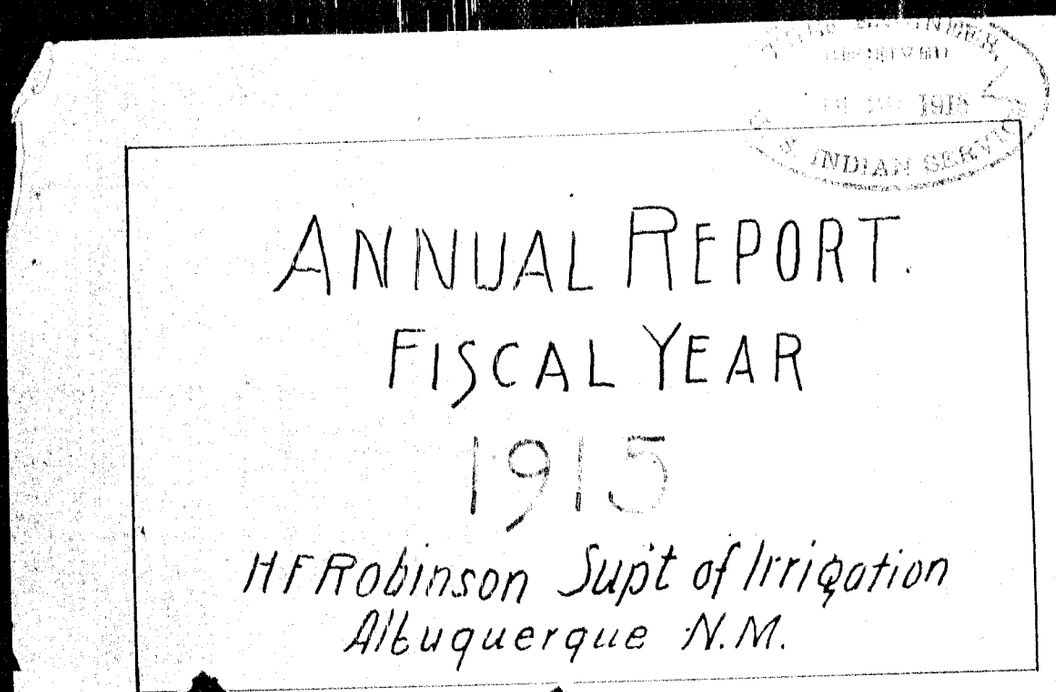


ANNUAL REPORT.
FISCAL YEAR
1915

H F Robinson Supt of Irrigation
Albuquerque N.M.

Annual Report
Fiscal Year 1915
H. F. Robinson
Supt. of Irrigation. Chief Engineer Files.

DEPARTMENT OF THE INTERIOR

UNITED STATES INDIAN IRRIGATION SERVICE

SUPERINTENDENT OF IRRIGATION

Albuquerque, N. M., July 15, 1915.

Mr. W. M. Reed,

Chief Engineer,

Washington, D. C.

Sir:

I herewith submit my annual report for the fiscal year 1915.

DISTRICT NO. 5.

District No. 5 which comprises the territory under my jurisdiction, comprises northern Arizona, New Mexico, that portion of Utah lying south of the San Juan river and the Ute lands in Colorado, and includes the following reservations and pueblos:

Reservations.	Pueblos.
Navajo	Taos
Moki	Picuris
Zuni	San Juan
Supai	Santa Clara
Mescalero Apache	San Ildefonso
Jicarilla Apache	Nambe
Southern Ute Allotted	Tesuque
Southern Ute Diminished Res.	Cochiti
Navajo Allotted (Pueblo Bonito)	Santo Domingo
	San Felipe
(and several other reservations for which no work has ever been done within the bounds of this District).	Sandia
	Santa Ana
	Zia
	Jemez
	Isleta
	Laguna
	Acoma

NAVAJO. The Ganado Project.

This Project is to construct a reservoir about three miles from Ganado, Arizona, by impounding the waters of the Rio Pueblo Colorado in a reservoir on a flat on the north side of the stream where a small flood water lake has existed for many years, and irrigate the lands along the stream below, from it.

Plans and estimates were made for this Project and Congress appropriated $60100.00 for its construction. The plans prepared were for a diversion in the stream, the construction of the reservoir, the construction of a distributing ditch for a couple of miles and the enlarging and rebuilding of a ditch, formerly owned by Mr. J. L. Hubble, for several miles further, the Project to cover about 700 acres of land.

