

[orig. by McClure] csm

UNITED STATES DEPARTMENT OF AGRICULTURE

State of California

DEPARTMENT OF ENGINEERING

Sacramento, July 25th, 1918

Colonel Ed Fletcher,
920 Eighth Street,
San Diego, California.

Subject: Statement from Agricultural Department.

Dear Colonel:

Am disappointed that I have not had Mr. Tait's statement before this time. Several days ago I requested the Agricultural Department at Berkeley to secure for me a copy of the unpublished soil report information, as affecting Linda Vista Mesa Territory.

On Monday last, I learned that this had not yet been furnished Mr. Tait, and yesterday I called Berkeley on the telephone, and Doctor Fortier, head of the Department, stated said map would be sent immediately to Mr. Tait.

Trusting that you and yours are in your usual robust health and that business is moving smoothly and satisfactorily, I am

Yours very sincerely.

(Signed) W. F. McClure

STATE ENGINEER.

WFM:LKA

... 30,000 acres of which approximately ...
... Linda Vista Mesa, but the map shows this ...
... contain only about 30,000 acres, all of which is not ...
... Mr. Haggard, the engineer in Los Angeles, says ...
... they will deliver 30,000 acre feet from the proposed reservoir ...
... which could hardly supply as much land as Col. Fletcher ...
... in mind. Until these matters are recalled I thought ...
... best to avoid giving any exact figures on land areas. ...
... I do not know how this report is to be handled but ...

C o p y

UNITED STATES DEPARTMENT OF AGRICULTURE

Office of Public Roads and Rural
Engineering.

to Mr. McGuire that a copy be sent to him. If the report
is verified to great extent I would be pleased to have a

Los Angeles, Aug. 5, 1918

Dr. Samuel Fortier,
Berkeley, Calif.

Yours truly,

(Signed) C. M. Felt.

Dear Dr. Fortier:

I have mailed you a report on the benefits of
irrigation under the Volcan project at San Diego.

Perhaps you will find it too long and if so I
trust you will eliminate any unessential matters. I in-
tended to write more briefly giving exact figures on areas
of land but found confusing data, so wrote in more gener-
al terms and it was not easy to give what seemed to be
needed in less space. Rather than to hold it to be worked over
for a second writing I have sent it on.

For example, Col. Fletcher in San Diego, said they
would irrigate about 50,000 acres of which approximately
44,000 would be on Linda Vista Mesa, but the map shows this
mesa to contain only about 30,000 acres, all of which is not
irrigable and Mr. Hawgood, the engineer in Los Angeles, says
they will deliver 34,000 acre feet from the proposed reser-
voirs which could hardly supply as much land as Col. Fletcher
has in mind. Until these matters are reconciled I thought
best to avoid giving any exact figures on land areas.

I do not know how this report is to be handled but

REPORT ON THE BENEFITS TO BE DERIVED FROM THE USE OF WATER

-2-

ON LINDA VISTA MEESA AND OTHER LANDS NEAR SAN DIEGO
would suggest that if it does not in its regular course go
to Mr. McClure that a copy be sent to him. If the report
is modified to great extent I would be pleased to have a
copy.

Yours truly,

Los Angeles, California,
(Signed) C. E. Tait.

The purpose of this report is to show the benefits
to be derived from the use of water to be supplied by the
Volcan Land and Water Company for the irrigation of Linda
Vista Meesa and other lands in San Diego County, California,
and particularly the values that would be given the land
and water.

The proposed works of the company include storage
reservoirs on San Luis Rey and Santa Ysabel rivers and power
plants in the mountains, below which the water released is to
be recovered and conveyed to a distributing reservoir to be
constructed in San Clemente Valley and so located to command
by gravity the City of San Diego, the entire Linda Vista
Mesa and other lands near the city and the ocean.

For the purpose of this discussion, it is assumed
that the water supply is sufficient and that the proposed
works are adequate to furnish the lands with a proper amount
of water for irrigation and no data on watersheds, descriptions

C o p y

REPORT ON THE BENEFITS TO BE DERIVED FROM THE USE OF WATER
ON LINDA VISTA MESA AND OTHER LANDS NEAR SAN DIEGO
UNDER THE PROPOSED WORKS OF THE VOLCAN LAND
AND WATER COMPANY.

