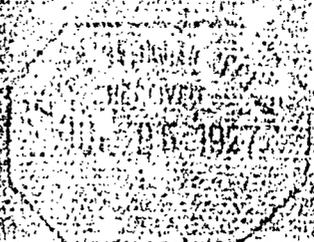
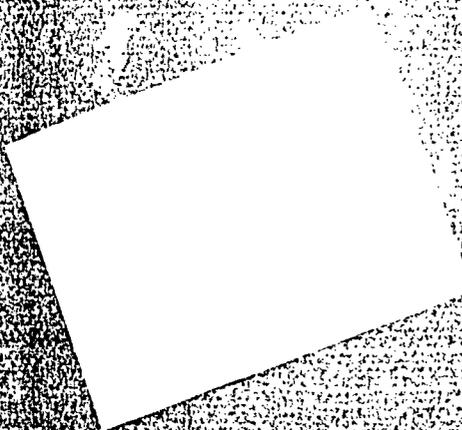


1927

# ANNUAL REPORT

FIFTH IRRIGATION  
DISTRICT

H. F. ROBINSON SUPERVISING ENGINEER



GANADO PROJECT

Practically all of the work on the Ganado Project in the past year has been operation, maintenance and some betterments.

It was found that the reservoir dam was becoming badly infested with rodents and a supply of poison grain was obtained from the Biological Survey. By its use practically all of the burrowing animals have been killed and in the future whenever the work of any of them is seen the poison grain will be again used or other methods to kill them out. Quite a little bit of work was done on the dam in filling up the rodent holes and strengthening it with some repairs to the rip rap.

Two bridges were built over the canal with lumber that was furnished last year, at no expense, from the Government sawmill on the Southern Jurisdiction. All of the flumes on the project were given one coat of paint and at various places along the canal where there was washing and seepage, masonry and rip rap were placed.

At a number of places where side washes brought flood waters into the canal, diversion was made or other work done to prevent damage. A sluice gate was placed in flume No. 4 and quite a little bit of repairs were done at flume No. 3, both to the structure and in protective work in the wash.

The entire canal was cleaned in the spring at no expense to the Government; J. L. Hubbel doing the portion that he is obligated to do by his contract and the Presbyterian Mission and the Indians donating the balance of the work.

During most of the year the project was in charge of Mr. A. B. Myers but just before the end of the year it was necessary to let Mr. Myers go on account of his drinking habits and Mr. J. R. Cordova, who had been on the project more or less as ditch rider during the past year, was left in charge. He will probably be kept on during the irrigation season of 1927 and if he makes good will probably be permanently appointed. Assistant Engineer

Burns has general supervision of the project and will look after the operation and maintenance.

Next year it is the intention to extend the work by the building of one or more flumes to cover lands under ditch but which cannot be irrigated until the flumes are in. Practically all of the land that can be covered has been taken up during the past year and several Indians have now taken up ground beyond flume B which must be repaired, and they are anxious to get water.

The map of the cultivation on this project for 1927 shows that there has been put in this year 183.3 acres of new land, making a total under cultivation of 798.1 acres.

The outlook for this project is better than it has been any time since it was completed as the Indians have at last taken interest in the work and are taking up the land quite rapidly.

KIN LE CHEE PROJECT

Most of the work on this project has been done by the Indians. During a heavy local storm the Indians allowed trash to accumulate in the ditch which was carried down and lodged at the end of one of the high flumes, causing the water to overflow, cut out the approach and the shore bent fell into the wash. Repairs were made, the Indians donating most of the work to the value of \$288. Most of the land on this project is in this year and the Indians should have very good crops to repay their efforts.

### Red Lake Project

This is an old project, originally built under the direction of Superintendent of Irrigation Butler prior to 1904. No use was made of it and twice since that date our service has rebuilt it and put it into first class condition, but still no use was made of it.

With the proposed construction of a large sanitarium at Fort Defiance, a need was felt for additional area to plant in alfalfa and other forage crops for a dairy herd. It was impossible to do this at the Fort and the nearest practicable place was at Red Lake. Funds, other than regular irrigation funds were supplied by the Office and we were directed to place the project again in shape to divert and store the water. This has been done, but the ditch system is not in shape to carry water, as this was thought to be the province of the Indians if they wished to make use of the project beyond what the Agency forces would cultivate for the Sanatarium.

