximate.
† Big flood on last 2 days of month; gage washed out.

PECOS RIVER AT AVALON, N. MEX.

This station was established January 6, 1906, just below the Avalon dam, about six miles north of Carlsbad, New Mexico. The discharge at this point includes that at Lakewood, the flow of certain springs between the stations, the discharge of the spillways of the McMillan dam, and that portion of the leakage through the gypsum in the bottom of the reservoir that returns to the river above Avalon.

Estimated monthly discharge, in acre feet, of Pecos river at Avalon, New Mexico:

Month	1906	1907
January (6-21, 1906), (21 days, 1907)	26,000	27,000
February	25,000	19,100
March (16 days, 1907)	10,000	9,080
April	29,000	.....
May	32,900	.....
June	24,300	.....
July	46,200	.....
August (9-31, 1906)	26,100	.....
September (1-15, 1906)	6,520	.....
The period	227,000	55,180

PECOS RIVER AT CARLSBAD, N. MEX.

This station was estabilshed May 20, 1903, at the Green Street Bridge, Carlsbad, New Mexico, and is about 500 feet below the station of the Pecos Valley and Northwestern Railway and 2,000 feet below the Hagerman power dam.

Estimated monthly discharge, in acre feet, of Pecos river at Carlsbad, New Mexico:

Month	1903	1904	1905	1906	1907
January	.....	6,112	24,100	32,500	31,254
February	.....	5,407	46,540	26,800	21,107
March	.....	5,226	77,840	14,800	14,909
April	.....	5,242	64,210	34,500	5,465
May	.....	5,183	96,780	33,900	10,108
June	116,600	5,439	74,740	30,400	23,097
July	10,080	5,934	321,900	54,400	9,474
August	5,700	8,116	71,570	30,700	17,167
September	4,927	9,045	28,920	12,300	14,226
October	5,011	194,800	18,940	13,300	* 168,005
November	4,862	41,360	43,970	19,500	33,828
December	4,938	24,800	45,620	45,700	28,987
The year or period	152,100	316,700	915,100	349,000	278,527

* Approximated.

PECOS RIVER NEAR DAYTON, N. MEX.

This station was established March 24, 1905, about three miles east of Dayton, New Mexico, 100 feet below the mouth of Penasco river and about six miles above McMillan dam at Lakewood, New Mexico.

Estimated monthly discharge, in acre feet, of Pecos river near Dayton, New Mexico:

Month	1905	1906	1907
January	.....	27,000	28,000
February	.....	19,000	21,900
March	5,237	11,900	8,550
April	56,223	31,500	12,500
May	101,198	38,500	21,600
June	71,973	18,300	33,400
July	* 36,709	39,500	28,500
August	37,323	16,600	20,600
September	20,533	6,960	16,100
October	14,137	11,700	27,400
November	17,075	23,300	24,900
December	35,345	36,800	26,100
The year or period	395,753	281,000	270,350

* Flood July 23-26 not included in discharge for July.

PECOS RIVER NEAR FORT SUMNER, N. MEX.

This station was established June 12, 1904, by Earl Patterson. It is located about 12 miles northwest of Fort Sumner, New Mexico, near Sunnyside, and 45 miles south of Santa Rosa, New Mexico.

Estimated monthly discharge, in acre feet, of Pecos river near Fort Sumner, New Mexico:

Month	1904	1905	1906	1907*
January	.....	.....	33,700	7,440
February	.....	.....	7,780	4,490
March	.....	.....	6,100	10,500
April	.....	.....	21,200	18,400
May	.....	.....	35,500	36,300
June (12-30, 1904)	18,350	.....	23,400	33,400
July (5-31, 1905)	39,540	7,391	38,100	.....
August (1-11, 1904)	16,340	11,740	21,000	.....
September	.....	8,985	11,500	.....
October	.....	6,050	7,990	.....
November	.....	10,890	6,310	.....
December	.....	14,450	14,800	.....
The year or period	74,230	59,510	227,000	110,530

* Continued under Part II, page 29.

PECOS RIVER AT LAKEWOOD, N. MEX.

This station was established January 11, 1906, for the purpose of comparing the amount of water available at the McMillan reservoir with that below the Avalon dam. It shows the flow discharge from the gates of the dam, but does not include the discharge from the spillway nor any leakage from the reservoir. It is located three miles southwest of Lakewood and one-half mile below McMillan dam.

Estimated monthly discharge, in acre feet, of Pecos river at Lakewood, New Mexico:

Month	1906	1907
January		
February (8-28, 1906)	.....	22,400
March	20,800	9,390
April	3,870	3,500
May	20,900	1,440
June	22,800	10,300
July	12,900	24,800
August	34,400	13,000
September	19,300	16,500
October	1,190	9,100
November	1,230	21,800
December	9,100	25,600
The year or period	35,800	21,000
	182,000	178,830

PECOS RIVER NEAR ROSWELL, N. MEX.

This station was established April 24, 1903, and was discontinued June 30, 1906. It is located at the highway bridge eight miles southeast of Roswell, New Mexico, and about 200 feet below the mouth of Hondo river.

Estimated monthly discharge, in acre feet, of Pecos river near Roswell, New Mexico:

Month	1903	1904	1905	1906
January				
February	.....	17,295	5,455	21,100
March	.....	12,949	11,286	16,500
April	.....	7,098	22,146	7,560
May	.....	8,237	42,115	24,200
June	10,275	7,694	80,626	36,000
July	124,245	17,553	82,131	22,900
August	12,553	36,809	85,219	.....
September	17,446	37,214	29,385	.....
October	11,167	* 117,147	30,651	.....
November	12,355	244,332	11,622	.....
December	20,493	1,705	31,878	.....
	20,988	.....	20,533	.....
The year or period	229,622	508,033	452,847	128,000

* Floods during month.

PECOS RIVER AT SANTA ROSA, N. MEX.

This station was established May 5, 1903. It was originally located at the bridge of the Chicago, Rock Island and Pacific Railway, but was removed later in the year to a point 335 feet above the railway bridge.

Estimated monthly discharge, in acre feet, of Pecos river at Santa Rosa, New Mexico:

Month	1903*	1904	1905	1906
January	.....	4,277	681	861
February	.....	5,287	2,289	739
March	.....	5,227	6,534	928
April	.....	3,781	9,029	22,300
May	2,940	3,685	14,692	33,400
June	28,314	7,326	7,694	23,700
July	6,781	8,910	2,693	23,200
August	6,633	10,989	5,069	11,000
September	5,960 †	2,720	1,685	1,330
October	5,009	10,068	1,386	2,700
November	5,109	1,139	4,920	3,210
December	1,821	921	1,113	8,120
The year or period	62,567	64,330	57,795	131,000

* Approximate.
† Flood September 29 and 30; discharge not estimated; gage arose to 23 feet.

PENASCO RIVER NEAR DAYTON, N. MEX.

This station was established September 12, 1905, about two miles east and one mile north of Dayton and about one mile above the mouth of the river.

Estimated monthly discharge, in acre feet, of Penasco river near Dayton, New Mexico:

Month	1905	1906	1907
January (22-31, 1906)	.....	920	2,470
February	.....	2,950	1,480
March	.....	1,240	184
April	.....	1,680	16
May	.....	135	000
June	.....	000	131
July	.....	8	000
August	351	565	000
September (12-30, 1905)	418	1,085	000
October	1,684	62	953
November	4,630	1,160	149
December		1,920	184
The year or period	7,083	11,725	5,567

RIO GRANDE NEAR LOBATOS,* COLO.

This station was located on June 28, 1899, by A. L. Fellows. It is at the state bridge across the Rio Grande, at a point near the Colorado-New Mexico state line and about

10 miles east of Lobatos, Colorado. Drainage area 7,695 square miles.

Estimated monthly discharge, in acre feet, of Rio Grande near Lobatos, Colorado:

Month	1899	1900	1901	1902	1903
January	.....	39,229	36,524	32,035	1,537
February	.....	42,153	32,267	42,097	1,388
March	.....	35,847	22,443	33,757	2,091
April	.....	20,826	16,542	18,744	18,684
May	.....	87,927	103,299	30,129	123,713
June	.....	84,734	61,408	6,783	379,339
July	2,582	1,783	5,041	1,353	72,432
August	3,259	1,353	3,689	1,045	2,890
September	6,069	1,845	2,975	1,547	5,355
October	7,194	2,275	3,320	1,968	3,935
November	15,412	9,223	4,284	1,785	12,674
December	19,553	35,109	20,721	2,275	18,569
The year or period	54,069	362,304	312,513	173,518	642,607

Month	1904	1905	1906	1907
January	18,820	61,500	44,300	44,000
February	23,990	68,300	68,900	34,700
March	7,563	55,200	27,900	47,900
April	9,104	46,000	45,300	117,000
May	1,322	350,000	205,000	201,000
June	1,208	430,000	260,000	411,000
July	1,076	16,700	90,400	334,000
August	8,608	10,000	30,900	107,000
September	11,660	3,830	25,200	73,200
October	97,770	6,270	56,800	53,400
November (1-24, 1906)	24,750	13,600	45,400	27,900
December	53,310	33,600	.....	21,800
The year or period	259,200	1,100,000	900,000	1,450,000

* Formerly known as Cenicero.

RIO GRANDE AT EMBUDO, N. MEX.

This station was established in the spring of 1889, at the railroad station of Embudo, on the D. & R. G. in Rio Arriba County in the canyon above the Espanola Valley. Drainage area 10,090 square miles.

Estimated monthly discharge, in acre feet, of Rio Grande at Embudo, New Mexico:

Month.	1889	1890	1891	1892	1893	1894	1895	1896
Jan.	26,660	26,970	36,270	30,690	27,900	26,970	29,760	33,170
Feb.	26,660	31,080	34,440	34,510	29,960	25,200	27,440	31,610
Mch.	48,670	42,160	56,730	65,100	37,510	31,000	47,120	59,110
Apr.	135,600	124,800	142,200	178,800	83,200	.....	154,800	107,700
May	212,660	307,520	369,830	303,180	193,750	.....	163,370	99,200
June	175,200	246,300	302,400	188,700	152,400	.....	181,500	22,200
July	29,140	98,580	146,010	33,170	20,460	.....	82,770	18,600
Aug.	12,710	50,530	57,660	11,780	21,080	.....	66,340	13,640
Sept.	12,600	32,700	38,200	9,000	24,300	9,300	38,100	13,800
Oct.	17,360	34,720	104,160	12,400	30,070	23,560	30,690	.....
Nov.	21,900	36,900	46,500	18,900	27,900	34,000	36,600	.....
Dec.	33,480	39,990	34,100	20,150	27,590	26,660	32,240	.....
The year.	852,580	1,072,250	1,358,500	606,380	682,220	166,690	890,530	399,030

RIO GRANDE EMBUDO, N. M. (CONTINUED).