By C. E. Tait.

Los Angeles, California,
August 2nd, 1918.

The purpose of this report is to show the benefits to be derived from the use of water to be supplied by the Volcan Land and Water Company for the irrigation of Linda Vista Mesa and other lands in San Diego County, California, and particularly the values that would be given the land and water.

The proposed works of the company include storage reservoirs on San Luis Rey and Santa Ysabel rivers and power plants in the mountains, below which the water released is to be recovered and conveyed to a distributing reservoir to be constructed in San Clemente Valley and so located to command by gravity the City of San Diego, the entire Linda Vista Mesa and other lands near the city and the ocean.

For the purpose of this discussion, it is assumed that the water supply is sufficient and that the proposed works are adequate to furnish the lands with a proper amount of water for irrigation and no data on watersheds, descriptions

of engineering plans or estimates of costs are here given. It is understood that works definitely decided on for construction and not including additional works that may be constructed later, will make available through the main irrigation conduit terminating in San Clemente Reservoir, 24,000 acre feet in the period of April to September, and 13,000 acre feet in the period of October to March. By proper regulation in this distributing reservoir it should be possible to deliver even a greater proportion of the total 37,000 acre feet in a six or seven months season of regular irrigation, including the summer, or to give sufficient elasticity to conform the delivery of water to the common practise in irrigating any of the crops of the region.

Linda Vista Mesa, the principal area to be irrigated is the largest body of unutilized agricultural land in San Diego County, and it contains about 30,000 acres of land of which the greater part is irrigable. The mesa slopes from the broken country along the Coast Range westward nearly to the Pacific Ocean at the rate of 100 to 25 feet per mile and the surface ranges from 600 to 300 feet above the sea.

The soils of this region are fully described by the report of the Reconnaissance Soil Survey of the San Diego Area just issued by the U. S. Bureau of Soils. The soils of Linda Vista Mesa are shown to have been formed by the weathering of old, unconsolidated water-laid deposits and to be mainly

of two types, the one of greater extent a gravelly and sandy loam, and the other occupying the southwestern portion of the mesa, a sandy loam. The surface soils are underlaid at depths of eight to thirty inches by layers of hardpan of varying thickness, and in places a layer of heavy clay intervenes between the soil and the hardpan. The Hard-pan, while undesirable, does not deprive the land of utility. With irrigation a great variety of garden truck and shallow rooted crops may be grown and where the hard-pan is not thick, citrus fruits may be grown if the hard-layer be shattered by blasting. Similar areas at Chula Vista and elsewhere near San Diego where blasting was resorted to, are among the established producing lemon districts. The soils of the coast lands from Pacific Beach to La Jolla are similar to those of Linda Vista Mesa, except that there is less evidence of an impervious subsoil.

The climatic conditions for agriculture are of a high order. In this respect Linda Vista Mesa has rare qualifications for the growing of lemons, which crop is one of the most valuable that can be produced. The climate is equable and practically frostless. The coast lands, on account of the stronger winds, are probably better adapted to truck growing than to citrus fruits. It is reasonably expected that some of the mesa lands would also be devoted to vegetables, deciduous fruits and miscellaneous crops, and that at first there would be much intercropping in young orchards, but that

the cost of any part of the distributing system, is estimated

ultimately lemon growing would be the industry over a large portion of the mesa.

The amount of water required for citrus orchards in San Diego County and in other districts along the southern California coast, is about one acre foot per acre per annum. The amount required for deciduous orchards is less. The amount required for truck is not so well fixed, but especially with double cropping, it is more than for citrus orchards. Under the Sweetwater Company a typical system near San Diego, irrigating 4200 acres, of which about two-thirds is citrus orchard and the remainder truck and miscellaneous crops, the average duty of water is a little less than one acre foot, however, this section would be bettered with more water. One acre foot may be taken as the duty for lemon orchards on Linda Vista Mesa and the average duty for other crops is estimated at 1.5 acre feet per acre.

If the Volcan system supplies 34,000 acre feet and one half is used on lemon orchards and one half on vegetables and deciduous orchard, under the duties mentioned, a total of about 27,000 acres may be irrigated.