After the preparing of the plans and before construction was commenced, the stream shifted its channel from where it formerly ran on rock bottom to a place in deep alluvial soil, and the channel was cut down some fifteen feet below its former level. This made the diversion cost a great deal more than was anticipated. The plans were also changed for the construction of concrete headworks instead of wooden. Heavy floods, both in the stream and from cloudbursts on the side drainage, changed the stream so that larger

flumes were necessary, and one flume was entirely washed out after being constructed. From all of these causes the money appropriated was not sufficient to complete the Project. An estimate was made for completing the original Project and for extensions to bring more land under ditch, and the amount necessary was included in the Indian Appropriation Bill for 1916, which failed of passage. The work therefore has been closed down until Congress gives additional money for this Project.

At present the status of the work is as follows:

The diversion works are completed. The storage reservoir has been completed within eight feet of th height contemplated, and the distribution canal has beer completed to a point beyond the Hubble Ranch and within a short distance of the end of the canal as originally proposed.

Mr. J. L. Hubble had diverted water from this stream and had built a canal to his place, planning to build this reservoir at his own expense but found it too expensive to handle alone. Mr. Hubble made a proposition to the Government to give up his water rights and his constructed ditch in exchange for a reservoir right in the proposed reservoir, and the right to convey water to his land through the Government ditch, and has further agreed to guarantee the maintenance of the

ditch indefinitely. This agreement was ratified by the Department May 31, 1913.

Water has been impounded in the reservoir to as great a depth as was safe, and we have been ready to furnish water for irrigation purposes to a limited area of land since May. There are several hundred acres of Indian land that can be watered as well as the lands of Mr. Hubble. Only two of the Indians have made any attempt at cultivation this year, as we would not guarantee that they could have water. These Indians have been furnished water and Mr. Hubble has been given the amount he needed during the latter part of May and all of June, and will be served during the balance of the season.

All construction work has ceased as the funds available are almost exhausted, but location surveys are now under way for the balance of the system, including ditches on both sides of the stream, as we have been informed that the General Land Office are about to commence their survey for the subdivision of this land, and it was necessary to have the canal lines staked on the ground that they might be meandered and the right of way for the ditch not included in any subdivision for allotment.

WESTERN NAVAJO. Marsh Pass Project.

About 90 miles north of Tuba is Marsh Pass through which the only wagon road between the Tuba country and the north slopes of the mountains passes. Just below this pass has been located a new boarding school. Surveys, plans and estimates have been made for the construction of an irrigation project diverting water from Laguna creek and covering land below the school.

While there are large floods, in this stream an excessive amount of silt is carried. The normal flow however of between four and five second feet can be depended upon most of the year. With this water it is proposed to irrigate about a thousand acres of land, which would give a couple of hundred acres for the school and some 800 acres for the Indians. Owing to the fact that there is little or no irrigable land in this Reservation, this development would be extremely valuable to the Indians. If these Indians were given five acres of irrigable land for each head of a family approximately 160 families would have sufficient land upon which to raise corn and vegtables which would go a long ways toward their support, and be a large factor in their advancement along the lines of civilization.

Marsh Pass
Project - 2.

Owing to the long distance from the railroad from which all forage and food supplies are freighted, this Project would be of great value in allowing a considerable portion of the forage and no inconsiderable amount of foodstuffs to be raised.

The cost of the Project is estimated at a little over $16,000.00 or a cost of approximately $16.00 for each acre irrigated. A full detailed report has been made to the Indian Office under date of June 26, 1915, regarding the possibilities of this Project.

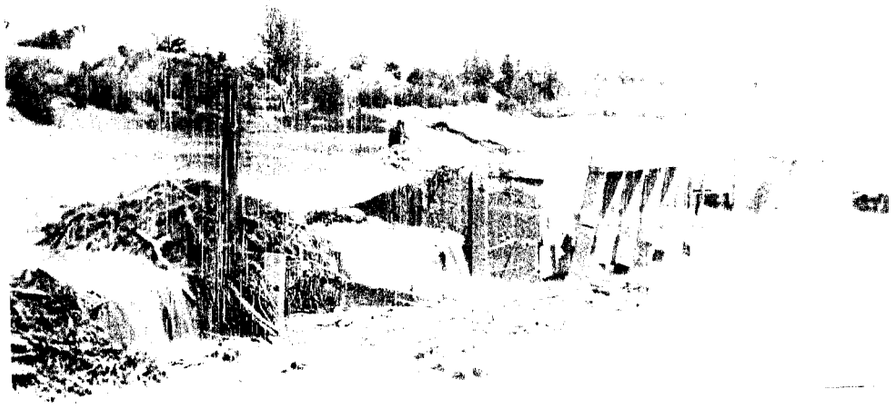
WESTERN NAVAJO.