Month	1897	1898	1899	1900	1901	1902	1903
January	24,226	30,006	28,899	31,236	20,967	26,420	19,468
February	22,659	26,159	26,713	28,935	25,880	25,676	20,836
March	34,495	42,733	46,792	35,724	31,851	32,698	48,436
April	101,038	133,289	64,859	30,526	37,369	39,352	58,711
May	334,679	132,137	58,782	142,836	212,809	49,061	158,241
June	274,968	207,074	14,817	167,445	101,990	26,202	533,970
July	78,336	157,777	18,252	17,770	24,472	9,719	92,608
August	20,783	29,391	14,511	11,006	27,730	15,154	20,537
September	20,469	20,112	18,387	14,876	21,362	13,587	20,707
October	94,569	17,401	21,890	15,249	20,352	14,182	19,860
November	67,716	21,243	31,835	19,458	21,362	13,736	25,825
December	33,880	20,844	29,391	22,320	26,009	16,245	17,401
The year	1,107,818	838,166	375,138	537,381	572,153	280,032	1,036,600

RIO GRANDE AT BUCKMAN, N. MEX.

On Feb. 1, 1895, this station was established by A. P. Davis and P. E. Harroun. It was located below Espanola, one-fourth mile above the station of Water Tank on the D. & R. G. R. R. This station was discontinued in 1905. Drainage area 14,050 square miles.

Estimated monthly discharge, in acre feet, of Rio Grande at Buckman, New Mexico:

Month	1895	1896	1897	1898	1899	1900
January	.....	47,120	28,715	21,705	26,009	36,770
February	33,040	45,820	30,101	24,936	35,599	32,322
March	84,940	84,940	60,750	33,449	81,164	52,818
April	304,200	208,800	302,113	265,864	176,430	51,531
May	286,130	168,020	702,254	200,328	117,687	211,517
June	277,800	34,800	366,128	223,973	23,742	173,395
July	109,740	27,280	97,274	161,590	36,647	18,262
August	91,760	12,090	27,423	39,168	22,197	10,145
September	43,200	36,580	40,463	19,279	53,137	42,605
October	43,710	.....	136,196	21,890	26,563	23,796
November	50,100	.....	71,881	35,583	44,985	25,289
December	44,020	.....	32,220	39,168	38,184	29,022
The year	1,368,640	645,450	1,896,518	1,086,933	682,344	707,472

Month	1901	1902	1903	1904	1905
January	24,410	29,643	23,127	20,910	43,470
February	36,543	27,183	24,724	24,220	51,590
March	45,624	33,709	75,193	21,340	158,100
April	83,425	97,577	172,324	27,310	218,900
May	319,367	73,567	406,612	24,160	785,200
June	130,850	28,215	709,468	17,020	572,700
July	44,824	16,730	136,780	15,130	53,740
August	50,850	34,165	26,563	91,990	36,680
September	34,512	28,790	22,314	148,300	23,150
October	30,190	17,157	21,828	252,800	25,950
November	27,491	18,386	25,170	49,450	37,960
December	28,468	19,220	23,611	35,420	37,940
The year	856,554	424,342	1,667,714	729,650	2,047,000

* Rio Grande or San Ildefonso.

RIO GRANDE AT SAN MARCIAL, N. MEX.

This station was established Jan. 29, 1895, at Railroad Bridge, one-half mile south of San Marcial. Drainage area 28,067 square miles.

Estimated monthly discharge, in acre feet, of Rio Grande at San Marcial, New Mexico:

	1895	1896	1897	1898	1899	1900
January	.....	.....	19,553	57,675	27,854	40,582
February	53,760	39,114	24,325	59,425	24,603	35,099
March	128,879	41,750	40,767	62,164	27,546	33,203
April	279,014	186,962	212,548	271,458	54,089	6,248
May	222,892	124,143	755,196	165,832	35,048	123,590
June	233,375	9,759	366,426	126,268	952	159,888
July	140,476	28,653	65,977	167,062	28,407	000
August	179,113	7,255	6,149	13,835	6,395	000
September	.....	7,735	114,188	4,641	2,916	73,190
October	.....	45,624	281,677	* 1,230	676	000
November	.....	12,444	175,715	11,722	9,551	2,440
December	.....	38,060	152,736	23,365	21,828	10,084
The year or period	1,246,509	541,499	2,215,257	964,677	239,835	484,324

	1901	1902	1903	1904	1905	1906
January	31,720	22,731	17,197	16,840	39,114	36,496
February	43,166	17,435	21,927	18,902	63,868	39,689
March	36,333	7,954	46,790	6,060	217,904	56,866
April	34,967	40,106	100,007	†	279,392	163,140
May	263,121	26,787	318,367	†	962,221	500,707
June	110,661	6,407	660,476	†	714,268	345,064
July	41,354	*	77,841	10,532	35,782	118,314
August	46,015	49,210	3,064	55,974	20,093	43,210
September	37,056	13,349	1,438	44,727	5,276	25,527
October	14,771	823	545	463,240	7,349	70,830
November	35,342	4,641	5,534	51,769	42,397	77,752
December	30,888	11,286	18,883	41,752	34,344	86,142
The year	725,394	200,729	1,272,069	709,796	2,422,008	1,563,737

* River dry June 14 to August 11, inclusive. † Dry.

SAN FRANCISCO RIVER AT ALMA, N. MEX.

This station was established October 18, 1904, by W. A. Farish. It is located about one-half mile south of Alma, New Mexico, and 85 miles northwest of Silver City.

Estimated monthly discharge, in acre feet, of San Francisco river at Alma, New Mexico:

Month.	1904	1905	1906	1907
January	.....	17,340	2,930	36,327
February	.....	43,870	12,300	31,571
March	.....	79,260	32,000	19,109
April	.....	72,830	13,900	10,054
May	.....	16,540	2,610	4,880
June	.....	1,297	226	2,011
July	.....	1,463	1,870	4,975
August (18-31, 1904)	4,470	3,480	3,770	16,649
September	2,571	10,520	3,220	7,436
October	8,485	2,804	726	5,649
November (1-19, 1904) (1-26, 1905)	1,709	10,520	1,360	4,859
December (3-31, 1905)	.....	3,779	36,900	4,219
The year or period	17,235	263,703	112,000	147,919

SAN JUAN RIVER NEAR FARMINGTON, N. MEX.

This station was established June 18, 1904, and discontinued September 22, 1906. It was first located near the Methodist Indian school about three miles south of Farimngton, New Mexico, and about two miles below the mouth of Animas river. On May 11, 1906, it was removed to the new suspension bridge, which replaces the old one, about one and one-half miles above the original location.

Estimated monthly discharge, in acre feet, of San Juan river near Farmington, New Mexico:

Month	1904	1905	1906
January	.....	14,880	56,499
February	.....	37,880	80,071
March	.....	99,920	119,196
April	.....	255,300	512,533
May	24,520	621,600	620,532
June (19-30, 1904)	23,060	1,087,000	764,997
July	161,500	221,600	68,271
August	81,820	107,400	30,314
September (1-22, 1906)	364,900	99,550	24,176
October	64,680	103,900	.....
November	21,400	77,710	.....
December		66,650	.....
The year or period	741,900	2,793,000	*2,276,589

* Approximate.

SAPELLO RIVER AT LOS ALAMOS, N. MEX.

This station was established August 22, 1903, for the purpose of determining the amount of water available for diversion into the San Guijuela reservoir for the Las Vegas project. It is located at a ford crossing Sapello river at a point about one-fourth mile due north from Los Alamos, New Mexico, which is about 13 miles north of Las Vegas.

Estimated monthly discharge, in acre feet, of Sapello river at Los Alamos, New Mexico:

Month	1903	1904	1905	1906	1907
January	.....	.....	* 2,413	2,689	1,640
February	.....	.....	5,761	1,850	1,760
March	.....	.....	15,596	2,149	1,210
April	.....	2,059	8,465	3,257	881
May	.....	2,376	2,055	2,723	3,950
June	.....	5,217	563	1,362	2,900
July	911	6,801	1,010	972	‡.....
August	2,376	3,692	472	644	.....
September	2,455	7,425	368	713	.....
October	1,376	2,139	933	723	.....
November	**	†	.....	1,109	.....
December		.....	1,053	3,334	.....
The year or period	8,118	29,709	38,689	21,525	12,341

* Frozen measurement in January.
** Frozen over.
† Gage destroyed by flood.
‡ Continued in Part II, page 34.

Water Supply

PART II.

In this section full and complete records as far as have been obtained are given. In future work of this kind, when many other important and necessary stations can be established the same method of exactness and accuracy will be carried out so that such records as are secured will be of value in basing the possibilities of projects for irrigation and power.

As the New Mexico work has been under the supervision of the Territorial Engineer and owing to the inability of the engineer to devote much of his time to the work and the lack of funds for such work, the U. S. Geological Survey has kindly furnished a hydrographer to the Department who has made the rounds of the stations taking measurements of stream discharge. In one or two instances as the Cameron and Stephens creeks at Fort Bayard measurements have not yet been secured sufficient to calculate the daily discharge of these streams, however, the daily gage heights have been given in order that some idea may be derived as to their flow.

LAS ANIMAS RIVER AT AZTEC, N. MEX.

The Las Animas gaging station is located one-half mile west of the town of Aztec and was originally established on June 8, 1907, by V. L. Sullivan. It is placed at the wagon bridge across the river. Later, on September 9, 1908, the gage was moved up the river about one-half mile to the location of a new suspension bridge. Measurements are now taken from this bridge and daily readings are recorded by H. S. Wattles. Gage consists of an inclined staff, graduated vertically in feet and tenths. River bottom rocky and permanent.

Discharge measurements of Animas River at regular station near Aztec.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
June 8, 1907	8.5	3658.00	V. L. Sullivan
Sept. 9, 1907	6.9	825.50	do
Dec. 15, 1907	6.0	269.00	do
Apr. 13, 1908	7.3	1141.00	do
*Sept. 12, 1908	3.6	357.70	do

* New Gage.

Daily gage height, in feet, of the Animas River at Aztec.