In doing this work the storage dam

which forms Red Lake was rebuilt, and raised four and a half feet, the outlet gate rebuilt and the dam paved on the water side with rock. 12,000 square feet was paved or re paved. This was not so expensive as most of the rock was along the old dyke, as it had been previously paved.

The diversion dam in Black Creek was partly reconstructed. It is a log crib dam filled with rock. It is reported that several of the timbers in the lower part of the dam are not as sound as formerly, but it is believed that they will last for at least ten years, and by that time if the project is used as it should be, the replacing of the present structure by a concrete dam would be warranted. This can easily be done as the dam is on rock foundation clear across the stream.

A concrete diversion gate structure with steel gates was installed which has a capacity of 65 second feet with a one foot head, which will enable the filling of the reservoir rapidly when water is available.

There was so much fall in the diversion canal that a combination structure of weir and drop was built, in which was also installed a waste gate and sand trap and a small service gate which will serve about 100 acres of land above the level that could be served from the reservoir. With the reconstruction of this project some 700 acres of land are available for irrigation next year. An additional farmer has been recommended to take charge of this project as well as to look after some other irrigation work, and it is hoped that he will be appointed. With a good man here, this project will be of great benefit. If it is not placed under a good, vigorous man the Indians will not try and put it under cultivation, and in a short time the project would again go to ruin.

There was expended on the reconstruction of this project the sum of \$5,300.00.

## TUBA AND MOENCOPI WASH

Near Tuba a canal takes water from the Moencopi Wash and irrigates the Agency and School farm and several hundred acres belonging to the Navajo Indians, lying further down the Wash. This canal does not effect the lands of the Hopi Indians, they getting all of their water from Reservoir Canon and springs.

Early in the winter, heavy floods from local rains damaged the main canal; the head section which runs through a deep cut had been lined with concrete to a height of five feet. The local flood waters ran into this section of the canal and as at the time of the occurrence both the headgates and wastegates were closed, the canal was filled and the water passed over the lower banks into the wash. Much of the water was allowed to remain in the canal until the banks above the concrete lining were softened and slipped into the canal and the hydrostatic action of the water lifted the concrete lining in places until for a considerable distance it was practically destroyed. Repairs have been made to

this canal by cleaning it out, replacing the lining where it had broken and carrying it higher up the banks so that it will not be overtopped by another flood.

To care for future floods that might come, a rock and concrete check wall was built across the arroyo on the upper side of the canal with wing walls so that the entire flow into the canal would be concentrated at this point. This was immediately opposite the waste gate on the lower side; adjoining the waste gates an overflow weir was constructed 20 feet long.

It is believed that this will form ample spillway to care for any flood waters coming into the canal and is at such an elevation that 1.5 feet of water can be carried in the canal at all times.

## NAVAJO AND HOPI WATER DEVELOPMENT.

This is a report on the development of domestic and stock water in the Navajo and Hopi Reservations. What is being done is the continuation of work that has been carried on for many years, and the value of the work to the Indian is so well known that it is not necessary to go into details of the "why" of this work. It is generally recognized that the development of water for these people is one of the most important works being done for them, if not the most important. The Indians themselves recognize this and are very appreciative of the work being done for them.

We can divide the work into several phases or parts; the drilling of wells, the development of springs and the development of other sources of supply by water catches and ponds or reservoirs to store flood runoff, and by digging shallow wells.

For a number of years we devoted the most of our money and efforts to well drilling. The area that can be improved

in this manner is limited by the topography and geology of the country covered, and we have been able to develop water only in limited areas by this method.

About two years ago it was decided that to continue the well drilling meant working where the depths to water made it very expensive to secure it and that to get the greatest good for the greatest number and at the minimum cost, it was advisable to stop the well drilling and develop the other sources of water, particularly the springs and seeps. The well rigs have therefore been laid up and as many spring development crews as possible have been put at work.

That the Indians themselves understand both the general situation and the value of water development is shown by the fact that during the past year those from the Jurisdiction have authorized the expending of \$10,000. of their oil royalties, tribal fund, for water development, to be used either for the domestic development or on the smaller irrigation projects.