The mesa lands are at present unused.

The average annual rainfall on the mesa is about 10 inches, which is not enough for profitable farming without irrigation, but it supplies enough moisture to the soil to support a heavy growth of oak, creosote and other native brush. The cost of preparing the land for irrigation, not including the cost of any part of the distributing system, is estimated

at \$20 to \$30 per acre, of which about \$10 per acre is for the clearing of the brush and the remainder for grading.

The lemon orchard land with water should have a value of \$500 per acre before the trees are planted. The orchards when mature should have values corresponding to other sections. Of those near San Diego the values at Lemon Grove range from \$1000 to \$1500 per acre, and at Chula Vista, \$1500 to \$2000 per acre. The difference of about \$500 is due mainly to a more efficient water system at Chula Vista. The values in other counties of Southern California are higher than in San Diego County. The value of lemon orchards on Linda Vista Mesa should equal that at Chula Vista for these areas are similar as to soil, climate, and distance from San Diego and the ocean. The value of truck land is normally about half that of the orchards.

The value of the water independent of the land depends on the character of the water right, the stability of the water supply, the amount of outstanding indebtedness, if any, the annual operation and maintenance charges and the value of the products to which the water may be applied. Other things being equal, gravity water is more valuable than pumped water, because the rights are generally better established and the operating costs are less. The value of a miner's inch of gravity water in Southern California is from \$1500 to \$2500, and of a miner's inch of pumped water, \$1000 to \$1500. Where the water rights are on the basis of one

miner's inch to 5 acres and the value is \$2500 per miner's inch, as at Riverside, the water right is worth \$500 per acre. Where the basis is one miner's inch to 7.5 acres and the value is \$1000 per miner's inch, as at Pomona and elsewhere, the right is worth \$135 per acre. It is understood that the Volcan Company is, by the extensive purchase of riparian lands on San Luis Rey and Santa Ysabel Rivers, in control of the water rights on these streams. If then the reservoirs give an assured supply and the annual charges are reasonable, the water delivered near San Diego should have an agricultural value of \$1500 per miner's inch.

This statement is concerned chiefly with the agricultural values and no attempt is made to estimate the value of land and water for other purposes. The lands to be irrigated are mainly within 10 miles of the City of San Diego and many of them may have added values for suburban residence purposes for the section has the natural attractions of climate and scenery that are sought for improved estates. The opinion is expressed in San Diego that the city may, with wise forethought, take reasonable measures to conserve and make available the flood waters of the county for future domestic and irrigation purposes, as the City of Los Angeles has provided for the future, and water from the Volcan system may be taken by the City. The city now claims a population of 90,000 and events which are expected to contribute to its prosperity include the early opening of the railroad now

practically completed to Imperial Valley, the maintenance of the Government Aviation Field on North Island, the construction of Government ship yards and a marine training station, both now in progress, on the bay. Camp Kearny now located on Linda Vista Mesa is in need of a better water supply than it has by pumping from a distant source.

San Diego County has, owing to peculiar conditions, been more backward in agricultural development than other counties in southern California. Soon after the enactment of the first state irrigation district law, about 30 years ago, few counties had greater activity in the organization of irrigation districts. The districts were in the main ill timed and mismanaged speculative schemes, under a law not without defects, and there could be no other outcome than failure. For years bonded indebtedness stood against many lands with depressing effect. The time came, however, when it required no effort to obtain settlement of lands in any part of southern California, with plenty of water at reasonable cost. But to extensively utilize the water resources of San Diego County requires more capital than in the other sections. In this county the precipitation is more erratic and the streams are subject to more variation from year to year and to greater difference between winter and summer flow. The enterprises must then depend largely on storage and be of some magnitude. The underground water areas are also of less extent than in counties to the north, and the opportunities

for pumping by individual and small community effort have been less. In view of the need of storage of flood waters the county is fortunate in having a large number of storage sites which, owing to the broken and complex character of the topography, are found on every large stream. With the demand for irrigated lands which has now obtained for some years, with a market for the power that may be developed in conjunction with irrigation systems safeguarded by storage, and with capital, San Diego County should now make substantial progress in irrigation development.

