

Reservoir.
Supplemental
report relative
to silt.

5-1148

DEPARTMENT OF THE INTERIOR
UNITED STATES INDIAN IRRIGATION SERVICE
SUPERINTENDENT OF IRRIGATION

Albuquerque, N. M., February 14, 1912.

The Commissioner of Indian Affairs,
Washington, D. C.

Sir:

I am in receipt of a telegram from Mr. J. L. Hubbell, of Ganado #Arizona, and now in Washington, that "matter of reservoir held up in Interior Department on account of silt report" and who requests that I make the matter a little more clear to the Department than my report of January 29th seemed to do.

The silt tests made on the Rio Pueblo Colorado were not extensive as they should be as it was impossible to keep a man there to sample the water. The samples secured were taken by Mr. Forrest M. Parker, at Ganado and forwarded to me, bottled. The maximum floods showed a silt and sand carrying capacity of $6\frac{1}{2}\%$ and lesser floods $2\frac{1}{2}\%$, but there are long periods when the stream is low when the water is practically clear, and I estimate that there is sufficient quantity of this practically clear water to fill the reservoir once.

Field
Of the samples taken a considerable percentage was found to be a heavy sand carried in suspension by the velocity of the water, as the stream is wide and shallow with a heavy fall. While there was no definite analyses made of this silt, at least two per cent in the maximum floods will be found to be of this sand which can be separated from the water by checking its velocity. That is to say: about one third of the total solids in the samples taken can be prevented from going into the reservoir with proper precautions.

The plans submitted in my report of October 15, 1910, were more or less tentative, and not entirely complete as the work would be built.

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The additional cost of caring for this sand would be nominal, and the following is submitted. In the diversion dam (prints of which are enclosed), several sluice pipes, probably three, spaced 30 feet apart, will be placed at the bottom of the channel about ten feet below the floor of the head gates, which will be provided with valves or gates. The capacity of these pipes will be sufficient to carry all ordinary floods of the stream. During times of flood these gates to be opened sufficiently to carry all water not admitted to the canal, and in any event approximately one half of the flow. The action of these sluices is apparent. The diversion dam by checking the top velocity will cause the sand in suspension to settle to the lower part of the flow, where it will be carried out through the sluices. The top water will enter the headgates of the canal by dropping over flash boards and will carry only the finely divided silts. A sand box could also be installed in front of the gates. In this way the solids carried by the water will be greatly reduced and should not exceed 4% during the largest floods.

Now assuming that the average flood carries 4% of silt, which can readily be seen is excessive, and that one filling is made by storing the winter flow, which is clear, the average silt content of the two fillings will be 2%.

At this rate the reservoir will be filled with silt at the end of 35 years. At this time it will be very easy to provide extra storage by raising the dam. An additional 4 or 5 feet can be added to the dam and still use the proposed headworks, with very little cost for the diversion.

The situation will allow the dam to be raised 35 or 40 feet higher than planned, but this will mean additional expense for a long diversion. It has been brought to my attention since making the report on the project that some two or two and one half miles above the reservoir site are two lakes similar to the one in the present reservoir site, and that it will be possible

to divert the stream into these lakes, and carry the overflow into the proposed reservoir under discussion. This being the case it will be a comparatively easy job to raise the reservoir dyke to any height desired and carry the water into it after the present reservoir is silted to an extent that makes it necessary. And in the case such a plan is carried out, the upper lakes will form a settling basin and very little silt will be carried into the lower reservoir.

I do not consider that this plan is the best one at present as the first cost of the project would be prohibitive, but after land has been in cultivation under the proposed plan for a period of 35 years, or even 25 years, the land will have increased in value and earned enough to make the further work perfectly practicable, and not excessively expensive.

As a check on the above assumption of silt, we may take the performance of the Zuni Reservoir during the past nine years.

The Zuni project is not so favorably situated as is the Ganado project since it closes the entire water way and stops all of the silt and sand carried down by the water, while the Ganado reservoir will only take silt in proportion to the water stored and does not have to carry the burden of the floods passing the headworks of the intake canal.

The water shed conditions of the two projects are quite similar and the rainfall and runoff so far as known do not differ much.

During the past nine years the Zuni Dam has caught 3179 acre feet of silt which amounts to 2.2% of the capacity per annum. A portion of silt will pass the Ganado Dam - all of it stays in the Zuni Reservoir, which will go far to prove the assumption that assuming an average of 2% as the amount that may be expected to be deposited in the Ganado Reservoir is if anything, too large, and that in estimating the life of the reservoir at 35 years we are on the safe side.

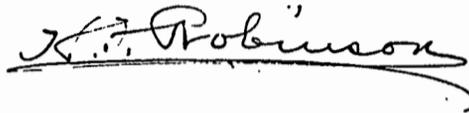
The ease with which the reservoir can be enlarged as its capacity grows less, and the earning power of the lands under it increases is such an additional fac-

tor of safety, that it would seem to make the project a good and a safe one.

The fact that there is so little water on the Navajo Reservation and the needs for irrigation and agriculture are so great would seem to make it advisable to take a few chances, and incur heavier expences per acre for land reclaimed that under other conditions.

While the data is meagre and much of the above is assumption, still it is my belief, based on 26 years experience in irrigation work in this southwestern country that the statements are very nearly correct.

Very respectfully,

A handwritten signature in cursive script, reading "H. J. Robinson". The signature is written in dark ink and is underlined with a single horizontal line.

Superintendent of Irrigation.

Copy to Mr. Hubbell
for his information.