Day	1907 Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep
1	....	9.00	7.60	7.80	6.50	6.30	6.00	6.00	6.00	6.20	6.30	7.20	7.10	8.00	8.50	7.30	6.30
2	....	9.00	7.70	7.50	6.50	6.30	6.00	6.00	6.00	6.20	6.30	7.20	7.50	8.10	8.20	6.80	6.20
3	....	8.90	8.10	7.30	6.40	6.20	6.00	6.00	6.00	6.30	6.30	7.10	7.60	8.00	7.90	6.70	6.10
4	....	8.80	7.80	7.10	6.40	6.30	6.00	6.00	6.00	6.30	6.30	7.10	7.60	7.90	7.60	6.90	6.00
5	....	8.80	7.80	7.10	6.40	6.30	6.00	6.00	6.00	6.40	6.50	7.20	7.70	8.10	7.40	7.00	6.00
6	....	9.00	7.80	7.10	6.40	6.30	6.00	6.00	6.00	6.40	6.50	7.20	7.70	8.10	7.40	6.80	5.90
7	....	8.95	7.50	7.10	6.50	6.20	6.00	6.00	6.00	6.40	6.50	7.20	7.60	8.20	7.40	7.00	5.90
8	....	8.90	7.40	7.00	6.50	6.20	6.00	6.00	6.00	6.20	6.50	7.20	7.60	8.40	7.30	6.90	5.80
9	....	8.70	7.30	6.90	6.50	6.20	6.00	6.00	6.00	6.20	6.50	7.30	7.60	8.40	7.20	6.90*	3.70
10	....	8.60	7.20	6.90	6.50	6.20	6.00	6.00	6.00	6.20	6.50	7.30	7.60	8.50	7.30	6.70	3.60
11	....	8.50	7.20	6.80	6.50	6.20	6.00	6.00	6.00	6.20	6.30	7.20	7.50	8.30	7.30	6.60	3.60
12	....	8.50	7.10	6.80	6.50	6.20	6.00	6.00	6.00	6.20	6.40	7.20	7.60	8.60	7.30	6.60	3.60
13	....	8.45	7.20	6.70	6.50	6.20	6.00	6.00	6.00	6.20	6.40	7.20	7.60	8.40	7.20	6.70	3.60
14	8.70	8.60	7.20	6.70	6.50	6.20	6.00	6.00	6.00	6.00	6.70	7.30	7.60	8.40	7.20	6.70	3.60
15	8.65	8.90	7.20	6.80	6.50	6.20	6.00	6.00	6.00	6.00	7.00	7.30	7.70	8.60	7.20	6.90	3.60
16	8.65	8.60	7.10	7.10	6.40	6.10	6.00	6.00	6.00	6.00	7.00	7.30	7.80	8.50	7.20	7.00	3.50
17	8.70	8.40	7.00	7.00	6.40	6.10	6.00	6.00	6.00	6.00	7.20	7.40	7.70	8.60	7.10	7.10	3.50
18	8.90	8.20	7.00	7.10	6.40	6.10	6.00	6.00	6.00	6.00	7.50	7.50	7.80	8.70	7.30	7.30	3.50
19	9.00	8.15	6.95	7.20	6.40	6.10	6.00	6.30	6.00	6.00	7.20	7.50	8.00	8.50	7.20	7.40	3.50
20	8.80	8.10	6.90	7.30	6.40	6.10	6.00	6.50	6.00	6.00	7.60	7.50	8.10	8.40	7.30	7.40	3.50
21	8.50	8.15	7.80	7.40	6.40	6.10	6.00	6.40	6.00	6.00	7.80	7.60	8.30	8.20	6.80	7.50	3.50
22	8.50	8.10	7.30	7.30	6.40	6.10	6.00	6.30	6.00	6.00	7.70	7.80	8.50	8.30	6.90	7.40	3.50
23	8.30	8.10	7.20	6.90	6.40	6.10	6.00	6.30	6.00	6.00	7.70	7.70	8.30	8.40	6.70	7.30	3.50
24	8.40	8.00	7.00	6.80	6.40	6.10	6.00	6.30	6.00	6.00	7.80	7.60	8.00	8.40	6.60	7.20	3.50
25	8.65	8.00	....	6.80	6.40	6.10	6.00	6.30	6.00	6.10	7.80	7.60	8.00	8.40	6.60	7.10	3.50
26	8.75	8.00	....	6.70	6.40	6.10	6.00	6.30	6.00	6.30	7.50	7.50	7.90	8.50	6.50	7.10	3.50
27	8.75	8.00	....	6.70	6.40	6.10	6.00	6.30	6.00	6.30	7.60	7.50	7.90	8.40	6.40	6.90	3.50
28	8.80	7.90	....	6.60	6.40	6.10	6.00	6.30	6.00	6.30	7.60	7.50	7.90	8.40	6.40	6.80	3.50
29	8.80	7.90	....	6.60	6.40	6.10	6.00	6.30	6.00	6.30	7.70	7.50	7.80	8.40	6.40	6.80	3.50
30	9.00	7.80	....	6.60	6.40	6.00	6.00	6.30	6.00	6.30	7.70	7.50	7.80	8.40	6.40	6.80	3.50
31	....	7.70	....	....	6.30	....	6.00	6.20	6.00	6.20	7.60	7.40	7.70	8.50	6.50	6.70	3.70
											7.50	7.30	7.60	8.40	6.70	6.70	3.70
											7.40	7.20	7.50	8.40	6.60	6.60	3.70
											7.30	7.20	7.70	8.50	6.80	6.50	3.60
											7.30	....	8.00	....	6.60	6.40	....

* New gage.

Computed monthly discharge of Las Animas River at Aztec.

Year	Month	Second Feet	Acre Feet
1907	June	72,120.00	142,798.00
	July	105,630.	209,488.
	August	38,835.	77,044.
	September	26,690.	52,959.
	October	15,170.	30,067.
	November	10,550.	20,945.
	December	8,370.	16,602.
1908	January	10,470.	20,783.
	February	10,080.	20,017.
	March	30,565.	60,627.
	April	36,405.	72,238.
	May	55,410.	109,712.
	June	94,620.	187,348.
	July	33,745.	66,898.
	August	25,610.	50,789.
	September	9,957.	19,755.
	The period	584,227.	1,158,070.

CAMERON CREEK AT FORT BAYARD, N. MEX.

Gage located at Fort Bayard. Daily readings made and recorded by Serg. T. J. McBurney.

Discharge measurements of Cameron Creek at regular station at Fort Bayard.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Jan. 19, 1907	2.02	14	Wm. A. Lamb
May 14, 1907	1.75	1.0	do

Daily gage height, in feet, of the Cameron Creek at Fort Bayard.

Day	1908 Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
1	1.50	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.48
2	1.50	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.45
3	1.50	1.50	1.50	1.45	1.45	1.45	1.45	1.45	1.70*
4	1.50	1.80	1.50	1.45	1.45	1.45	1.45	1.45	1.45
5	1.50	1.68	1.50	1.45	1.45	1.45	1.45	1.45	1.45
6	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
7	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
8	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
9	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
10	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
11	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
12	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
13	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
14	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
15	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
16	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
17	1.50	1.58	1.50	1.45	1.45	1.45	1.55	1.45	1.45
18	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
19	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
20	1.50	1.58	1.50	1.45	1.45	1.45	1.45	1.45	1.45
21	1.50	1.58	1.50	1.45	1.45	1.45	1.45	2.63	1.45
22	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.50	1.45
23	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
24	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
25	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
26	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
27	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
28	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.45	1.45
29	1.50	1.58	1.45	1.45	1.45	1.45	2.10	1.45	1.45
30	1.50	1.58	1.45	1.45	1.45	1.45	1.50	1.45	1.45
31	1.50	1.58	1.45	1.45	1.45	1.45	1.45	1.60	....

* Gage reached 7.00 about 1:00 a. m., Sept. 3.

Note:—Discharge measurements on Cameron Creek at Fort Bayard not sufficient to compute discharge curve.

CIMARRON RIVER AT SPRINGER, N. MEX.

The Cimarron gaging station No. 1 is located one-fourth mile north of the town of Springer at the wagon bridge. The gage consists of a vertical staff, graduated into feet and tenths and measurements are taken from bridge. The bed of the river is permanent excepting occasional deposits of sand occur. This gage was established by V. L. Sullivan, July 13, 1907, and W. L. Sever is the observer.

Discharge measurements of Cimarron River at regular station near Springer.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
July 13, 1907	....	27.49	V. L. Sullivan
Oct. 13, 1907	.10	3.31	do
Mar. 28, 1908	.60	18.90	do
Apr. 27, 1908	1.10	203.00	R. L. Cooper
July 12, 1908	.00	1.70	do
Aug. 12, 1908	.05	2.00	do

Daily gage height, in feet, of Cimarron River at Springer.

Day	1907 Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sep.
1	.0	.0	.0	.6	.7	.6	.6	1.0	.5	.0	.6	.0
2	.0	.0	.0	.4	.4	.6	.5	1.0	.5	.0	.0	.0
3	.0	.0	.0	.3	.7	.6	.4	1.1	.3	.0	.0	.1
4	.0	.0	.0	.2	.6	.6	.4	1.1	.2	.0	.0	.0
5	.0	.0	.0	.2	.6	.6	.3	1.1	.2	—.1	.0	.0
6	.0	.0	.0	.5	.4	.7	.3	1.1	.2	—.1	.0	.0
7	.0	.0	.0	.6	.5	.7	.3	1.0	.0	—.1	.1	.0
8	.0	.0	.0	.5	.6	.7	.3	1.0	.0	.0	.1	.0
9	.0	.0	.0	.4	.5	.8	.3	.9	.0	.0	.0	—.1
10	.0	.0	.0	.5	.4	.6	.3	.9	.0	.0	.1	—.1
11	.0	.0	.0	.5	.5	.6	.3	.9	.0	.0	.1	—.1
12	.0	.1	.0	.5	.5	.6	.4	.9	.1	.0	.0	—.1
13	.0	.1	.0	.5	.5	.6	.6	.9	.1	.0	1.15	—.1
14	.0	.1	.0	.6	.7	.6	.8	.9	.1	.25	.5	—.1
15	.0	.1	.0	.7	.7	.6	1.0	.9	.1	.1	.3	1.1
16	.0	.1	.0	.6	.8	.6	1.0	.9	.1	.0	.0	—.1
17	.0	.0	.1	.8	.9	.6	1.2	.9	.1	.0	.0	—.1
18	.0	.0	.1	.8	.9	.7	1.2	.9	.1	.0	.0	—.1
19	.0	.0	.1	.7	.7	.7	1.1	.8	.0	.0	.3	—.1
20	.0	.2	.3	.7	.7	.7	1.1	.7	.0	.0	.5	—.1
21	.0	.1	.3	.7	.8	.8	1.2	.7	.0	.0	.4	—.2
22	.0	.0	.3	.8	.7	.7	1.1	.7	.0	.0	.4	—.2
23	.0	.0	.3	.6	.6	.8	1.2	1.0	.0	.0	.4	—.2
24	.0	.0	.3	.6	.6	.6	1.2	1.0	.0	.2	.3	—.2
25	.0	.0	.3	.5	.6	.6	1.2	.9	.2	.0	.3	—.2
26	.1	.0	.4	.5	.6	.6	1.1	.9	.2	.0	.2	—.2
27	.0	.0	.3	.5	.5	.6	1.1	.9	.1	.0	.1	—.2
28	.0	.0	.3	.5	.5	.6	1.0	.9	.1	.0	.1	—.2
29	.0	.0	.2	.5	...	.6	1.0	.7	.0	.65	.1	—.2
30	.0	.0	.1	.5	...	.7	1.0	.6	...	.3	.0	...
31	.0	.0	.5	.5	...	.6	...	.6	...	...	...	...

Computed discharge of Cimarron River at Springer.

Year	Month	Second Feet	Acre Feet
1907	October	102.40	202.9
	November	99.70	198.0
	December	144.70	287.1
1908	January	593.0	1,174.
	February	766.2	1,518.
	March	809.0	1,605.
	April	3,790.2	7,515.
	May	2,841.0	5,625.
	June	130.0	257.
	July	129.9	257.2
	August	1,067.8	2,054.2
	September	59.9	118.6
	The period	10,533.80	20,812.00

CIMARRON RIVER AT UTE PARK, N. MEX.

This second station is located about three hundred feet north of the Ute Park station. It is graduated in feet and tenths. Measurements are taken from bridge. Bed of river rocky and permanent. On July 14, 1907, this station was established by V. L. Sullivan. Observer, Mrs. W. P. Woodard.