C. E. TAIT.
Senior Irrigation Engineer.

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UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING.

COOPERATIVE IRRIGATION
INVESTIGATIONS IN CALIFORNIA

FEDERAL BUILDING
LOS ANGELES, CALIFORNIA

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UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING.

COOPERATIVE IRRIGATION
INVESTIGATIONS IN CALIFORNIA

FEDERAL BUILDING
LOS ANGELES, CALIFORNIA

Los Angeles, Cal., May 27, 1919.

Col. Ed. Fletcher,
San Diego, Cal.

Dear Col. Fletcher:-

Mr Bowlus and myself make the following suggestions after a hasty inspection of the lands on the San Dieguito Ranch and after a study of the contour map which is being returned to you under separate cover. On this map the suggested temporary ditches are shown in red and the lines that may be now made either permanent or temporary are shown in brown. We have assumed that the map is correct but doubt if the contours are shown in as much detail as would be desirable for designing a permanent system.

Before temporary ditches are begun a careful inspection should be made of the ground along the routes to be followed to determine if there are any places where construction would be unduly difficult and unjustified.

Considering first the lands on the northwest side of the Little San Elijo, since these will ultimately be served by the permanent main conduit to be constructed from the San Dieguito reservoir to the coast lands toward Oceanside it would not be advisable to construct permanent distributing laterals for these lands along the Little San Elijo until the area to be irrigated on the coast is definitely known so that

Los Angeles May 24 / 19

Dear Mr. King

I endeavored to return your map by today but have had so many interruptions that I am not able to do that. We have studied the problem some and will write our suggestions Monday or Tuesday and send them with the map. Your letter about measuring the water just received and will give this attention.

Yours truly
C. E. Fair

the permanent main conduit can be properly designed as to capacity.

A main ditch three and one quarter miles long and leading from the San Dieguito reservoir along the northwest side of the Little San Elijo would directly deliver water to 370 acres marked A.

A lateral branching from this main ditch about one half mile below the reservoir would reach the area B of 30 acres or possibly 50 acres in the Escondido Creek drainage. A cut in the saddle of the divide would have to be made for this lateral and it is suggested that this be located carefully so that it can be used for the permanent system later.

Another lateral branching from this main ditch about two and one half miles below the reservoir would reach C, 100 acres, also in the Escondido Creek drainage. By dropping 60 feet in the grade of this ditch in the channel as indicated on the map it should be practical to add the area L, 60 acres.

The lower lands in the vicinity of the walnut grove and southeast of K maybe served in one of three ways; first by the construction of a pipe line branching from the Del Mar main at its crossing of the divide between the San Dieguito and the Little San Elijo and running along the southeast side of the latter stream; second by a pipe line branching from the Del Mar main and crossing the divide through a 600 foot tunnel located northwest of the ranch headquarters; and third by constructing a 1500 foot siphon across the Little San Elijo

from the terminus of the main ditch on the northwest side of the creek.

The first mentioned plan would be costly to construct on account of the rough character of the ground and need be considered if at all only when permanent lines are constructed. Either the first or the second would reach the highest levels that would be possible to reach by gravity from the reservoir and would make it possible, if so desired, to now construct permanent main lines and laterals for the walnut grove section and to irrigate up to the 200 foot contour. It appears from the map that the flatter lands already cleared are below the 150 foot contour.

The third mentioned plan would probably be the most practical and cheapest although we have not had time to make careful estimates. Would roughly estimate that the tunnel would cost \$3,000 and a steel siphon \$2200. The siphon should be constructed so that additions could be made to both ends at such time that it would be used in the permanent distributing system for the permanent lines would be on less grade and would reach higher levels. The siphon would for the time being be under a head of 100 feet only but it should be constructed for the 160 foot head that it would be subjected to under the permanent system.

Lands above the 150 foot contour could hardly be served by this plan because the elevation of the siphon is determined by the grade of the three and one quarter mile

ditch on the northwest side of the creek. Furthermore the lower end of this temporary ditch would practically be determined by the elevation of the saddle about one half mile above the siphon. The siphon would irrigate D, 250 acres on the southeast side, and E, 70 acres on the northwest side of the creek, the latter area including only the less broken land below the 60 foot contour.

