Van Neuffer

U. S.
INDIAN
IRRIGATION
SERVICE

DISTRICT
NO. 5.

ANNUAL
REPORT

1 9 3 1

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GANADO PROJECT

This project is located on the Navajo Reservation. It consists of a concrete diversion dam, feeder canal, and storage dam having a capacity of 2600 acre feet. The main canal is 9.69 miles long with 3 miles of laterals. The irrigable area of the project is estimated at 1200 acres of which 703 are under cultivation; 552 by Indians, and the balance by J. L. Hubbell and the Ganado Mission. The Indians produced crops during the past year valued at $35,790.30.

During the early part of the fiscal year torrential rains fell over the project area and on August 8th one of the highest floods of record occurred in the Rio Pueblo Colorado from which stream the project receives its water supply. There was sufficient water available in the storage reservoir during the past year to supply the needs for irrigation and at the close of the irrigation season there were approximately 1200 acre feet in storage. At the inception of the 1931 season, which began on May 27th, there were 1656 acre feet of water in the reservoir.

During the past year the North and South side canals were enlarged and a flume on the south side

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constructed to replace one previously washed out which will make an additional 150 acres of land available for cultivation.

A silt trap was constructed in the main canal 300 feet below the head gates. This was to replace a small sluice gate 18 inches in diameter placed at approximately canal grade. The silt trap constructed consists of a 36-inch corrugated culvert pipe placed 4 feet below the present grade of the canal, complete with head wall and gate. A weir wall was placed across the canal at right angles to the head wall of the sluice gate structure, the lip of the weir being at the present canal grade. This structure provides a silt trap 4 feet by 12 feet wide at the sluice gate, the grade tapering back 300 feet to the canal gate elevations. During flood stages of the river and when water is being diverted, the sluice gate is left slightly open, depending upon the volume of water in the canal. During low water stages the gate is opened several times during the day and all of the sand deposited in the trap sluiced back into the river.

There were a number of brush and rock jetties placed in the Rio Pueblo Colorado to prevent erosion

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to farm lands. Most of this work was done voluntarily by the Indians without compensation from the Government.

The Indians farming on the Ganado Project have been organized into a water users association which meets regularly on the 4th day of the month to discuss any problems in connection with the project. This organization has performed certain work on the project without cost to the Government and during the early spring months removed 1000 cubic yards of earth and rock from a slide at a contract price of $100.00.

The Indians performed their proportionate share of the annual spring cleaning of the canals, and the J. L. Hubbell Ranch and the Ganado Mission employed the Indians to perform their proportionate share of the annual maintenance. During the past year the Indians performed labor on the project without cost to the Government in the amount of approximately $1,820.00.

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CRYSTAL PROJECT

This project is located thirty miles north of Fort Defiance, Arizona, on the Navajo Reservation. It receives its water from Crystal Creek where there is a continuous flow of water for the irrigation of the lands on the project. This project consists of a log crib diversion dam and five miles of canal. There are 700 acres irrigable of which 156 were under cultivation during the past year, producing crops valued at $11,760.00.

Work performed on the project during the year consisted of repairs to a flume which was partially destroyed by logs floating down from an old diversion dam which the Indians had constructed some thirty years ago, and placing small jetties to prevent erosion of the stream bank. In repairing the flume a 36-foot truss was constructed to take the place of two 18-foot spans. This was done to provide a clearer waterway for the flood waters of that stream.

The Indians farming on this project have formed a water users association and meet regularly to discuss project affairs and elect officials to take charge of the canal system for a period of one year.

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MARSH PASS PROJECT

This project is located at Kayenta, Arizona, and receives its water supply from Laguna Creek, an ephemeral stream. The project consists of a log crib diversion dam and about three miles of main canal. There are 250 acres of irrigable land on the project of which 118 were under cultivation in 1930, producing crops valued at $2,087.00.

About 50 feet of the apron of the log crib diversion dam were destroyed and temporary repairs were made to the structure by placing loose rock and grouting it with concrete to form a new apron, repairs being considered only temporary in view of the fact that a complete rehabilitation of the project is contemplated.