Discharge measurements of Cimarron River at regular station near Ute Park.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Oct. 12, 1907	.38	13.34	V. L. Sullivan
Mar. 28, 1908	.50	21.60	do
Apr. 26, 1908	1.10	112.00	R. L. Cooper
June 27, 1908	.40	17.00	do
Aug. 11, 1908	.45	18.2	do

Daily gage height, in feet, of the Cimarron River at Ute Park.

Day	1907 Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar	Apr.	May	Jun.	July	Aug	Sep.
1	.4	.4	.4	.4	.5	.4	.5	1.0	.9	.4	.5	.3
2	.4	.4	.4	.4	.5	.4	.5	1.0	.7	.4	.5	.3
3	.4	.4	.3	.4	.5	.4	.5	1.1	.7	.4	.5	.3
4	.4	.4	.3	.5	.5	.4	.5	1.1	.7	.4	.4	.4
5	.4	.4	.3	.4	.5	.4	.5	1.1	.7	.4	.4	.4
6	.5	.4	.4	.4	.5	.4	.5	1.1	.7	.4	.4	.3
7	.6	.4	.4	.4	.4	.4	.5	1.0	.7	.4	.5	.3
8	.6	.4	.4	.4	.4	.4	.5	.9	.7	.5	.5	.3
9	.5	.4	.4	.4	.4	.4	.5	.9	.7	.5	.5	.3
10	.5	.4	.4	.4	.4	.4	.6	.9	.7	.4	.5	.3
11	.4	.4	.4	.4	.4	.4	.4	1.0	.7	.4	.4	.2
12	.4	.4	.4	.4	.4	.4	.8	1.0	.7	.4	.4	.2
13	.4	.6	.4	.4	.4	.4	.95	1.0	.7	.4	.4	.2
14	.4	.6	.3	.4	.4	.4	1.0	1.0	.6	.4	.5	.2
15	.4	.5	.3	.4	.4	.6	1.4	.9	.6	.4	.5	.3
16	.4	.5	.3	.4	.5	.6	1.45	.9	.6	.5	.4	.3
17	.4	.4	.3	.4	.5	.6	1.4	1.0	.5	.5	.4	.3
18	.4	.4	.3	.4	.4	.6	1.4	1.0	.5	.5	.4	.3
19	.4	.4	.3	.4	.4	.6	1.3	1.0	.5	.5	.4	.3
20	.4	.5	.3	.4	.4	.6	1.3	1.0	.4	.5	.5	.3
21	.4	.4	.3	.4	.4	.6	1.3	1.0	.4	.5	.5	.3
22	.4	.4	.4	.4	.4	.6	1.2	.9	.3	.4	.5	.2
23	.4	.4	.4	.4	.4	.6	1.3	.9	.3	.4	.4	.2
24	.4	.4	.4	.4	.3	.6	1.3	.9	.3	.4	.4	.3
25	.4	.3	.4	.4	.3	.6	1.3	1.0	.3	.3	.5	.3
26	.4	.5	.4	.4	.3	.6	1.1	.9	.4	.4	.5	.3
27	.4	.4	.4	.4	.3	.6	1.1	.9	.4	.4	.5	.3
28	.4	.4	.4	.4	.3	.5	1.0	1.0	.4	.4	.5	.3
29	.4	.4	.4	.4	.3	.6	1.0	1.0	.4	.4	.5	.3
30	.4	.3	.4	.5	...	.6	1.0	1.0	.4	.5	.4	.3
31	.4	...	.4	.5	...	.5	...	.9	...	.5	.4	...

Computed monthly discharge of Cimarron River at Ute Park.

Year	Month	Second Feet	Acre Feet
1907	October	557.00	1,102.90
	November	606.50	1,200.90
	December	350.00	693.00
1908	January	546.50	1,082.00
	February	529.00	1,047.40
	March	452.00	895.00
	April	515.50	1,020.70
	May	483.50	957.30
	June	741.50	1,468.10
	July	2,599.00	5,146.00
	August	2,648.00	5,243.00
	September	903.00	1,787.90
	The period	10,931.50	21,644.20

GALLINAS RIVER AT HOT SPRINGS, N. MEX.

This station is located at Hot Springs and consists of a vertical staff attached to a pier on the south side of the river near the springs. This station was established by the Gov-

ernment several years ago. Bed of river permanent. Observer Wm. Prager.

Discharge measurements of Gallinas River at regular station near Hot Springs station.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Aug. 27, 1907	2.00	12.69	V. L. Sullivan
Oct. 7, 1907	1.70	1.34	do
Mar. 24, 1908	1.85	5.95	do
Apr. 30, 1908	2.20	41.00	R. L. Cooper
July 15, 1908	1.85	11.7	do
Aug. 13, 1908	2.10	29.3	do

Daily gage height, in feet, of Gallinas River at Hot Springs.

Day	1907 Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1908 Jan	Feb.	Mar	Apr.	May	Jun.	Jul.	Aug.	Sep
1	2.0	2.3	2.3	1.9	1.7	1.8	1.8	1.7	2.0	1.9	2.2	2.0	1.75	2.45	2.10
2	2.	2.5	2.4	1.8	1.7	1.8	1.8	1.7	1.8	1.9	2.2	2.0	1.7	2.75	2.10
3	2.	2.4	2.35	1.8	1.7	1.8	1.8	1.7	1.8	1.8	2.2	2.0	1.70	2.8	2.10
4	2.	2.3	2.3	1.8	1.7	1.8	1.8	1.7	1.8	1.8	2.2	1.95	1.80	2.65	2.05
5	2.	2.2	2.2	1.8	1.7	1.8	1.8	1.8	1.8	1.8	2.15	1.9	1.85	2.5	2.
6	2.	2.2	2.2	1.7	1.7	1.8	1.8	1.8	2.0	1.8	2.1	1.9	1.75	2.35	2.
7	2.	2.15	2.2	1.7	1.7	1.8	1.8	1.8	1.9	1.8	2.1	1.9	1.7	2.3	2.
8	2.	2.15	2.15	1.7	1.8	1.8	1.8	1.8	2.1	1.8	2.1	1.9	1.7	2.55	1.95
9	2.	2.15	2.1	1.7	1.8	1.8	1.8	1.8	1.9	1.9	2.1	1.8	1.7	2.35	1.9
10	2.	2.05	2.1	1.7	1.8	1.8	1.8	1.8	1.9	1.95	2.1	1.8	1.7	2.2	1.9
11	2.	2.	2.1	1.7	1.8	1.8	1.8	1.8	2.	2.	2.05	1.8	1.7	2.20	1.9
12	2.	2.	2.	1.7	1.8	1.8	1.8	1.8	2.	2.	2.	1.8	1.7	2.15	1.9
13	2.	2.	2.	1.7	1.8	1.8	1.8	1.8	1.9	2.	2.	1.8	1.75	2.25	1.9
14	2.	2.	2.	1.7	1.8	1.8	1.8	1.8	1.8	2.1	2.05	1.8	1.9	2.4	1.9
15	1.1	2.	2.	1.7	1.8	1.8	1.8	1.8	1.8	2.1	2.1	1.8	1.9	2.3	1.9
16	1.1	2.	2.	1.7	1.8	1.8	1.8	1.8	1.8	2.1	2.1	1.8	1.9	2.2	1.9
17	2.2	1.9	2.	1.7	1.8	1.8	1.8	1.8	1.8	2.1	2.1	1.8	2.20	2.1	1.9
18	2.	1.3	2.	1.7	1.8	1.8	1.8	1.8	1.9	2.15	2.05	1.8	2.05	2.2	1.9
19	2.	1.3	2.	1.7	1.8	1.8	1.8	1.8	1.9	2.3	2.	1.8	2.1	2.4	1.9
20	2.5	2.15	2.	1.7	1.8	1.8	1.8	1.8	1.9	2.35	2.	1.75	2.	2.2	1.9
21	2.	2.15	1.9	1.7	1.8	1.8	1.8	1.8	1.9	2.5	2.	1.7	1.95	2.6	1.8
22	2.	2.1	1.9	1.6	1.8	1.8	1.8	1.8	1.9	2.5	2.1	1.7	1.9	2.35	1.8
23	2.1	2.	1.9	1.6	1.8	1.8	1.8	1.8	1.9	2.45	2.1	1.7	1.9	2.25	1.8
24	2.05	2.	1.9	1.7	1.8	1.8	1.8	2.	1.9	2.35	2.1	1.7	1.9	2.2	1.8
25	2.1	2.	1.9	1.7	1.8	1.8	1.7	1.8	1.9	2.3	2.1	2.05	1.9	2.15	1.8
26	2.05	2.	1.9	1.7	1.8	1.8	1.7	1.8	1.9	2.25	2.05	1.85	2.	2.1	1.8
27	2.3	2.	1.9	1.7	1.8	1.8	1.7	2.	1.9	2.2	2.	1.8	1.9	2.4	1.8
28	2.2	2.	1.9	1.7	1.8	1.8	1.7	2.1	1.9	2.2	2.	1.8	1.9	2.35	1.8
29	2.3	2.	1.9	1.7	1.8	1.8	1.7	....	1.9	2.2	2.	1.8	2.05	2.3	1.8
30	2.3	2.15	1.9	1.7	....	1.8	1.7	....	1.9	....	2.	....	2.65	2.2	....
31	2.3	2.2	....	1.7	....	1.8	1.7	....	1.9	....	2.	....	2.65	2.2	....

Computed monthly discharge of Gallinas at Hot Springs.

Year	Month	Second Feet	Acre Feet
1907	July	766.00	1,520.00
	August	847.	1,680.
	September	684.	1,370.
	October	52.	104.
	November	91.	179.
	December	108.	215.
1908	January	79.1	156.
	February	133.4	264.
	March	231.5	458.
	April	904.5	1,788.
	May	865.	1,713.
	June	342.5	676.
	July	520.5	1,031.
	August	2,002.	3,964.
	September	469.	929.
	The period	8,095.50	16,047.00

LA PLATA RIVER AT LA PLATA, N. MEX.

The La Plata gaging station is located at the wagon bridge one mile south of La Plata postoffice and was established May 25, 1905, by the Government. Gage consists of a vertical staff, graduated in feet and tenths and measurements taken from bridge. John Smith is the observer at this place.

Discharge measurements of La Plata River at regular station near La Plata.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
June 8, 1907	3.55	202.9	V. L. Sullivan
Sept. 8, 1907	2.00	26.92	do
Dec. 14, 1907	.60	.73	do
Apr. 11, 1908	2.33	73.00	do

Daily gage height, in feet, of the La Plata River at La Plata.