The Western Navajo Indian Reservation is probably the most arid of any of the Indian reservations in the United States. Aside from the few small patches that have been developed by the Indians themselves, there is no irrigation or cultivation on the entire Reservation excepting at Tuba. The elevation at this point is about 4500 feet and the mean annual rainfall is 6.33 inches. Some years the precipitation is very much less, as in 1899 the total amount was 2.63 inches.

At Tuba numerous springs are found, and it is with this water that the School and Agency Plant is irrigated.

East of the Agency about a mile is what is known as Reservoir Canyon, in which three reservoirs have been constructed which are filled by the accumulating water from springs. This water runs down a natural channel and is used for irrigating a small tract of land cultivated by a small band of Hopi Indians, an offshoot from the Pueblo of Oraibi and known as Moencopi Village.

Moencopi Wash Dam



A receeding Flood

Distant view of Dam as flood receeds

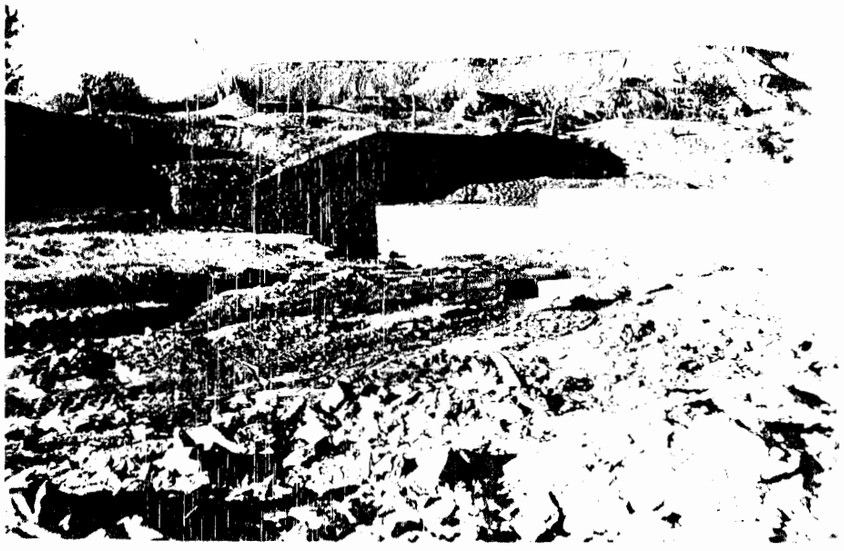
Moencopi Wash.

Moencopi Wash lies south of Tuba about a mile. This stream drains a large area and while the normal flow is very small it is subject to very large floods.

Tuba and the surrounding country was purchased by the Government from Mormon settlers who came in there at an early date. These people had diverted water from this Wash over several hundred acres of bottom land which they had in cultivation at the time of the Government's purchase. Almost every year they were obliged to rebuild their diversion dam and after the purchase by the Government the dam was rebuilt quite a number of times in the same general manner and had gone out with each reoccurrence of flooods.

Early in 1909 plans were made for extending the ditch 1800 feet up the stream and constructing a dam. This work was done during 1909 and 1910. A very large flood in 1910 which carried logs and trees brought down from the mountains above, badly damaged this dam, and it was decided to cover the loose rock with slabs of concrete and with a concrete wall above and at the toe of the dam. This was done and at the same time the spillway was lengthened from 100 to 140 feet. This was followed within a short time with an excessive flood which not only filled the channel of