The Indians assisted in the repair of the diversion dam, hauling and placing all of the rock and assisting in the mixing and placing of the grout on the rock to repair the apron. Labor in the amount of $300.00 was performed by the Indians without cost to the Government in the repairs to this project.

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RED LAKE PROJECT

This project is located fifteen miles north of Fort Defiance, Arizona, on the Navajo Reservation, and consists of a diversion dam, feeder canal, and storage reservoir having a capacity of 4500 acre feet, with three miles of main canal and several miles of laterals which have been extended by the Indians. There are 700 acres of irrigable land of which 146 were under cultivation during the past year, producing crops valued at $10,725.00.

Repairs were made to a flume which had been partially destroyed by flood waters from a side arroyo on the project. This work consisted of replacing one bent and about 15 feet of new flume material was required in this replacement.

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CHIN LEE DOMESTIC WATER SUPPLY

Funds in the amount of $4,500.00 were turned over to the Irrigation Service for the purpose of developing a domestic water supply at Chin Lee.

Tests were made for the location of an infiltration system and it developed that there was apparently an abundance of water about one mile west of the Chin Lee School and on the south bank of the Chin Lee Wash. There were other locations where water-bearing sands were found but because of the fineness of the sand it was impracticable to construct an infiltration system. The site selected is near the Irrigation Service headquarters at Chin Lee and where the porosity of the gravel and sand is such that a comparatively free flow of water can be developed in an infiltration system.

This work consisted of sinking a 12-foot diameter reinforced concrete caisson equipped with a 33-inch steel shoe. The caisson was sunk to a depth of 40 feet where an abundance of water was obtained for the Chin Lee School.

In addition to the caisson, four well screens 10 feet long and 4 inches in diameter were sunk in the bottom of the well to provide additional infiltration.

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KEAMS CANYON DOMESTIC WATER SUPPLY

Funds in the amount of $8,000.00 were turned over to the Irrigation Service for the construction of a domestic water supply for the Keams Canyon Boarding School at Keams Canyon Agency.

This work consisted of sinking a reinforced, octagon-shaped, concrete caisson to the depth of 48 feet in the Keams Canyon arroyo. Previous tests indicated that there was an abundance of water in the arroyo bed and that the porosity of the gravel would allow an overflow into the infiltration system at a depth of approximately 50 feet; however, the bottom of the arroyo bed was at 72-foot elevation below the normal ground surface.

The reinforced caisson was equipped with a 33-inch steel shoe in order to insure more rapid penetration and to insure proper seeding in impervious stratas which were expected to be encountered in the bottom of the arroyo. The sinking of the caisson was accomplished by excavating the material on the inside by the use of an orange-peel bucket. Considerable trouble was experienced in sinking this caisson due to the excessive amount of water encountered which required constant pumping while the excavation was in progress. A supply of 14,000 gallons per day was obtained.

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In addition to the reinforced concrete caisson which was equipped with infiltration windows, four well points 10 feet long by 4 inches in diameter, were sunk in the bottom of the well.

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ORAIBI DOMESTIC WATER SUPPLY

At the request of Superintendent Miller at Keams Canyon, funds in the amount of $4,325.00 were turned over to the Irrigation Service for the development of a domestic water supply at the Oraibi Day School.

Water was developed by sinking a 12-foot diameter reinforced concrete caisson with steel shoe. Infiltration windows were provided by leaving apertures in the reinforced concrete caisson. The caisson was sunk to a depth of 63 feet and supplied 24,000 gallons of water per day. The concrete caisson was equipped with a 33-inch steel shoe in order that penetration may be more rapid and to prevent a free flow of sand from crowding in on the excavation. The material was excavated by means of an orange-peel bucket, using a double drum hoist equipped with a 16 HP motor to furnish the necessary power.