Day	1907 Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep
1	....	3.00	1.00	2.60	1.00	0.70	0.60	0.50	0.70	1.30	1.80	1.50	1.40	0.70	6.60	0.50
2	....	3.00	2.00	2.40	.80	.70	.70	.50	.70	1.40	1.60	1.60	1.20	.60	.70	.50
3	....	3.00	3.00	2.20	.80	.70	.70	.50	1.00	1.20	1.50	1.60	1.00	.60	.60	.50
4	....	2.80	1.00	2.20	.80	.70	.70	.50	3.50	1.20	1.60	1.60	1.00	.60	.60	.40
5	....	2.80	1.00	2.20	.70	.70	.70	.50	1.54	1.20	1.80	1.50	1.00	.60	.60	.40
6	....	2.60	1.00	2.20	.70	.70	.70	.60	1.06	1.40	2.00	1.50	1.00	.60	3.20	.40
7	3.50	2.40	1.00	2.20	.70	.60	.70	.60	1.04	1.40	1.90	1.50	1.00	.60	.60	.40
8	3.50	2.40	1.00	2.20	.70	.60	.70	.50	1.04	1.20	2.00	1.50	1.00	.60	.60	.40
9	3.40	2.20	1.00	2.20	.70	.60	.70	.50	1.04	1.20	1.90	1.60	1.00	.60	.50	.40
10	3.40	2.00	1.00	2.00	.70	.60	.60	.50	1.06	1.00	1.90	1.60	1.20	.60	.50	.40
11	3.40	2.00	1.00	2.00	.70	.60	.60	.50	1.06	1.00	1.80	1.50	1.40	.60	.60	.40
12	3.30	1.60	1.00	2.00	.70	.60	.60	.50	1.04	1.80	1.90	1.40	1.20	.60	.60	.40
13	3.20	1.60	1.00	2.00	.70	.60	.60	.60	1.02	1.30	1.80	1.40	1.20	.50	.60	.40
14	3.20	1.50	1.00	2.00	.70	.60	.60	.60	1.02	1.40	1.90	1.30	1.20	.60	.60	.40
15	3.10	1.50	1.00	2.00	.70	.60	.50	.60	1.00	1.60	2.00	1.20	1.20	.60	.50	.40
16	3.10	1.30	1.00	2.00	.60	.60	.60	.60	1.02	1.80	2.20	1.20	1.00	.70	3.20	.40
17	3.10	1.30	1.00	1.80	.60	.70	.50	.60	1.02	1.80	2.40	1.20	1.00	.70	.80	.40
18	2.80	1.30	1.20	1.80	.60	.70	.50	.60	1.02	2.00	2.20	1.40	.80	.70	2.20	.40
19	3.40	1.20	1.20	2.40	.60	.70	.50	.60	1.02	2.00	2.20	1.60	.70	.60	2.00	.40
20	3.60	1.20	1.20	2.20	.60	.60	.50	.60	1.04	2.20	2.40	1.80	.70	.60	5.60	.40
21	3.20	1.20	7.00	2.00	.60	.60	.50	.60	1.04	2.40	2.00	1.60	.70	.60	2.40	.40
22	3.20	1.00	4.00	1.80	.70	.60	.40	.70	2.00	2.40	1.80	1.60	.70	2.60	1.80	.40
23	3.10	1.00	2.60	1.80	.70	.60	.40	.70	2.00	2.40	1.90	1.80	.70	.60	2.00	.40
24	3.10	1.00	2.20	1.60	.70	.60	.40	.70	2.00	2.20	1.60	1.50	.70	.60	2.00	.40
25	3.20	1.00	....	1.60	.70	.60	.40	.70	1.05	2.00	1.60	1.20	.70	.60	1.80	.40
26	3.20	4.50	....	1.60	.70	.60	.40	.70	1.08	1.80	1.50	1.20	.70	.60	1.60	.40
27	3.30	3.00	....	1.40	.70	.60	.50	.70	1.08	1.80	1.50	1.20	.70	.50	1.40	.40
28	3.20	2.40	....	1.20	.70	.60	.50	.70	1.04	2.00	1.40	1.20	.70	.50	1.00	.30
29	3.10	1.00	....	1.00	.70	.60	.50	.70	1.04	1.80	1.40	1.00	.70	3.00	.60	.30
30	3.10	1.00	....	1.00	.70	.60	.40	.70	....	1.90	1.30	.90	.70	.50	.50	.30
31	....	1.00	....	....	.70	....	.50	.70	....	2.00	....	1.20	....	2.00	.50	....

Computed monthly discharge of La Plata River at La Plata.

Year	Month	Second Feet	Acre Feet
1907	June	3,460.00	6,854.00
	July	1,475.	2,951.
	August	2,307.	4,550.
	September	856.	1,666.
	October	34.	67.
	November	20.	42.
	December	12.	24.
1908	January	31.	61.
	February	718.	1,422.
	March	738.	1,460.
	April	801.	1,586.
	May	445.	881.
	June	164.5	326.
	July	244.	483.
	August	3,144.5	6,226.
	September	.....	.....
	The period	14,450.	28,773.

MIMBRES RIVER AT FAYWOOD, N. MEX.

This station was established on the Mimbres river about six miles southeast of Faywood Hot Springs on April 23, 1908, by V. L. Sullivan. It is a chain gage, low water measurements being taken by wading and high water measurements from a car on cable. The river bed is sandy and liable to shift. Daily gage readings are taken by Ralph C. Trujillo.

Discharge measurements of Mimbres River at regular station near Faywood.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
May 12, 1908	.00	6.3	R. L. Cooper
July 31, 1908	.20	38.00	do

Daily gage height, in feet, of Mimbres River at Faywood.

Day	May	June	1908 July	Aug.	Sep.
1	.1	.1	.0	.2	.2
2	.1	.1	.0	.6	.2
3	.2	.1	.0	.5	1.5
4	.2	.1	.0	.2	.5
5	.1	.0	.0	.2	.2
6	.1	.0	.0	.1	.2
7	.1	.0	.0	.2	.2
8	.1	.0	.0	.2	.2
9	.1	.0	.1	.2	.2
10	.1	.0	.2	.2	.2
11	.0	.0	.1	.1	.2
12	.0	.0	.0	.1	.2
13	.0	.0	1.1	.1	.2
14	.0	.0	.2	.8	.2
15	.0	.0	.4	.5	.2
16	.0	.0	1.3	.3	.3
17	.0	.0	.2	.2	.2
18	.0	.0	.3	.2	.2
19	.1	.0	.3	1.1	.2
20	.1	.0	.2	.4	.3
21	.1	.0	.1	.2	.2
22	.1	.0	.0	.2	.2
23	.1	.0	.0	.2	.2
24	.1	.0	1.5	.2	.2
25	.0	.0	1.7	2.3	.3
26	.0	.0	.1	.3	.3
27	.0	.0	1.5	.3	.2
28	.0	.0	1.3	.2	.2
29	.0	.0	.5	2.5	.2
30	.0	....	.2	.3	....
31	....	....	....	....	....

Note:—Discharge measurements on the Mimbres River since its establishment May 1st, 1908, are not sufficient to form a discharge curve for the calculation of monthly discharges.

MORA RIVER AT LA CUEVA, N. MEX.

The location of this station is about five hundred feet south of La Cueva at the highway bridge and was established on April 29, 1905, by the Government. Gage is made up of a vertical staff, graduated in feet and tenths. Measurements taken from bridge. Observer, Hugh Loudon. Bed permanent.

Discharge measurements of Mora River at regular station near La Cueva.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Aug. 28, 1907	1.20	52.82	V. L. Sullivan
Oct. 10, 1907	.80	16.27	do
Mar. 26, 1908	.35	.93	do
Apr. 14, 1908	.80	18.00	R. L. Cooper
July 13, 1908	.50	1.87	do
Aug. 14, 1908	1.10	52.00	do

Daily gage height, in feet, of Mora River near La Cueva.

Day	1907 Jul.	Aug.	Sep.	Oct.	Nov.	Dec	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep
1	1.0	1.0	1.7	0.6	0.8	0.7	*	*	0.6	0.3	0.8	1.0	0.4	0.9	0.7
2	.9	1.1	1.5	.6	.8	.7	....	....	.6	.3	.75	1.1	.4	1.5	.7
3	.9	1.4	1.4	.65	.8	.55	....	....	.6	.3	.75	.95	.5	1.3	.8
4	1.1	1.25	1.35	.6	.75	.6	....	....	.5	.3	.7	.9	.4	1.2	.7
5	1.0	1.1	1.3	.6	.75	.6	....	....	.5	.3	.8	.9	.5	1.1	.7
6	.9	1.0	1.2	.8	.8	....	....	....	.6	.35	.75	.9	.4	1.0	.6
7	.9	.9	1.2	.5	.75	.7	....	....	.5	.35	.65	1.2	.45	.95	.4
8	.85	.85	1.15	.65	.8	.65	....	....	.5	.35	.55	.8	.45	1.1	.6
9	.75	.8	1.1	.8	.8	.7	....	....	.5	.4	.5	.8	.4	1.05	.6
10	.7	.7	1.0	.8	.8	.7	....	....	.6	.5	.5	.9	.4	.95	.5
11	.7	.7	1.0	.8	.8	.65	....	....	.6	.4	.6	1.15	.35	.9	.45
12	1.1	.9	.95	.8	.8	.6	....	.8	.4	.5	.4	.95	.35	.8	.45
13	.85	.8	.9	.8	.55	.6	....	.7	.45	.45	.45	1.0	.35	.8	.4
14	.0	.8	.9	.7	.65	.75	....	.7	.5	.5	.5	1.15	.35	1.1	.55
15	.7	.7	.9	.7	.75	1.0	....	.7	.45	.4	.45	1.0	.45	1.2	.4
16	.65	.7	.9	.8	.8	.8	....	.7	.5	.4	.4	.9	.5	1.1	.6
17	.65	.7	.9	.8	.7	.8	....	.55	.4	.45	.8	.8	.7	1.1	.65
18	.7	2.2	.9	.8	.75	.8	....	.6	.5	.65	.55	.7	.6	.95	.65
19	.6	1.0	.8	.7	.75	.8	....	.75	.6	.8	.7	.55	.65	1.1	.6
20	.65	1.4	.9	.8	.7	.8	....	.7	.5	.8	.7	.5	.5	1.1	.6
21	.65	1.4	.8	.8	.75	.8	....	.6	.5	.8	.7	.6	.5	1.15	.5
22	.75	1.25	.8	.8	.8	*	....	.6	.5	.8	.9	.5	.45	1.15	.45
23	.7	1.15	.75	.8	.8	....	....	.7	.5	.9	.9	.2	.45	1.15	.45
24	1.0	1.15	.7	.85	.65	....	....	.7	.45	.9	1.3	.4	.4	1.1	.3
25	.85	1.5	.7	.8	.55	....	....	.6	.5	.85	1.1	.5	.9	1.0	.5
26	.8	1.25	.6	.8	.75	....	....	.5	.4	.85	1.05	.7	.9	1.1	.45
27	1.0	1.1	.6	.8	.7	....	....	.6	.35	.8	1.1	.6	.85	1.0	.55
28	1.05	1.2	.65	.8	....	....	....	.6	.3	.75	1.05	.4	.8	1.0	.4
29	1.1	1.25	.55	.8	.4	....	....	.6	.35	.8	.9	.45	.7	.95	.55
30	1.0	2.2	....	.8	....	....	....	....	.35	.75	.95	.45	.8	.9	.4
31	1.0	1.8	....	.8	....	....	....	....	.3	....	1.1	....	.9	.8	....

* River frozen over.

Computed monthly discharge of Mora River near La Cueva.