It is believed that without going into a wordy detail of the accomplishments of the past year the following list of the NEW work (not O. and M.) of the year will convey the idea in full of what we have done.

All of the work is being done in the very best manner possible and designed to be as nearly permanent as possible. It is thought that some Minutes of a meeting at Crown Point during the Indian Council of 1927 may give, in connection with the list, a better idea than many pages of detailed discussion, and the ideas of the Superintendents as well:

MINUTES OF A MEETING TO CONSIDER WATER DEVELOPMENT, NAVAJO AND HOPI RESERVATIONS.

On the evening of July 6, 1927, at Crown Point, a meeting was called by Commissioner H. J. Hagerman to consider water development on the Navajo and Hopi Reservations. There were present: H. J. Hagerman, the Superintendents of the six jurisdictions: Edgar K. Miller, A. H. Kneale, S. F. Stacher, Aug. F. Duclos, C. L. Walker and J. G. Hunter; H. F. Robinson, Supervising Engineer, Supervisor E. H. Hannord, Inspector Thos. B. Roberts, A. H. Womack, Foreman of the Water Development, and Supt. Geo. A. Trotter of the Zuni Reservation.

After introductory remarks by Gov. Hagerman outlining the value of getting closer together in the work, Supervising Engineer Robinson was asked to outline what had been done and what was planned for the immediate future.

Mr. Robinson began outlining the way the work had been done, especially in the well drilling, explaining that it was necessary to do the work progressively, that is, with a rig one could not move it from one place to another at considerable distance without excessive loss of time and money but when work was begun in one locality it must be progressive with the shortest moves to accomplish results; that this was also true with the spring development and because of this, as well as the geologic and topographic nature of the various parts of the reservation, there were inequalities in the quantity of work done and the development accomplished on the different reservations.

Mr. Robinson also stated that undoubtedly mistakes had been made, that perhaps places not yet developed had needed it more than some places worked over, and that he requested any superintendent who had any suggestions, criticisms or complaints, to be perfectly frank and bring them out that they might be remedied or explained.

He further explained that accurate accounts had been kept by the Irrigation Service as to costs of each feature - well, spring, etc. - but that these had not been segregated by jurisdictions, hence a report by jurisdictions could not be made then, but this could be done at a later date if desired although it would take much work to go over the books for the records cover many years.

The method of operation and maintenance of wells was explained, showing the system of patrolling the wells and this brought out the suggestion that each developed spring, etc. should also be inspected at regular intervals and if the Indians were not caring for them, in the way of filling up holes where the cattle and sheep tramped them out, and similar repairs, to advise the superintendents that an effort might be made to get this work kept up by those using the springs, but to make these O. & M. repairs if not done by the Indians. And it was explained and fully understood the difficulty of getting the Indians to do such work when there were many watering there, with no ownership vested in any one of any groups, each leaving the work to the others and consequently nothing is done, and it was stated that in many cases the cost of getting the Indians to do the work would exceed the cost of doing the repairs by a paid gang.

At the suggestion of Gov. Hagerman, the work of the past, and particularly that of the last year, was taken up by jurisdictions and discussed. There is attached a list of the new development during the fiscal year 1927. This includes all domestic and stock water developed during this period with the approximate cost of the work in each case. This, however, is subject to correction, and some increase as it does not include inventory, overhead of superintendence and district office and no depreciation on equipment. All springs listed includes cost of concrete trough. In this connection the irrigation work proposed was also outlined, as per the attached schedule. These were gone over, a few suggestions were offered by Mr. Kneale, including the periodic visit to all springs as mentioned above.

Regarding the method of development of springs, he expressed unqualified approval of methods and workmanship and stated that in the beginning of the work he had ideas of the proper methods to pursue, but

after seeing the work done by the Irrigation Service he had entirely changed his ideas. He wishes the work extended as rapidly as possible and stated that the Indians of his jurisdiction had approved the use of \$6,000. from oil royalty funds for the coming year. It was stated that it was expected to keep two spring crews at work on this jurisdiction during 1928.

On the Hopi jurisdiction Supt. Miller expressed a wish for closer consultation with him that he might know, and in advance, what was proposed. A consultation in the near future between the Superintendent his two stockmen, with the Supervising Engineer and Foreman Womack, was arranged. As to past work and its construction features he expressed full approval.

