Water Resources Survey

Part I:

HISTORY OF LAND AND WATER USE ON IRRIGATED AREAS

Musselshell County, Montana

Published by
STATE ENGINEER'S OFFICE
Helena, Montana, July, 1949

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State Engineer	Fred E. Buck
Assistant	Gerald J. Oravetz

STATE WATER CONSERVATION BOARD

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MONTANA STATE AGRICULTURAL EXPERIMENT STATION

O. W. Monson	Irrigation Engineer and Consultant

July, 1949

Hon. John W. Bonner
Capitol Building
Helena, Montana

Dear Governor Bonner:

Submitted herewith is a consolidated report on the Water Resources Survey of Musselshell County, Montana. This work is being carried on by funds made available to the State Engineer by the Thirty-first Legislative Session, 1949, and in cooperation with the State Water Conservation Board.

The report is divided into two booklets—part one consisting of the history of land and water use, irrigated lands, water rights, etc., while part two contains all of the township maps showing in color the lands irrigated from each canal.

The office files contain minute descriptions and details of each individual water right, water and land use, etc., which are too voluminous to be included herein. These office files are available for inspection to those who are interested.

Mr. Gerald J. Oravetz, Assistant State Engineer, has directed the detail office and field work of this project and is entitled to much credit for the excellent accomplishment.

Respectfully submitted,

FRED E. BUCK, State Engineer

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Acknowledgments

A survey and study of water resources involves many phases of work in order to gather the necessary data to make the work both complete and comprehensive. Appreciation of the splendid cooperation of various agencies and individuals who gave their time and assistance in gathering data for the preparation of this report is hereby acknowledged.

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Cooley-Goffena Irrigation System
&
Goffena-Sudan Ditch ..... L. W. Goffena, Manager

Roundup City Water Department ..... Frank Liebetrau, City Engineer

Naderman Ditch Company ..... Clarence Lindstrand, Secretary

Musselshell Ditch Company ..... Judge F. V. Watts, Secretary

Foreword

In nearly all of the 17 Western Reclamation States a water right is obtained by first making a filing with some legally designated central state agency— usually the State Engineer's Office—setting forth the amount of water desired and the area proposed to be irrigated. A study is then made of the sufficiency of the water supply and, if found adequate, a permit for use of the water is issued and recorded. If studies show that the stream is depleted, the application is denied. The procedure in Montana, however, is vastly different.

In Montana a right to the use of water from a stream not adjudicated by the courts is acquired by posting a notice on the stream and filing a copy of same in the office of the county clerk of the county wherein the appropriation is located, and by proceeding to divert and use the water. Where a person diverts and uses water from a stream without posting or filing a notice, a water right based thereon has been recognized as valid by the courts. Whenever it becomes necessary to adjudicate the stream, both methods of acquiring rights have been recognized by the courts, and the amount of water finally decreed and dates of priority in either case are determined by the evidences and proofs.

Under Montana law there is no restriction as to the amount of water one may designate in his notice of appropriation. As a consequence, the amount set forth in the filing in no way indicates the amount being diverted and used, nor does it show whether or not the water was ever used at all to perfect the right. Nor is there any relation whatsoever between the amount filed on and the normal flow of the stream. To further complicate this matter, our courts have made it almost impossible to prove the abandonment of a water right.

There is no central office in the State where recordings are filed, or any supervision over the distribution of water from unadjudicated streams. One wishing to study the validity of a water right must make a search of the county records wherein the stream is located and perhaps two, three, or more counties if the stream courses through them. About the only result one will accomplish by such a research will be a tabulation of the dates of filing. The amounts of water filed on will be of no consequence; there is no conclusive evidence that the recorded appropriations have been perfected, and there is no record of the rights which are being used but never recorded. Therefore, a purchaser of ranch property, where he has to depend upon irrigation from a stream that is not adjudicated, has no way of determining the validity or priority of his water right. He has no assurance of the value of the right until the stream is adjudicated by the court, when each claimant must prove his claim by material witnesses.