Year	Month	Second Feet	Acre Feet
1907	July	666.00	1,320.00
	August	1,071.	3,380.
	September	981.	1,950.
	October	436.	867.
	November	401.	797.
	December	255.	504.
1908	January†	400.	800.
	February†	250.	496.
	March	77.	153.
	April	240.	477.
	May	523.	1,040.
	June	552.	1,090.
	July	230.	455.
	August	1,455.	2,890.
	September	266.	526.
	The period	8,433.	16,745.

† Estimated.

PECOS RIVER AT SUNNYSIDE, N. MEX.

This station was established a number of years ago by the United States Government and is located on the Pecos river about four miles above the town of Sunnyside. The station consists of a sloping gage, graduated in feet and tenths and is attached to the sandstone bluff on the south side of the river. The river bottom is sandy and shifts around varying with the height of the water, thus necessitating numerous discharge measurements. High water measurements at this station are made from a car on a cable. J. C. Pacheco is the gage reader for this station.

Discharge measurements of Pecos River at regular station near Sunnyside.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Sept. 27, 1907	2.20	117.36	V. L. Sullivan
Dec. 23, 1907	2.20	132.00	do
Apr. 10, 1908	2.30	287.00	R. L. Cooper
Aug. 8, 1908	2.70	630.00	do

Daily gage height, in feet, of Pecos River near Sunnyside, New Mexico.

Day	1907 Jul.	Aug.	Sep.	Oct.	Nov	Dec.	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep
1	2.17	2.42	2.37	2.00	2.05	2.20	2.35	1.90	2.05	2.13	2.33	2.15	2.28	2.48	2.33
2	2.12	2.10	2.35	2.00	2.02	2.20	2.33	1.95	2.03	2.08	2.28	2.23	2.23	2.85	2.23
3	2.10	2.52	2.40	2.02	2.12	2.20	2.30	2.35	2.10	2.15	2.23	2.25	2.55	2.93	2.33
4	2.10	2.47	2.30	2.05	2.02	2.22	2.30	2.12	2.10	2.13	2.23	2.23	2.20	2.80	2.55
5	2.10	2.22	2.42	2.05	2.07	2.25	2.35	2.05	2.10	2.10	2.20	2.15	2.10	2.75	2.33
6	2.05	2.12	2.30	2.30	2.10	2.22	2.30	2.05	2.10	2.10	2.30	2.15	2.05	2.70	2.33
7	2.10	2.02	2.32	2.27	2.10	2.25	2.30	2.03	2.15	2.10	2.28	2.10	2.03	2.73	2.15
8	2.05	2.12	2.42	2.22	2.12	2.25	2.25	2.00	2.15	2.13	2.20	2.15	2.05	3.08	2.19
9	2.07	2.02	2.42	2.22	2.10	2.25	2.20	2.00	2.10	2.15	2.20	2.20	2.05	3.00	2.03
10	2.10	2.02	2.42	2.22	2.15	2.22	2.20	2.00	2.15	2.15	2.20	2.13	2.05	2.55	2.05
11	2.10	2.00	2.40	2.25	2.10	2.20	2.20	2.03	2.13	2.10	2.15	2.10	2.13	2.43	2.03
12	2.10	2.00	2.40	2.22	2.15	2.20	2.20	2.05	2.13	2.10	2.15	2.15	2.13	2.40	2.00
13	2.25	2.02	2.30	2.22	2.15	2.20	2.20	2.05	2.10	2.08	2.18	2.05	2.10	2.53	2.00
14	2.05	1.92	2.30	2.00	2.12	2.22	2.20	2.05	2.15	2.05	2.28	2.05	2.13	3.03	2.03
15	2.02	1.90	2.10	2.05	2.07	2.25	2.13	2.05	2.15	2.05	2.28	2.05	2.20	3.10	2.00
16	2.10	1.90	2.12	2.25	2.22	2.22	2.05	2.03	2.15	2.05	2.28	2.05	2.30	2.35	2.13
17	2.10	1.92	2.07	2.25	2.25	2.25	2.05	2.00	2.05	2.08	2.25	2.05	2.15	2.53	2.05
18	1.90	1.92	2.42	2.25	2.20	2.25	1.95	1.95	2.03	2.13	2.25	2.13	2.28	2.50	2.10
19	2.42	1.92	2.42	2.25	2.20	2.25	1.93	1.95	2.15	2.13	2.25	2.10	2.85	2.53	2.03
20	2.60	1.92	2.22	2.22	2.35	2.25	1.90	2.05	2.05	2.30	2.25	2.05	2.33	2.63	2.15
21	2.57	1.92	2.12	2.25	2.32	2.25	1.90	2.05	2.00	2.30	2.20	2.03	2.33	2.10	2.10
22	2.40	2.25	2.12	3.50	4.30	2.35	1.93	2.03	2.05	2.30	2.25	2.00	2.63	2.10	2.03
23	2.75	2.80	2.07	2.32	2.22	2.23	1.90	2.13	2.05	2.28	2.20	2.00	2.50	3.23	2.03
24	2.30	2.27	2.01	2.12	2.22	2.25	1.90	2.15	2.15	2.25	2.23	1.95	2.32	3.25	2.03
25	2.20	2.17	2.01	2.62	2.22	2.20	1.90	2.15	2.15	2.20	2.25	1.95	2.40	2.63	2.10
26	2.22	2.17	2.00	2.52	2.20	2.32	1.95	2.15	2.15	2.25	2.23	2.03	2.40	2.00	2.15
27	2.52	2.17	2.00	2.07	2.22	2.25	1.90	2.13	2.03	2.33	2.23	2.03	2.40	2.05	2.13
28	2.10	2.45	2.12	2.02	2.25	2.20	1.90	2.08	2.00	2.45	2.23	2.00	2.53	2.05	2.23
29	2.17	2.45	2.22	2.10	2.25	2.25	1.90	2.03	2.05	2.30	2.33	2.33	2.33	2.48	2.13	2.23
30	3.92	2.45	2.22	2.12	2.22	2.25	1.90	2.05	2.05	2.33	2.25	2.30	2.40	2.38	2.20
31	2.40	2.45	2.10	2.05	2.22	2.25	1.93	....	2.05	2.30	2.20	2.33	2.75	2.53	2.15
	1.90	2.35	....	2.03	....	2.22	1.93	....	2.13	....	2.23	....	2.60	2.00	....

Computed monthly discharge of Pecos River at Sunnyside.

Year	Month	Second Feet	Acre Feet
1907	July	12,470.00	24,700.00
	August	6,230.	12,400.
	September	4,740.	9,400.
	October	5,070.	10,000.
	November	3,470.	6,900.
	December	4,350.	8,610.
1908	January	3,970.	7,860.
	February	4,465.	8,841.
	March	6,045.	11,969.
	April	7,535.	14,919.
	May	9,990.	19,780.
	June	9,460.	18,731.
	July	12,755.	25,255.
	August	17,905.	35,452.
	September	8,760.	16,345.
	The period	117,215.	231,162.

RAYADO RIVER AT MIAMI, N. MEX.

This station was established July 9, 1907, by V. L. Sullivan and is located about 12 miles west of Springer and at the location of the Farmer's Development Company's proposed storage dam across the river. The gage consists of a vertical staff and measurements are taken by wading. Observer J. W. Ausherman.

Discharge measurements of Rayado River at regular station near Miami Station.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
July 9, 1907	.10	.36	V. L. Sullivan
Oct. 11, 1907	.20	1.79	do
Mar. 27, 1908	.10	.37	do
Apr. 24, 1908	.55	20.8	R. L. Cooper
June 19, 1908	.10	.84	do

Daily gage height, in feet, of Rayado River near Miami.

Day	1907 Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar.	Apr.	May	Jun	Jul.	Aug.	Sep
1	....	.20	.35	.15	.10	.10	.10	.10	.10	.20	.30	.30	.10	.10	.00
2	....	.25	.50	.15	.10	.10	.10	.10	.10	.18	.30	.30	.10	.20	.00
3	....	.30	.45	.15	.10	.10	.10	.10	.10	.18	.30	.20	.10	.10	.00
4	....	.45	.35	.15	.10	.10	.10	.10	.10	.18	.30	.25	.10	.10	.00
5	....	.35	.30	.15	.10	.10	.10	.10	.10	.18	.30	.20	.10	.10	.00
6	....	.30	.30	.15	.10	.10	.10	.10	.10	.15	.30	.20	.10	.10	.00
7	....	.30	.30	.15	.10	.10	.10	.10	.10	.20	.40	.30	.10	.10	.00
8	....	.20	.30	.15	.10	.10	.10	.10	.10	.30	.40	.30	.10	.10	.00
9	....	.20	.30	.15	.10	.10	.10	.10	.10	.30	.40	.20	.10	.00	.00
10	....	.20	.25	.15	.10	.10	.10	.10	.10	.25	.30	.20	.10	.00	.00
11	....	.10	.20	.15	.10	.10	.10	.10	.10	.25	.30	.20	.10	.00	.00
12	.10	.10	.20	.15	.10	.10	.10	.10	.10	.40	.30	.20	.10	.00	.00
13	.10	.10	.20	.20	.10	.10	.10	.10	.10	.45	.40	.20	.10	.00	.00
14	.10	.10	.20	.20	.10	.10	.10	.10	.10	.60	.25	.20	.10	.10	.00
15	.10	.10	.20	.20	.10	.10	.10	.15	.10	.40	.30	.20	.10	.10	.00
16	.00	.10	.20	.20	.10	*	.10	.10	.10	.40	.30	.20	.10	.00	.10
17	.10	.10	.20	.20	.10	....	.10	.10	.10	.40	.30	.18	.10	.00	.10
18	.00	.10	.20	.20	.10	....	.10	.15	.10	.45	.25	.18	.10	.00	.10
19	.00	.10	.20	.20	.10	....	.10	.15	.10	.45	.20	.18	.10	.00	.10
20	.00	.15	.20	.20	.10	....	.10	.20	.10	.45	.20	.13	.10	.00	.00
21	.00	.15	.20	.20	.10	....	.10	.10	.10	.48	.20	.15	.10	.00	.00
22	.00	.15	.20	.10	.10	.10	.10	.10	.10	.45	.35	.18	.10	.00	.00
23	.00	.15	.20	.10	.10	.10	.10	.10	.25	.53	.43	.18	.10	.10	.00
24	.00	.15	.15	.10	.10	.10	.10	.10	.20	.53	.15	.18	.10	.10	.00
25	.10	.15	.15	.10	.10	.10	.10	.10	.10	.58	.35	.18	.10	.00	.00
26	.10	.15	.15	.10	.10	.10	.10	.10	.10	.40	.30	.30	.10	.00	.00
27	.10	.15	.15	.10	.10	.10	.10	.10	.10	.40	.30	.10	.10	.10	.00
28	.10	.20	.15	.10	.10	.10	.10	.10	.10	.30	.30	.10	.10	.10	.00
29	.10	.20	.15	.10	.10	.10	.10	.10	.30	.30	.30	.50	.10	.10	.00
30	.10	.50	.15	.10	.10	.10	.10	....	.20	.30	.25	.10	.10	.00	.00
31	.10	.35	....	.10	....	.10	.10	....	.25	....	.20	....	.20	.00	....