For Western Navajo, Supt. Walker felt that while the past year's work was not only successful but met with his full approval, he would like in addition to the one development crew, that an additional one be put on as the work there was some years behind other jurisdictions. When it was stated that each crew put on needed a full equipment of automobile, tools and other equipment, he stated that he thought he could equip one outfit if we had the funds for the work. This was promised conditioned upon funds. Foreman Womack had spent some time in a trip with Supt. Walker, going over a large part of the jurisdiction and general plans made for the future.

The Southern jurisdiction has had much well and irrigation development but lacks spring work. A new outfit was just started in May of this year and will do intensive work during the next fiscal year. Methods and cooperation fully approved by Supt. Duclos. He stated that he could spare \$9,000. of the oil royalty fund unexpended during the past year and would recommend that it be turned over to the Irrigation Service for this work.

On the Eastern jurisdiction it was admitted a minimum of work had been done. This was explained as because most of this jurisdiction was non reservation and funds appropriated for the reservation were not applicable to non reservation lands even tho it was allotted as work done on an allotment, would go to the individual and not to the tribe. It was stated that only about 12% of all moneys spent for Navajo and Hopi water and irrigation development had gone to this jurisdiction. Very little can be done in the future.

For the Leupp jurisdiction Supt. Hunter stated that he had been there such a short time he was not competent yet to talk on the subject but from what he had learned his jurisdiction had received its proportion of the development and there is now some work pending which would be continued to completion.

In the irrigation development it was realized and fully understood that only the Northern and Southern jurisdictions could expect much development because of the nature of the country and the water possibilities.

While most of the Superintendents acknowledged good cooperation and consultation with them by the employees of the Irrigation Service, there was a little feeling expressed that a closer contact between the Superintendent and the Supervising Engineer personally was desirable that detailed plans might be worked out between them personally rather than between the subordinates. A further suggestion was made that a tentative budget be prepared at the beginning of the year showing available funds and its division between the various jurisdictions be prepared and submitted to the Superintendents that they might know what was planned and the amount available to carry out the plans. These suggestions are constructive and agreed upon and will be followed more closely in the future.

The meeting then took up the consideration of other matters and later adjourned.

LIST OF THE WATER DEVELOPMENT DONE ON THE NAVAJO  
AND HOPI RESERVATIONS DURING FISCAL YEAR 1927.

This includes all domestic and stock water developed during this period with the approximate cost of the work in each case. This, however, is subject to correction, and some increase as it does not include inventory, overhead nor superintendence or the District office, and no depreciation on equipment. All springs listed includes cost of concrete trough.

NORTHERN JURISDICTION

Paid from the fund, Water Supply,  
Navajo & Hopi, Spring Development.

Tsay-ya-to Spring	617.98
Do-be-chady Spring	237.62
Red Mesa Spring	284.46
Tsa Clishin Bito Spring	368.45
Chil-chin-bito Spring	318.92
Shan-to or Cha-el-sissy bito Sp.	442.64
Sheep Dip Spring	41.56
Black Rock Spring	251.33
Tsa-yo-to-Tucase Spring	332.18
West Sheep dip Spring	433.51
To-Inchony Spring	309.20
Charlie Curley Spring	268.55
Drilling well No. 902	4,627.64
	<u>8,486.04</u>

Paid from the Oil Royalty Fund.  
The following springs developed and  
concrete troughs built:

Stinking Spring No. 2	650.61
Te-la Spring	576.39
Frank W. Smith Spring	380.22
Kinne-do-de-tsie Spring	421.23
George's Spring	212.44
Whitewater Spring	180.63
Sagae Ezly Spring	293.23
Two Gray Hills Sheep Dip Spring (inc. Res.)	702.46
Mud Springs	165.02
Sheep Dip Well (Denahotso)	92.85

The following improved by filling  
around trough, etc.

Silent Man's Spring	74.07	
Dead Man's Spring	69.16	
Well No. 901 Concrete trough	153.50	
Cross Roads Well Conc. Reser.	28.40	
Toeito Spring, Conc. trough	141.24	
Drolet Well	95.00	
Toeito Well, purchase of	1,000.00	
Equipment on hand	2,208.21	
Mat. & Sup. on hand	2,357.11	
Misc. unpaid	155.71	
Balance	32.82	\$10,000.00

#### HOPI JURISDICTION

Paid from the fund, Water Supply,  
Navajo & Hopi.