The pioneers who are able to offer direct testimony in adjudication suits are rapidly passing on. One phase of this Water Resources Survey is to obtain all of the first-hand information possible on water and land use from the "old-timers" who are left, before it is too late. These data will include every known water right up to the time of completing the work in the respective counties, and the information will be on file for inspection in the State Engineer's office. At the time of this publication, Yellowstone, Carbon, Stillwater, Big

Horn, Custer, Rosebud, Musselshell, Golden Valley and Wheatland Counties are completed, with work progressing on Meagher County. A prospective land purchaser, after studying the record in these counties may have a good idea of the sufficiency and priority of the right appurtenant to the land in question.

In this and succeeding volumes of the data compiled by this Water Resources Survey, it is the intention to provide as much information as is possible relative to the water right records of the various counties, as well as to assemble such other information as may be available from all sources having knowledge of these various water rights. Every precaution is being taken to avoid errors in the compilation of these data.

The results of this work were used in negotiating the Yellowstone River Compact between the States of Wyoming, North Dakota and Montana. In arriving at an equitable division of the waters between the states, it was necessary for Montana to have a catalog of its irrigated land and water use. This same question may arise in other river basins. Again, it is highly important that Montana gather such data, and thereby be able to defend its water rights in the development of the great river basins of the Missouri and Columbia Rivers.

The subject of water rights is coming more and more into prominence as the rapid expansion of our irrigated area proceeds under the impetus of both State and Federal development programs. As new canals are dug and old canals and ditches are enlarged and extended, the relative area of land to be irrigated, compared to the water supply available for irrigation, becomes greater, and a competition for the limited water supply results, which often develops into controversy over the right and ownership of the water.

In a strict sense a "water right" on a live stream does not imply ownership in the same way as does a deed to a tract of land or a certificate of title to an automobile. A water right implies only the right to divert and use water from river or stream. Water when stored in a reservoir, however, is recognized as real property which may be sold, or disposed of as desired by the owner. The ownership to the water of our rivers and streams rests in the State and the rules under which the State grants to the individual the right to use these waters are known as Water Right Laws.

The early settlers in Montana took up land under the provisions of the Homestead Law of 1862 and the Desert Land Act of 1877. The former act gave 160 acres of land to anyone who settled on it and put it in cultivation. The latter gave 640 acres of land to anyone who would irrigate it and pay the government $1.25 per acre. In 1890, filings under the Desert Land Act were reduced to 320 acres. The construction of ditches on desert claims was in compliance for title to land, rather than for irrigation, and little attention was paid to the water supply available. Consequently miles of ditches were dug through which no water ever flowed. This is especially true in the drier parts of the state, where the diversions were made from intermittent streams.

In the more fertile mountain valleys irrigation was given more importance than in the plains country. Live streams provided a dependable source of water supply and the ditches which tapped them were designed to actually carry water, not merely to comply

with a legal requirement to obtain title to a piece of land. Thus, the right to diversion and use of water for irrigation became as important as the acquisition of title to the land.

But, while the government granted a patent deed as evidence of title to the land upon proof of compliance with the Homestead Laws, there was no deed, certificate of title or other legal instrument offered as evidence of title to a water right.

Water rights refer also to other uses than irrigation. Thus, the authorized use of water for mining, power, fish hatcheries, bird refuges, recreational purposes, municipal needs for culinary supply and sewage disposal, manufacturing, or navigation, all may become valid water rights.

The first irrigators took for granted their right to use water from creeks or rivers for irrigation. They saw water going to waste and appropriated it to their needs. It was as free to them as the air they breathed. They made no official record of the game they shot for food or the fish they caught in the streams and likewise considered it unnecessary to make official record of the time, place, or the amount of water diverted for irrigation. However, time has changed these conditions and it is now necessary to record the game killed and limit the fish catch, and also file a claim for the water appropriated from the streams and rivers for irrigation or other use.