The area K, 27 acres on the southeast side of the Little San Elijo may be covered by 4000 feet of ditch diverting water from the creek at the junction of its two branches, the water to be supplied from the blow-off in the long siphon on the Del Mar main.

The areas F, 50 acres, G, 100 acres, H, 135 acres and J, 275 acres, total 560 acres may be served by laterals taken directly from the Del Mar main. Since this part of the system is in no manner affected by the design of the Oceanside conduit it is suggested that if so desired they may now be made permanent lines. The approximate locations for these laterals have been indicated by brown lines on the map and they are in all cases on the ridges.

Assuming a duty of water of 1.5 acre feet per acre per annum to be applied each 15 days by rotation on each lateral during an irrigation season of six months, a continuous flow of one-fifth miner's inch per acre would be required. With 50 per cent loss each 100 acres would require .80 second feet continuous flow. On account of possible

future extensions would recommend designing earthen ditches for one second foot per 100 acres.

With a fairly deep ditch and assuming $n = .0225$ (Kutters formula) the northwest main ditch should have a grade of about .25 per cent at the head with an increase up to .40 per cent at the lower end. The main ditch for the walnut grove section should have a grade from .40 per cent at the head to .70 per cent at the lower end. The laterals should have from .50 to .80 per cent grade. This would give sufficient velocity to avoid high seepage loss, or as much of it as it is possible to avoid with practical construction. Alfalfa would require twice as much and orchards about two thirds of the amount of water assumed above.

We would suggest that the proposed ditch lines be surveyed roughly to determine the feasibility of their construction. Then to work out the details of the system perhaps it would be well to prepare another map on a larger scale, or maps, including only the lands to be irrigated. For these maps five foot contours should be shown.

At a later time we can give you more complete data on the practice followed in terrace and contour irrigation on some of the larger and best laid out orchard properties in southern California. For the time being perhaps the following may be of some use to you.

The hill side lands above the Gage canal between Riverside and Arlington generally have slopes of about 20

per cent. On most of these lands the trees are planted in contour rows and the lands are not terraced. The irrigating furrows are given a grade of .8 per cent.

The Limoneria Company at Santa Paula, Ventura County makes a practice of terracing the slopes when they are over from 12 to 15 per cent. The furrows are given a grade of 1.25 per cent.

The Bastanchury lands which may be seen on the state highway between Fullerton and La Habra are not terraced. Some of these lands have slopes of 30 per cent and over and they are irrigated by contour furrows on grades of 2 per cent. The practice on the North Whittier Heights is the same.

Yours truly

C. E. Tait
Senior Irrigation Engineer

UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING,
WASHINGTON, D. C.

IN YOUR REPLY PLEASE
REFER TO FILE NO.

June 25, 1919

Mr. Thomas H. King,
San Diego, Cal.

Dear Mr. King:

When writing you after my return from San Diego, I had in mind that I had answered all of your inquiry, but on receiving your letter of June 17 realized that I had overlooked replying to your inquiry regarding the water measurement, and I owe you an apology for this.

If I understand the conditions under which you wish to measure water, they are about as follows: The conduit has so little grade that it would not be practical to use a measuring weir. One of the measurements is to be near the outlet from Hodges' Reservoir, where the water may have some velocity due to the head on the outlet. Probably the best way I can help you in the matter is to describe a number of devices with which we have had some experience, or about which we have some knowledge. This may give you some suggestions.

If it were possible to have the over-pour and drop in level that would be required for a weir, there are a number of instruments which might be used to obtain

T.H.K. #2

a continuous record of the gage height. You could obtain catalogs of these and other instruments. "The Stevens" is manufactured by Leopold, Voelpel & Co., 107 East 70th Street, North, Portland, Ore. "The Sentinel" by R. W. Sparling, North Main St., Los Angeles. "The Hydro-Chronograph" by the Hydro Manufacturing Co., Philadelphia. The "Friez" by Julian P. Friez, Belfort Observatory Baltimore, Md. The "Gurley" by W. & L. E. Gurley, Troy, N.Y.

The "Lyman Register" is manufactured by the Lyman Water Register Company, West Berkeley. This is a small device which may be attached to a weir. It does not give a continuous record of the gage height, but it is calibrated to give the number of acre feet passing over the weir.