Moencopi Wash Dam



West end of dam finished

Excavating for water cushion

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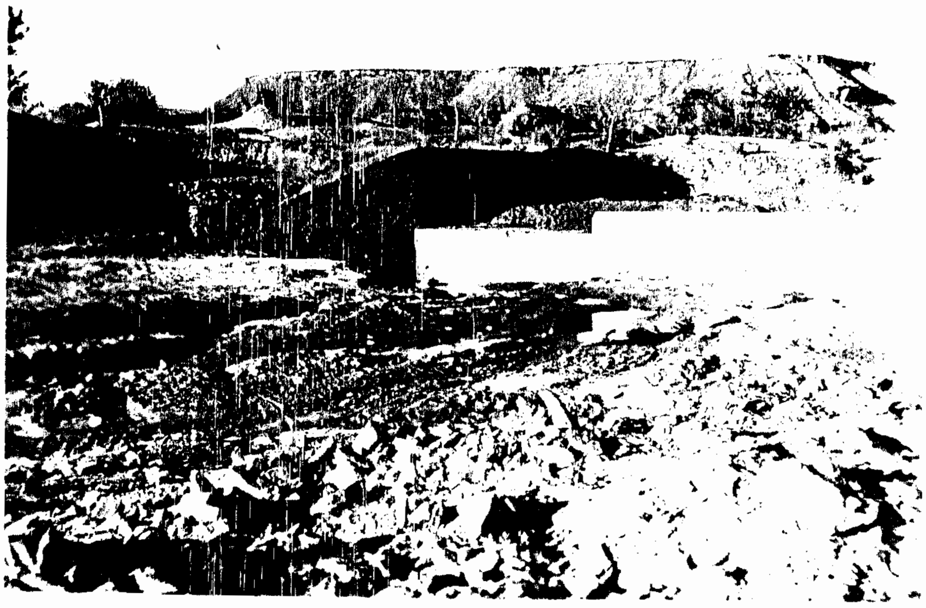
Moencopi Wash Dam



West end of dam finished

Excavating for water cushion

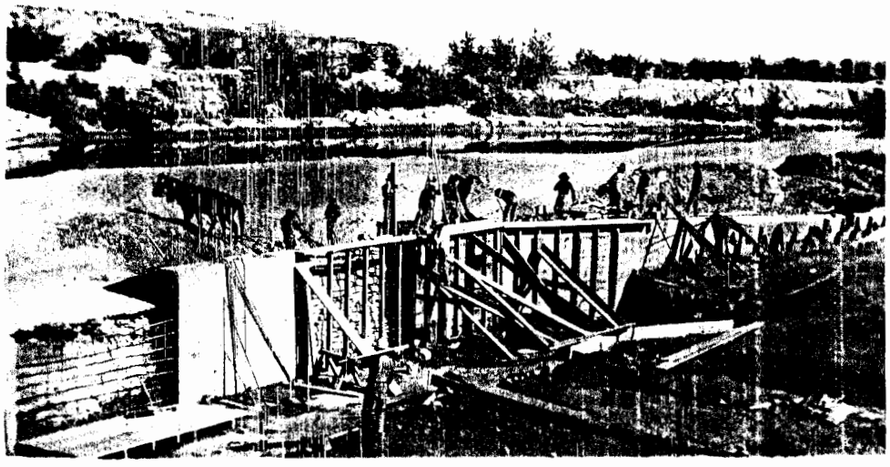
the stream, but passed over the headgates which are 13 feet above the crest of the dam and about 40 feet of the center of the dam was again destroyed.

Repairs to this dam were under way at the end of the last fiscal year. It was expected that this dam would be completed during that year, but the summer rains began six weeks earlier than usual and after the work was all opened up and concreting had commenced, floods in the stream brought down great quantities of mud and sand and covered the opened work to a depth of five feet. One flood after another followed during the summertime, and it was the middle of August before work was resumed. On the 3rd of September the largest flood of the season came down again burying the work, but in spite of the drawbacks the concrete was all placed during the month. During October the head section of the ditch was cleaned out and a sandbox and wasteway constructed about 1800 feet below the head, and the work on the Project was completed about the middle of September.

The bedrock at the dam site is a very soft red shale which becomes soft when in contact with water, and it was the disintegration of this shale that caused the center portion of the old dam to wash

Moencopi Wash Dam

West end of dam before building concrete face



Sections finished; placing concrete and showing reinforcement

out. In rebuilding the dam this rock was excavated below the dam and a water cushion two feet deep and 16 feet wide was constructed. The length of the dam was increased to 150 feet and the masonry wall at the gate was carried 25 feet further down stream and a riprap wall put in for about 30 feet further. On the south end of the dam a masonry wing wall was built 25 feet downstream and the same distance upstream. All of these walls are carried about 7½ feet above the crest of the dam, and the dam should now pass a flood of over 12,000 second feet before the wing walls are overtopped.