(Note: This only includes new construction,  
but not regular operation and maintenance  
of wells and springs)

For developing the following springs:

Taapany Spring	291.08
Burro Springs	396.13
Sae-es-skeesis Spring	308.23
Cow camp Spring	51.08
Devil Spring	189.35
Too-at-la Spring	4.95

For building concrete troughs at  
the following wells:

Well No. 238	140.25	
227	535.85	
9	204.47	
4	173.99	
463	128.76	
464	125.17	
480	128.27	
778	183.82	\$2,861.40

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WESTERN NAVAJO JURISDICTION  
Paid from fund, Water Development,  
Navajo and Hopi.

Red Lake water holes	312.30	
Saga-nitso Spring	546.38	
Walker seep	419.14	
Sheep Springs	417.44	
Cemetary Springs	221.15	
Hole in Rock Spring	378.57	
Rat Spring	708.37	
Tanner Wash Spring	600.24	
To-lo-can	262.26	
Bitter Seep Spring	292.18	
Kai-de-to	1,332.08	
Kai-de-to Spring No. 3 and 4	493.20	
" " 1 and 2	1,086.51	
Sandstone Spring	474.49	
Say-et-sissie seeps	379.44	
Chisey-yezzie	271.49	
Inscription Spring	183.95	
Kay-Atho	267.06	
Side-to-Spring	140.53	
Tachine Badony Spring	469.84	
Sischene Badony Spring	<u>361.94</u>	\$9,618.56

LEUPP JURISDICTION  
Paid from fund, Water Development,  
Navajo and Hopi.

Koney Nez Springs reservoir	240.20	
Ish-no-gallie Spring	<u>626.37</u>	866.57

SOUTHERN JURISDICTION  
Paid from Water Development,  
Navajo and Hopi.

Drolet Well	199.54	
To-na-to Spring	<u>372.36</u>	571.90

S U M M A R Y

NORTHERN JURISDICTION

Springs developed	23
Springs improved	2
Wells dug	
Wells drilled	1
Wells purchased	1
Trough at well	1

HOPI JURISDICTION

Springs developed	6	Reinforced storage tanks	
Concrete troughs		at wells	2
at wells	8		

WESTERN NAVAJO

Springs developed	21
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LEUPP JURISDICTION

Springs developed	2	Wells under construction	2
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SOUTHERN JURISDICTION

Springs developed	1
Dug well	1

EASTERN JURISDICTION

None

The following is an outline of the work in developing and repairing irrigation projects during the fiscal year 1928. Undoubtedly other small projects will be brought to our attention and investigated and perhaps construction done before the end of the year, the amount of work depending entirely upon funds available.

#### NORTHERN JURISDICTION

##### Tolthlakan Project.

This is a project about 65 miles west of Shiprock and was 65% complete July 1st. It is estimated that this work will be completed during July.

##### Headgate in Capt. Tom Wash

This is a headgate for the diversion of water from this stream in to an existing ditch by the Indians near Nava. This work will probably be completed during the month of July.

##### Diversion Dam in Capt. Tom Wash

The Indians have cornfields about ten miles below Nava on this Wash and desire permanently constructed dam. A complete survey has not been made but from preliminary observations it is estimated that this will cost about \$2700. and this amount will be reduced by whatever amount of labor the Indians donate.

##### Beautiful Mountain

This is a small project about 35 miles southwest of Shiprock. A preliminary survey has been made and it is doubtful whether construction is practicable but a complete survey will be made at an early date for this work.

### Kirtland Project

It is proposed to build a reinforced concrete headgate structure for this little project where they have about 600 acres, 400 of which are now under cultivation. The estimated cost is \$565.

### Lower Kirtland Project

This is another project lying just below the Kirtland Project with 400 acres under ditch, 300 of which are under cultivation. It is proposed to build a headgate for this project at a cost of \$680.

### Tes Nos Pos

This is an old project where the conditions were absolutely changed by floods. Studies are to be made here with the idea of rehabilitating the project.