The water stage recorders would of course have to be used in connection with a rating flume or with any rated section of the conduit. We have had much trouble with these water stage recorders. The clocks are difficult to regulate and keep in good order and I believe it is desirable to have some device which has no clock unless the point of measurement is to be visited frequently.

Recording gages, such as the Bristol Company, Waterbury, Conn., and the Bailey Meter Company, 141 Milk St., Boston, Mass., manufacture, are not to be recommended for irrigation work. Changes in the temperature of air

T. H. K. #3

and water affect these gages.

A rating flume near the reservoir might not give a true measurement if the velocity of the water was affected by the head on the outlet; in other words the discharge might not vary in direct ratio with the gage height, and under such conditions it would be difficult to get a proper rating curve.

The Venturi meter might be adapted to your conditions, altho I fear that it would require about as much loss in head as an ordinary measuring weir. The Venturi meter is also quite expensive; however, that might not be an objection in your case if it would do the work. I would suggest that you write the Simplex Valve and Meter Company, 112 North Broad St., Philadelphia, and the Providence Iron Works, Providence, R. I., for their catalogs of Venturi meters and other hydraulic instruments. The Simplex people get out quite a number of such devices and I believe they have a very good recorder for Venturi tubes.

All of this brings us to the desirability of a device which will total up on a dial the amount of water in somewhat the same fashion that a city water, gas or electric meter does. There are a few such devices for use with large conduits, or which can be applied to irrigation practice. One such instrument which we have used in our experimental work in Imperial Valley originated in

T. H. K. #4

Australia and is known as the Dethridge meter. It is not patented and is not supplied by dealers, but it can be cheaply made according to the specifications prepared by Mr. Dethridge the inventor. It consists of a paddle wheel placed in a structure on the conduit with a Veeder cyclometer or other counter to total up the revolutions of the wheel. The structure is of concrete and is the most expensive part; the wheel is constructed of 2 x 4 wooden pieces and galvanized sheet iron. This meter is described in Bulletin No. 247 California Experiment Station, Berkeley. If the drawings given in the Bulletin do not suffice I can loan you a set of blueprints sent over by Mr. Dethridge. This instrument gave very good service in Imperial Valley, except that we had some trouble with the wheel becoming locked by sticks and trash floating in the ditches. When the wheel stops it dams the ditch and of course the water overflows the banks above. We had to place screens in the ditches just above the meters and the trash had to be cleaned from these screens from time to time to prevent overflow and washing out of the earthen ditch banks.

About the only other instrument which requires but little loss in head, obviates the necessity of a clock and requires no record sheets is the Reliance or Hydrometric meter manufactured by the Hydrometric Company, 953 North Main St., Los Angeles.

T. H. K. #5

I believe you are familiar with this instrument. I have believed that this is one of the best instruments on the market, provided it is accurate, but have been somewhat in doubt about its accuracy. For a long time the makers had no test made of the instrument by any independent party, but finally at my suggestion they sent one of the meters to our testing laboratory at Fort Collins, Colo. This laboratory is probably the best of its kind in the United States. I would suggest that you write E. L. Parshall, ^{of Agricultural College} our agent at Fort Collins, in charge of the laboratory for his opinion of the meter, also for a number of bulletins giving results of tests on various meters at the Fort Collins station. I am not sure that the results of the test of the Hydrometric meter are to be published and I have only read hurriedly a typewritten copy of Mr. Parshall's report. This was seen at Berkeley last January. My recollection is that the test showed the meter to be reasonably accurate for a short range of medium heads, but that when larger or smaller heads were run thru the meter the percent of ^{error} ~~air~~ was considerable; also that the ^{error} ~~air~~ was such that no constant correction could be applied.

I went down to the Hydrometric Company plant today to learn what the Company had to say about the Fort Collins test and if they had made any changes for the better-

T. H. K. #6

ment of the instrument, but the manager was out of the city. I hope to see him in a few days.