* River frozen.

Computed monthly discharge of Rayado River near Miami.

Year	Month	Second Feet	Acre Feet
1907	July	4.32	8.60
	August	75.39	149.40
	September	94.30	186.80
	October	30.60	60.90
	November	10.80	21.40
	December	11.16	22.10
1908	January	11.16	22.10
	February	13.50	26.70
	March	22.76	45.10
	April	242.60	480.30
	May	138.50	274.20
	June	139.28	275.80
	July	12.60	24.90
	August	6.84	13.50
	September	1.44	2.90
	The period	815.25	1,614.70

SAN JUAN RIVER AT TURLEY, N. MEX.

This station was established on June 26, by V. L. Sullivan be ing located one-half mile north of Turley postoffice. Measurements were taken by cable and boat and readings were recorded by Mr. Jay Turley, C. E. Later, on November 2, 1908, this station was moved down the river about three and one-half miles and was established at the new suspension bridge one-half mile southeast of Blanco, New Mexico. The new

gage is a chain gage reading to feet and tenths and measurements are taken from the bridge. The bed of the river is rocky and fairly permanent. Readings are made at the new gage by F. T. Amiot.

Discharge measurements of San Juan at regular station near Turley.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
June 6, 1907	7.60	7751.60	V. L. Sullivan
Sept. 7, 1907	4.55	1961.10	do
Dec. 13, 1907	2.60	314.40	do
Apr. 12, 1908	5.40	3085.40	do

Daily gage height, in feet, of San Juan River at Turley.

Day	1907 Jun.	Jul.	Aug.	Sep	Oct.	Nov.	Dec.	1908 Jan.	Feb.	Mar.	Apr	May	Jun.	Jul.	Aug.	Sep
1	....	8.65	5.00	....	3.30	3.25	2.55	2.70	2.65	3.80	4.40	5.80	5.55	5.45	4.80	3.60
2	....	8.60	5.20	5.00	3.40	3.20	2.60	2.85	2.75	3.30	4.45	6.00	6.00	5.20	8.80	3.70
3	....	8.30	5.50	4.80	3.30	3.15	2.55	2.60	3.85	3.30	4.70	5.90	5.85	5.10	5.60	3.50
4	....	8.20	5.30	4.60	3.30	3.05	2.55	2.65	5.10	3.30	4.80	5.65	6.10	5.00	5.20	3.60
5	....	8.15	5.10	4.50	3.35	3.05	2.60	2.80	4.05	4.30	5.20	5.35	6.20	4.90	5.00	3.50
6	7.57	8.05	4.80	4.65	3.30	3.00	2.65	2.70	3.25	4.60	5.25	5.10	6.20	5.00	4.80	3.40
7	7.65	7.90	4.72	4.55	3.25	3.00	2.75	2.70	2.70	4.00	5.20	5.00	5.80	4.80	5.00	3.30
8	7.70	7.60	4.58	4.45	3.70	3.00	2.80	2.80	2.65	3.70	5.30	5.00	5.70	4.90	4.80	3.10
9	7.50	7.50	4.45	4.35	3.50	3.00	2.75	2.65	2.60	4.20	5.20	5.30	5.80	4.90	4.30	3.00
10	7.20	7.20	4.33	4.30	3.40	2.95	2.70	2.75	2.70	3.50	5.35	5.30	6.40	4.80	4.20	3.00
11	7.05	7.05	4.24	4.20	3.30	2.95	2.75	2.85	2.60	3.65	5.40	5.10	6.60	4.50	4.00	2.90
12	7.35	6.90	4.10	3.90	3.25	2.90	2.70	2.90	2.55	3.95	5.40	5.00	5.80	4.60	4.40	2.90
13	7.85	7.00	5.25	3.80	3.20	2.90	2.65	2.80	2.50	4.30	5.20	5.00	6.70	4.50	4.80	2.90
14	7.90	7.30	5.00	3.75	3.15	2.90	2.55	2.70	2.45	4.50	5.40	4.90	6.60	4.50	5.00	2.90
15	8.00	7.20	4.72	3.70	3.10	2.85	2.60	2.60	2.75	4.85	5.60	4.70	6.40	4.55	4.80	2.90
16	7.90	6.90	4.35	3.65	3.15	2.80	2.65	2.65	2.95	4.95	6.20	4.70	6.80	4.70	4.80	2.80
17	7.85	6.45	4.20	3.60	3.10	2.90	2.65	2.65	3.85	5.25	6.10	5.30	6.00	4.60	4.20	2.95
18	8.00	6.30	4.08	3.90	3.03	2.95	2.70	2.80	3.20	5.75	5.80	5.20	5.40	4.50	5.40	2.90
19	7.85	6.20	4.30	4.25	3.05	2.90	2.75	2.95	3.15	5.60	5.65	6.15	5.30	4.40	5.60	3.00
20	7.65	6.20	4.41	4.20	3.05	2.85	2.50	2.70	3.05	5.20	5.80	6.10	5.20	4.30	5.50	3.10
21	7.40	6.15	4.60	4.10	3.00	2.80	2.55	2.75	2.80	5.00	5.90	5.90	5.60	4.50	5.00	3.05
22	7.40	6.00	4.60	4.00	3.00	2.75	2.75	2.75	2.95	5.00	5.45	5.70	5.40	4.35	4.90	3.05
23	7.20	5.93	4.32	3.85	3.00	2.65	2.85	2.70	3.80	4.70	5.55	5.55	5.70	4.20	4.80	3.00
24	7.50	5.75	4.65	3.75	3.20	2.55	2.60	2.65	3.60	4.70	5.55	5.40	5.60	4.15	4.75	3.00
25	7.70	6.80	4.45	3.70	3.30	2.70	2.70	2.75	3.50	4.80	5.30	5.25	5.40	4.30	4.60	2.95
26	7.95	5.92	4.50	3.60	3.30	2.65	3.00	2.80	3.80	4.95	5.15	5.00	6.30	4.25	4.50	2.95
27	8.05	5.78	4.44	3.55	3.20	2.70	2.90	2.70	3.85	5.05	5.00	5.00	6.60	4.25	4.40	3.00
28	8.25	5.55	4.70	3.45	3.10	2.75	2.75	2.70	3.80	4.85	4.85	4.90	6.50	4.15	4.20	3.00
29	8.40	5.40	....	3.40	3.10	2.85	2.60	2.75	3.80	4.65	4.80	4.80	5.70	4.15	4.00	3.00
30	8.55	5.28	....	3.55	3.45	2.75	2.50	2.60	....	4.50	4.75	4.75	5.50	4.40	4.00	3.05
31	....	5.10	....	3.40	3.35	....	2.60	2.60	....	4.30	....	4.85	....	4.60	3.95	....

Computed monthly discharge of San Juan River at Turley.

Year	Month	Second Feet	Acre Feet
1907	June	215,620.00	426,927.00
	July	190,130.	377,103.
	August	63,440.	125,803.
	September	39,560.	81,102.
	October	20,370.	40,397.
	November	14,300.	29,320.
	December	11,940.	23,796.
1908	January	12,530.	24,841.
	February	21,050.	41,760.
	March	58,230.	115,474.
	April	89,010.	176,430.
	May	91,440.	181,388.
	June	130,440.	258,724.
	July	60,930.	120,823.
	August	77,060.	152,858.
	September	17,580.	36,032.
	The period	1,113,630.00	2,212,778.00

SANTA FE RIVER AT SANTA FE, N. MEX.

This gage was established on May 31, by V. L. Sullivan and is located at Don Gasper bridge in the City of Santa Fe. Gage consists of a vertical staff, graduated in feet and tenths. Low water measurements taken by wading and high water measurements taken from bridge. The river bed is gravelly and liable to shift. Observer, C. D. Miller.

Discharge measurements of Santa Fe River at regular station at Santa Fe.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Jan. 25, 1907.....	.17	2.69	V. L. Sullivan
May 23, 1908.....	.48	11.8	C. D. Miller
July 18, 1908.....	.55	34.6	R. L. Cooper
July 18, 1908.....	.50	24.5	do

Daily gage height, in feet, of Santa Fe River at Santa Fe.

	1907							1908								
Dy	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mch	Apr	May	Jun	Jul	Aug	Sep
1	.48	.00	.00	.60	.00	.05	.20	.30	.10	.10	.00	.05	.40	.00	.40	—.20
2	.50	.00	.00	.50	.00	.05	.30	.35	.10	.20	.00	.00	.60	.00	.65	—.30
3	.50	.00	.00	.55	.00	.05	.10	.30	.15	.15	.00	.10	.30	.00	.50	—.40
4	.50	.00	.10	.50	.00	.05	.08	.25	.10	.15	.00	.25	.20	.00	.50	—.40
5	.50	.00	.20	.40	.00	.05	.10	.30	.10	.20	.00	.00	.25	.00	.30	—.40
6	.50	.00	.00	.50	.00	.08	.15	.30	.30	.30	.00	.00	.20	.00	.20	—.40
7	.52	.00	.00	.40	.00	.08	.20	.30	.30	.20	.00	.20	.15	.00	.30	—.40
8	.52	.00	.00	.45	.00	.08	.20	.30	.25	.05	.00	.00	.15	.00	.40	—.50
9	.50	.05	.00	.40	.00	.08	.20	.30	.20	.25	.00	.00	.15	.00	.20	—.50
10	.50	.00	.00	.40	.00	.06	.25	.25	.20	.05	.00	.00	.00	.00	.20	—.50
11	.48	.05	.00	.30	.00	.06	.20	.25	.20	.25	.00	.00	.40	.00	.25	—.50
12	.48	.00	.00	.10	.00	.05	.20	.25	.20	.10	.00	.10	.30	.00	.25	—.50
13	.45	.00	.00	.00	.00	.05	.30	.20	.20	.20	.00	.20	.25	.00	1.46*	—.50
14	.45	.00	.00	.00	.00	.05	.30	.25	.20	.15	.00	.15	.00	.00	2.00	—.50
15	.40	.00	.00	.00	.00	.08	.35	.25	.25	.00	.00	.00	.00	1.40	1.00	—.50
16	.40	.00	.00	.10	.00	.05	.30	.20	.25	.05	.00	.00	.30	.30	1.00	—.50
17	.48	.00	.00	.00	.00	.05	.30	.20	.10	.10	.00	.15	.25	.30	.50	—.50
18	.40	.00	.00	.05	.00	.05	.30	.25	.20	.05	.00	.15	.00	.20	.20	—.50
19	.45	.00	.00	.00	.00	.06	.35	.25	.20	.00	.00	.10	.00	.30	—.10	—.50
20	.55	.00	.00	.05	.00	.06	.35	.20	.15	.00	.00	.00	.00	.30	.00*	—.50
21	.40	.00	.00	.02	.05	.05	.30	.20	.20	.00	.00	.00	.00	.40	.30*	—.50
22	.40	.00	.00	.02	.00	.05	.25	.20	.25	†	.05	.35	.00	.20	.30	—.50
23	.35	.00	.00	.00	.00	.10	.30	.20	.20	....	.05	.55	.00	.30	.38	—.50
24	.35	.00	.00	.00	.00	.15	.25	.20	....	....	.05	.40	.00	.25	.38	—.50
25	.35	.00	.00	.00	.00	.15	.25	.20	.25	....	.05	.30	.00	.30	.30	—.50
26	.20	.00	.00	.00	.00	.15	.25	.10	.20	....	.10	.15	.00	.20	.10	—.50
27	.15	.00	.00	.00	.00	.17	.20	.10	.30	....	.15	.10	.10	.18	.00	—.50
28	.15	.05	.00	.00	.00	.17	.20	.20	.20	....	.20	.15	.10	.20	.00	—.50
29	.10	.05	.00	.00	.02	.20	.25	.20	.25	....	.00	.15	.00	.10	—.20	—.50
30	.05	.00	.00	.00	.02	.20	.20	.20	....	....	.00	.00	.00	.20	—.10	—.50
31	....	.00	.00	....	.02	....	.25	.20	....	....	....	.00	....	.35	—.10	.....