### Hogback Project

The operation and maintenance of this project will continue and rather extensive repairs will have to be made to some of the flumes.

## SOUTHERN JURISDICTION

Detailed surveys are to be made as soon as practicable on the Whiskey Creek for a new project.

At the Wheatfields, where a project was built 18 years ago but never used, estimates are to be made for its rehabilitation.

Tsa ha li

This is about 45 miles north of Fort Defiance. Surveys will be made and estimates prepared for putting this project in shape. The Indians state that there is a reservoir site at this point which will also be investigated.

Red Lake Project

The rehabilitation of this project was practically complete June 30th but it is probable that a small amount of additional work will have to be done during the next year. A topographic survey of the lands under the project will be made.

Ganado

This project will be operated and maintained during the coming year with such additional construction work as can be done with the money available.

No projects for irrigation are contemplated for the coming year on the other jurisdictions and it has been requested that any of the Superintendents who know of any of the minor projects that might be possible, to report the same to the Supervising Engineer that he may make proper investigations.

Following the ideas brought out at Crown Point as to the allotment of the available funds for the coming year, a letter has been sent each of the Superintendents with the following suggestion which, with possible modifications to better the work, will be carried out during the fiscal year 1928:

To the Superintendents,  
Navajo and Hopi Reservations.

Gentlemen:

"In accordance with the plan discussed at the Crown Point meeting, I wish to submit a tentative allotment of funds for water development for each of the jurisdictions for the fiscal year 1928. Of course it is understood that this is subject to modifications as the necessities of the work indicate from time to time. It is also seen that while on the basis of population the Eastern Navajo is allotted \$3,000., because of the small area in the reservation, and the almost entire lack of chances to develop anything there, it is probable that this amount will not be used and may be transferred elsewhere where most needed.

There has been authorized for this office the sum of \$42,000. for well and spring work and \$9,000. for miscellaneous irrigation work; there being a special appropriation also for the Hogback Canal and the Ganado Project. The allotment in the table is only for the \$42,000. for the domestic and stock water development. It is believed that as probably all of the irrigation money will

have to be spent on the Northern and Southern jurisdictions, some of the allotment for the water development could be switched to other jurisdictions, especially the Hopi, with justice to all.

In making this apportionment, it is planned to be approximately on a basis of population, but not having any positive figures it may be somewhat in error.

Jurisdiction	Est. Population	Suggested Allotment	Est. needed for well O&M	Bal.	Oil Royalties
Northern	8000	\$8,000.	\$2516.00	\$5,484.	\$6,000.
Southern	12000	12,000.	513.00	6,687.	9,000.
Eastern	3500	3,000.		3,000.	
Western	6000	6,000.		6,000.	
Hopi	8000	9,000.	8163.00	837.	
Leupp	7000	3,000.		3,000.	
Reserved		1,000.			

The last column represents any amount from tribal funds, Oil Royalties that may be turned over to the Irrigation Service for water development. The two items shown for the Northern and Southern jurisdictions are the amounts mentioned by the Superintendents at the meeting. None of the other four made any suggestions along this line. If they desire more development work than their allotment will allow and can have authorized any of the Oil Royalties, plans will be made accordingly.

Please let me know at an early date any suggestions you have to make regarding the above."

Of course the new work was not all that was accomplished. There is the operation and maintenance of the wells. Two

patrols are out all of the time visiting these wells and keeping them in shape. A report of each well visited, the date and what was done is made the District Office and there posted. Our records show each and every time over many years when the various wells were visited, the work done, their condition and the cost of any repair or maintenance work done. Foreman Womack is on the road 80% of his time visiting the various crews at work, looking over new territory, deciding which spring shall be next developed and how, and it is to him that a large proportion of the praise for all of the work done in water development on these reservations is due. Without his knowledge of mechanics, his understanding of the Indians, what he knows about the geology of the country, his ability to handle men and get along with all kinds and conditions of people he has had to do business with, and last, but not least, the great confidence and respect he is held by the Indians, not nearly so much

work would have been accomplished, nor would its quality have been so high. I wish the Office to know more fully the value of this man to the water development work in this arid country and to give him no small part of the credit for what has been accomplished for it is there that the credit is due.