I am today writing Mr. Parshall at Fort Collins for a copy of his report on the Hydrometric meter and if I obtain the information will pass it on to you. Perhaps by properly selecting a meter as to size it could be used without undue error. I am anxious to see the Hydrometric meter perfected and made accurate for I believe it would then fill a great demand, but can not recommend it without reserve until assured that it is correct.

Mr. Sparling, whose address I have given, is now developing a new meter somewhat similar in principle to the Hydrometric meter, but it is for use on pipe lines and it is my opinion that it would not give a true measurement unless the pipe was running full. Only two or three of these have as yet been made and no circulars are out for them. I saw one of the meters today but Mr. Sparling himself was away and there was no one at the plant who knew all about it. It appears that this meter could be made for any size of pipe. I have no information as to its accuracy.

I have written somewhat at random, but trust that this may give you some suggestions in the solution of your problem. Shall be pleased to give any further aid that I can.

Yours truly,

C. E. Tait

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June 26, 1919

Mr. C. E. Tait,
Senior Irrigation Engineer
U S Dept of Agriculture,
Los Angeles, Cal.

Dear Sir:-

Your very kind letter of June 25th received. A short time ago I had Mr. Ebert of the U.S.G.S. out in the field to look at our conduit and make a recommendation on the measurement of the water in the conduit. He unqualifiedly recommended the use of the water stage meter at a certain point on our conduit, about 1/2 mile below the dam. We talked the matter over carefully and both he and I believe that by the time the water reaches this point, which is a good straight away portion of the conduit, that the water will have passed through a sufficient number of changes in form to have overcome any differences in the velocity due to different heads of water behind the Hodges Dam.

I hope we can get a good rating curve at this point. If we find, however, that our rating curve does not hold, we will install another station at the lower end of the conduit. The above method was just decided upon today.

The next problem we have to solve is an economical method of measuring the water as it is delivered to the irrigation consumers. If it is not asking too much, I would appreciate any advise you can give me on this subject. Thanking you for your very great kindness in this matter, I am,

THEK: BK

Very truly yours,

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UNITED STATES DEPARTMENT OF AGRICULTURE,
OFFICE OF PUBLIC ROADS AND RURAL ENGINEERING,
WASHINGTON, D. C.

IN YOUR REPLY PLEASE
REFER TO FILE NO.-----

Los Angeles, Cal.
July 3rd, 1919.

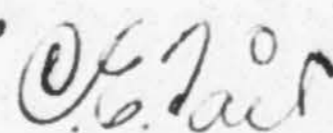
Mr. Thomas H. King,
Ed. Fletcher Company,
San Diego, Cal.

Dear Mr. King:

Replying to your letter of June 26th regarding the measurement of water as it is delivered to the irrigators I would suggest that if you wish to make a reasonably accurate measurement that an instrument such as the Hydrometric meter would be very practical provided the size were selected in accordance with the size of stream to be measured. I believe such an instrument is more satisfactory than the use of a measuring weir and water stage recorder. We have tried a number of the water stage recorders and have had much trouble in regulating the clocks. It is also a bother to change the record sheets and unless you have a good man to look after the instruments they are not satisfactory for measuring at delivery points to irrigators where the water is running intermittently.

I have written to Fort Collins, Colorado for the results of the test of the Hydrometric meter and will let you know about the test as soon as I get word.

Yours truly,



Senior Irrigation Engineer.

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July 17, 1919

Mr. C. E. Tait,
Senior Irrigation Engineer,
U S Dept of Agriculture,
Los Angeles, Calif.

Dear Sir:-

The records of the tests of the Reliance Motor reached me yesterday afternoon and I have read the report with a great deal of interest and profit. I was really much surprised to find such a high percentage of error.

If it were possible to have a fairly constant discharge, one of these meters could unquestionably be so calibrated as to give excellent results, but I do not believe it would be suitable for practical irrigation work, for there would necessarily be wide variations in the amount of water passing through the meter.

We are installing a Gurley Graphic Water Stage Register on Hodges Canal, but have not as yet made any decision on the method of measuring the water delivered to the consumer.

I deeply appreciate your sending me the office copy of the report and trust I may be able to reciprocate in some way.

Yours very truly,

THK:EK

Ed Fletcher Papers

1870-1955

MSS.81

Box: 29 Folder: 5

General Correspondence - Tait, C. E.



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