For a full discussion of the construction of this dam you are referred to Monthly Reports and to a special report of Assistant Engineer Baker of January 21, 1915. The cost data pertaining to this construction will be found on a separate page.

Moencopi Wash Dam

Above dam as flood receeds

Falls in Wash 1800 feet below dam.
This shows the stream running liquid mud

UNDERGROUND WATER DEVELOPMENT.

Camp of Foreman Womack at Chin Lee Arizona
where he is setting up steel tanks
for the wells, and building troughs
cutting pipe etc. for errection as
wells are developed. Tanks
are shipped knocked down.

UNDERGROUND WATER DEVELOPMENT.

The underground water development includes well drilling on the Navajo and Hopi reservations, spring development on the same reservations, well drilling on the Pueblos, and well and spring maintenance.

This work is considered the most valuable that this Service is doing in the Southwest. The Navajo and Hopi reservations are in the most arid portion of the United States, and these Indians depend almost entirely upon their flocks of sheep and goats for their subsistence, which is eked out by a few cattle and by the cultivation of little tracts of land where available.

Places where water in sufficient quantity for irrigation can be found are very limited. Water for stock purposes is scattered over the reservation, and at certain seasons of the year is found at frequent intervals because of small rainwater lakes, ponds which are filled during the rainy seasons, or by the melting of the winter snows. These frequently dry up, leaving large areas without any water.

There are also large tracts where there is no water that can be used for stock purposes, and many of these areas are well supplied with grass. It is to supplement the water supply, enabling the Indians to cover greater areas of land with their flocks and to

Und. W.
Dev-2

furnish them fit water for domestic purposes, that these operations are carried on. Five well rigs are operating, four of them in the Navajo and Hopi country.

Well Rig No. 1 is a large rig which has been exploring for artesian water. The rig was moved into the Choiska Valley at the end of last year in a region where it was thought artesian water could be found. The nearest water to this point is nine miles distant, so the first thing to do was to obtain a supply of water for the drilling operations. Two wells were put down before a supply was secured. Work was commenced on the deep well, which is now over 950 feet deep. Artesian water has been encountered in small quantities at 924 and 935 feet, the total flow now being 90 gallons an hour. It is expected that an additional flow will be struck at greater depths as we are working in a formation in which we find alternate layers of an impervious fire clay and waterbearing sandstone. The chances look very favorable for securing sufficient quantities of water in this valley to make it feasible to develop wells for the purpose of irrigating lands for the Indians.

The other well rigs working in the Navajo reservation have put down 27 holes. Eight of these

holes aggregating 2770 feet failed to secure water, or if they did the water was bad. Nine good wells have been developed with a total depth of 874 feet.

As shown in the annual report for last year, for lack of funds for maintenance quite a number of the wells were out of commission, and a large number of the wells had not been provided with tanks and troughs. Well Rig. No. 4 has put in a considerable portion of its time for the past year in overhauling these wells, and Foreman Womack, who has charge of the spring development, has put in considerable time in setting tanks, troughs, etc. at the wells as fast as they were put in shape.

Quite a number of the wells in the Chin Lee Valley had been left at comparatively shallow depths where water had been found in fine material, the experience that we have had during the past year demonstrating that water could not be developed in this fine material in sufficient quantities to supply a windmill, for two reasons. First, the fine material would block up any screen that we could put in, preventing the water from flowing into the cylinder, and second, the movement of water through this fine material was so slow that sufficient quantities were not available. When the wells were first put down, this

fine material was saturated and it seemed that there was a sufficient supply for all purposes, but after pumping a few weeks or months, the supply would become exhausted. Several of the wells heretofore reported as from fair to good have been abandoned, or redrilled at another point nearby.

All of the wells overhauled, and this includes practically every well drilled in the Navajo country, have been put in first class shape, have been equipped with windmill, tanks and troughs, and should be furnishing an abundant supply of water.

A table is enclosed showing the operations of each of the well rigs, depths drilled and cost of work, and graphic logs of the wells showing material passed through and all conditions encountered.

In the Hopi country no wells have been put down during the past year, but all of the wells have been looked after at regular intervals and are all in good shape. The springs where work has been done have also been looked after at frequent intervals to prevent deterioration of the improvements made.

Pueblos.

Well Rig No. 5 which has been operating in the Pueblos, put in the first couple of months of the year in overhauling all of the wells put down on the Acoma and Laguna Grants, that when the outfit left that region