* New gages. † Water all taken out by ditch.

Computed monthly discharge of Santa Fe River at Santa Fe.

Year	Month	Second Feet	Acre Feet
1907	June	449.80	890.60
	July	4.70	9.30
	August	3.10	6.10
	September	230.77	456.90
	October	3.82	7.60
	November	33.63	66.60
	December	157.31	311.50
1908	January	147.10	291.30
	February	107.10	212.10
	March	43.65	86.40
	April	11.25	22.30
	May	94.15	186.40
	June	131.75	260.90
	July	641.95	1,273.00
	August 1-12‡	166.20	329.00
	The period	2,226.28	4.410.00

‡ On August 13th the bottom of the creek bed was washed out, thereby causing the necessity of a new rating. Sufficient measurements have not been made upon which to compute a new curve for the discharges in August and September.

SAPELLO AT LOS ALAMOS, N. MEX.

This station is located on the Sapello river one-fourth of a mile east of Los Alamos and consists of a chain gage reading to feet and tenths. Low water measurements are made by wading, high water measurements being made by car on cable. This station was established by the United States Government many years ago. Name of observer is Wm. N. Frank, Jr.

Discharge measurements of Sapello River at regular station near Los Alamos Station.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Aug. 28, 1907	.05	3.89	V. L. Sullivan
Oct. 10, 1907	—.10	1.50	do
Mar. 26, 1908	—.10	.82	do
Apr. 28, 1908	.20	11.2	R. L. Cooper
July 14, 1908	—.25	.55	do
Aug. 14, 1908	.65	50.00	do

Daily gage height, in feet, of Sapello River at Los Alamos.

Day	1907 Jul.	Aug.	Sep.	Oct.	Nov.	Dec	1908 Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug	Sep.
1	.10	.85	.80	—.10	—.10	.10	—.10	—.10	.05	—.10	.10	—.05	—.25	.00	.45
2	.15	.75	.40	—.10	—.10	.10	.10	—.10	.05	—.10	.10	—.05	—.25	.00	.40
3	.17	.85	.20	—.10	—.10	.10	—.10	—.10	.05	—.10	—.10	—.05	—.25	.00	.30
4	.10	.70	.35	—.10	—.07	.10	—.10	—.10	.05	—.10	—.10	—.05	—.25	.00	.10
5	.10	.50	.25	—.10	—.10	.10	—.10	—.05	.00	—.10	—.10	—.05	—.25	.00	—.10
6	.10	.40	.20	—.10	—.12	.10	—.10	.00	.00	—.10	—.10	—.05	—.25	.00	—.20
7	.10	.35	.15	—.10	—.10	.10	—.10	.00	.00	—.10	—.10	—.05	—.20	.50	—.20
8	.24	.35	.12	—.10	—.10	.10	—.10	—.05	.00	—.10	—.10	—.05	—.20	.10	—.20
9	.10	.35	.10	—.10	—.10	.10	—.10	—.10	—.10	—.10	—.10	—.05	—.20	.10	—.20
10	.00	.30	.10	—.10	—.07	.10	—.10	—.10	—.10	—.10	—.10	—.05	—.20	.20	—.20
11	.00	.40	.10	—.10	—.07	.10	—.10	—.10	—.10	—.10	—.10	—.05	—.20	.20	—.20
12	—.02	.60	.10	—.10	—.10	.10	—.10	—.10	—.10	.10	—.10	—.10	—.20	.20	—.20
13	—.02	.20	—.10	—.10	—.10	.10	—.10	—.10	—.10	.18	—.10	—.10	—.20	.40	—.20
14	.00	.00	—.10	—.10	—.10	.10	—.10	—.10	—.10	.20	—.10	—.10	—.20	.65	—.20
15	—.05	—.10	—.10	—.10	—.10	.10	—.10	—.10	.10	.18	—.10	—.10	—.20	.55	—.20
16	.00	—.10	—.10	—.10	—.10	.10	—.10	—.10	.10	.18	—.10	—.10	—.20	.50	—.20
17	1.22	—.10	—.10	—.10	—.10	.10	—.10	—.10	.07	.18	—.10	—.13	—.20	.40	—.20
18	1.12	—.10	—.15	—.10	—.10	.10	—.10	.00	.10	.20	—.10	—.10	—.20	.45	—.20
19	.55	—.10	—.20	—.10	—.10	.10	—.10	.00	.00	.45	—.10	—.10	—.20	.50	—.20
20	.55	.65	—.20	—.10	—.10	.10	—.10	—.05	—.10	.60	—.10	—.10	—.20	.65	—.20
21	.00	.30	—.20	—.10	—.10	.10	—.10	.00	—.10	.55	—.10	—.10	—.20	.70	—.20
22	.05	.12	—.20	—.10	—.10	.10	—.10	.03	—.10	.60	—.10	—.10	—.20	.90	—.20
23	.05	.10	—.10	—.10	—.10	.10	—.10	.05	—.08	.55	.00	—.10	—.20	.80	—.20
24	.10	.10	—.10	—.10	—.10	.10	—.10	.03	—.10	.60	.00	—.10	—.20	.60	—.20
25	.10	—.10	—.10	—.10	—.12	.10	—.10	.00	—.08	.55	.00	—.10	—.20	.50	—.20
26	.15	—.10	—.10	—.10	—.12	.10	—.10	.05	—.13	.60	.00	—.10	—.30	.50	—.20
27	.15	—.07	—.10	—.05	—.10	.10	—.10	.05	—.10	.50	.00	—.10	—.30	.60	—.20
28	.10	—.05	—.10	—.05	—.10	.00	—.10	.10	—.10	.20	.00	—.10	—.30	.60	—.20
29	.50	—.05	—.10	—.10	—.10	.10	—.10	.05	—.10	.20	.00	—.20	—.30	.50	—.20
30	.30	.20	—.10	—.10	—.10	.10	—.10	.....	—.10	.10	.00	—.25	—.30	.50	—.20
31	1.15	1.10	.....	—.10	.....	.10	—.10	.....	—.10	.....	—.03	.....	.00	.50	.....

Computed monthly discharge of Sapello River at Los Alamos.

Year	Month	Second Feet	Acre Feet
1907	July	468.6	928.00
	August	596.4	1,180.
	September	196.5	393.
	October	48.6	98.
	November	46.0	89.
	December	31.	61.
1908	January	31.	61.
	February	65.	129.
	March	66.	131.
	April	471.	933.
	May	58.	115.
	June	32.2	64.
	July	21.8	43.
	August	870.0	1,723.
	September	138.5	274.
	The period	3,140.60	6,222.

STEPHENS CREEK NEAR FORT BAYARD, N. MEX.

This gate is located at the Fort Bayard (Forest) Planting Station. The observations are taken by Amos Hedricks.

Discharge measurements of Stephens Creek at regular station at Fort Bayard.

Date	Gage Height	Discharge in Sec.-Ft.	Hydrographer
Jan. 17, 1907	1.30	2.7	Wm. A. Lamb
May 14, 1907	1.14	0.1	do

Daily gage height, in feet, of the Stephens Creek at Fort Bayard.

Day	1908 Jan.	Feb.	Mch.	Apr.	May	June	July
1	1.17	1.17	1.16	1.15	1.15	1.13	0.0
2	1.17	1.17	1.16	1.14	1.15	1.13	0.0
3	1.19	1.17	1.16	1.17	1.17	1.13	0.0
4	1.18	1.18	1.17	1.16	1.16	1.13	0.0
5	1.18	1.18	1.16	1.15	1.16	1.13	0.0
6	1.18	1.17	1.17	1.14	1.16	1.13	0.0
7	1.18	1.17	1.17	1.15	1.17	1.13	0.0
8	1.18	1.18	1.17	1.15	1.16	1.12	0.0
9	1.18	1.18	1.17	1.16	1.16	1.12	0.0
10	1.18	1.18	1.17	1.15	1.16	1.12	0.0
11	1.18	1.18	1.17	1.15	1.16	1.12	0.0
12	1.18	1.18	1.17	1.15	1.14	1.12	0.0
13	1.18	1.16	1.16	1.14	1.16	1.13	0.0
14	1.17	1.18	1.16	1.14	1.16	1.12	0.0
15	1.17	1.19	1.16	1.14	1.15	1.12	1.12
16	1.18	1.18	1.16	1.14	1.16	1.12	1.32
17	1.18	1.16	1.16	1.16	1.16	1.12	1.13
18	1.17	1.16	1.16	1.16	1.16	1.12	1.13
19	1.17	1.16	1.16	1.16	1.15	1.12	1.13
20	1.17	1.16	1.17	1.16	1.16	1.12	1.13
21	1.17	1.16	1.17	1.15	1.16	1.12	1.13
22	1.17	1.18	1.16	1.15	1.16	1.11	1.13
23	1.17	1.18	1.16	1.15	1.17	1.11	1.13
24	1.17	1.18	1.16	1.17	1.16	1.11	1.13
25	1.18	1.17	1.16	1.16	1.17	1.11	1.13
26	1.18	1.17	1.16	1.15	1.16	1.11	1.13
27	1.18	1.17	1.17	1.16	1.16	1.11	1.13
28	1.17	1.16	1.17	1.16	1.15	1.13	....
29	1.17	1.16	1.17	1.15	1.16	1.11	1.15
30	1.17	....	1.17	1.15	1.15	1.11	1.13
31	1.17	....	1.16	....	1.16	....	1.17

Note.—Discharge measurements on Stephens Creek at Fort Bayard not sufficient to compute discharge curve.

Miscellaneous discharge measurements.

Date.	Stream.	Location.	Discharge in Second Feet.	Hydrographer.
Oct. 24, 1907	Alamo ..	10 miles S. E. of Alamogordo at Wood's Ranch.	2.95	V. L. Sullivan
Oct. 25, 1907	Fresnal ..	At Highrolls below bridge across creek.....	10.34	do
Nov. 13, 1907	Mimbres .	Dam site of Rio Mimbres Irrigation Company.....	19.43	do
May 5, 1908	Lucero ..	In canon 10 miles above Taos	43.7	do
May 5, 1908	Lucero ..	Above ditch.....	33.2	do
May 5, 1908	Lucero ..	Above Pueblo pasture.....	7.1	do

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PART II.