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FLOOD PROTECTION OF LEUPP INDIAN SCHOOL

During the fiscal year 1931 a request was made that this District send an engineer to assist Superintendent Balmer in the construction of dikes and repairs to old dikes to protect the School from floods. In view of the fact that the work had to be undertaken under adverse conditions and at a time when the entire area adjacent to Leupp and completely surrounding the School was under flood water, considerable difficulty was experienced in repairing the old dikes and constructing new dikes. In order to accomplish this work it was necessary to ship a dragline from Albuquerque to Canyon Diablo and thence overland to the Leupp School.

The work accomplished consisted of raising and widening 11,550 linear feet of old dike and completely reconstructing 300 feet of old dike which had been entirely washed out. In this connection 36,450 cubic yards of earth were removed in order to protect the dikes from flood waters. One thousand and seventy five units of Kellner jetties 2x2x¼"x12' and considerable brush bank protection was installed immediately above the dike section for the purpose of protecting the levee from erosion.

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The total cost of the work during the fiscal year 1931 was approximately $35,000. No detailed costs were kept by this office as the funds were expended by Superintendent Balmer.

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WATER SUPPLY, NAVAJO AND HOPI

Water development on the Navajo and Hopi Reservations is for the purpose of developing stock and domestic water for the Navajo and Hopi Indians which total 40,500 in population, and their combined flocks of sheep and goats amount to approximately 1,200,000 head. In addition to this they have a number of cattle and horses ranging on the reservation. The entire area of the Navajo Reservation comprises some 14,360,000 acres on which the rainfall varies from 4 to 14 inches per annum.

In the development of stock water for the entire reservation, which has been over a period of some twenty years, it has been impossible to keep the water supply development apace with the grazing demand on account of the rapid increase in the flocks and herds. As fast as water could be developed there was an immediate influx of excess stock and as a consequence of this overgrazing of the reservation the grass and forage has been practically depleted and it is now estimated that on the areas adjacent to water supplies the grass coverage is about 20%.

To meet the situation which confronts the Indians

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at this time, according to grazing experts it appears to be necessary to reduce the flocks to about 700,000 head and the water development program will have to be speeded up in order to meet the range conditions sufficient to allow the grass to reseed itself around the areas which are now overgrazed.

During the past year the construction work was confined to the development of springs, building small earthen dams to create reservoirs, digging shallow wells, drilling deep wells, and constructing reinforced tanks and troughs.

In deciding upon the locations of water development, the superintendents were consulted and as far as possible the development undertaken on the areas where the greatest benefit to the Indians would be derived.

There is very little live water on the Navajo Reservation and that is confined to a small area in the northcentral part of the Southern Navajo Jurisdiction on the west slope of the Choiska Mountains.

In addition to the construction work as outlined above, maintenance work is performed on all of the

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water developments. In this connection one crew is employed continuously and another crew part of the time. As many of the wells were drilled some twenty years ago, it is now found necessary to replace the casing, windmills, tanks, and troughs, as well as keep all windmills and other equipment in repair.

During the past year the maintenance crew constructed 70 reinforced concrete troughs to replace metal ones which had deteriorated beyond use and in addition constructed small reservoirs at windmills to impound excessive water over the amount held in the concrete storage tanks.

The following is a summary of the development work for new water supplies during the fiscal year 1931:

	Springs & Conc.troughs	Dug wells & Conc.troughs	Reservoirs	Drilled Wells	Total
Northern	5	15			20
Southern	10	12			22
Western		1	6		7
Eastern			6		6
Hopi	9	4			13
Leupp	4	1		2	7
TOTALS	28	33	12	2	75

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Table of Developments to date as to
Type and Jurisdiction

Jurisdiction	Springs	Dug Wells	Stock Water Reservoirs	Artesian Wells	Drilled Wells	Totals
Eastern	4	4	19	8		35
Southern	52	46		4	35	137
Leupp	23	6	4		4*	37
Western	55	26	28		4	113
Hopi	78	15		4	30	127
Northern	105	54		7	4	170
TOTALS	317	151	51	23	77	619

*Drilled fiscal years 1930-31; others drilled 1910-26.

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