When game was plentiful, no one concerned himself with the number of deer a person killed, but when game became scarce, steps were taken to prevent a few persons from taking more than their share while others had to go without. To do this it became necessary to issue licenses or permits to kill game and also to keep a record of game killed, a practice which is still followed.

Likewise, when only a few settlers diverted water for irrigation and the supply was more than enough for all, no one was concerned about the exact amount used by any one person. But as more and more settlers constructed diversion dams and ditches and tapped the rivers and streams for irrigation water, it soon became evident that there would not be enough water for all. Thus, a year with low water brought about disputes over the division of the supply. The older settlers, in such cases, demanded that the later comers close down their headgates and refrain from taking water, in order that the prior appropriations might have a full supply. The later users, on the other hand insisted that the available supply be divided among all users so that all might share alike.

Thus, progressive over-development of irrigation, together with the occurrence of seasons of water shortage, combined to bring about the enactment of Water Right Laws in the Western States where irrigation is practiced.

Method of Survey

Data incorporated in this report were obtained by the field survey method in cooperation with the irrigators on the land.

For irrigation systems under private ownership, water users were asked for specific information as to the source of water, present acreage irrigated, potential irrigable acreage under existing works, seeped acreage, condition of irrigation system, type of system, water supply, dates of priority, and the amount of water appropriated or decreed. This information was then recorded on a field form and later checked as to its authenticity.

The information in regard to the location of the irrigation system, present irrigated and potential irrigable lands, was indicated on aerial photographs with the exact location of each shown, and the various systems distinguished by color.

After the field survey was completed, the information was mapped on township maps from the aerial photographs, by means of projection, to insure the utmost in accuracy. In addition to the information pertaining to irrigation, all culture, drainage, section lines, etc., were taken in order to make complete and authentic township plats for the area concerned. This information was then mapped by farm units on individual farm forms that show the farm boundary, the location and type of irrigation system, location of irrigated and potential irrigable lands, present irrigated acres, potential irrigable acres, types of system, source of water, etc., with water filings attached. If the field survey information was complete, these individual farm forms were completed in the office. If not, the water user was again contacted in an attempt to complete the form. After these farm unit forms were completed, a summary was made of each township, which shows the name of the water user, section, township and range, source of water, whether a user has a private irrigation system or is under a ditch company or irrigation district, acres irrigated from each source, present irrigated acres, potential irrigable acres under existing facilities and maximum irrigable acres. The summary given in this report was tabulated from these township summaries to show the totals for the county. After this was accomplished and a final check made, color separation maps were drawn which included from 3 to 10 separation plates, depending on the number of colors that appear on the final township map in Part 2 of this report. Section and township corner locations were obtained by the photogrammetric system, based on Government land classification maps, county maps, plane table sheets and other sources.

This is the first survey of its kind ever to be consummated in the United States. The value of this work has been well substantiated by giving Montana its first accurate and verified information concerning its water resources under existing irrigation facilities. New lands to be developed by State and Federal construction agencies are not within the scope of this report. No effort has been made to analyze economic possibilities, or the problems of the irrigated projects, or to make recommendations as to their future development. The facts presented are as found and provide the items and figures from which a detailed analysis can be made.

Musselshell County

EARLY HISTORY

As the white man first came to Montana he found the Crows claiming the Yellowstone Valley from the western mountains to the mouth of the Tongue River. The immediate valley was claimed by the "Mountain Crows". Another group, the "River Crows", wandered more widely, centering on the Musselshell River and claiming the area from the mouth of the Musselshell west to Fort Benton and south to the Yellowstone. There were only slight differences between these two groups and they often lived together in entire harmony.

The white man's relationship with the Crows was almost uniformly peaceable, with little enough thanks to the white man. The first of a long series of general treaties, which involved the Crows and Eastern Montana Indians, was made in 1851 at Fort Laramie. This attempted to open up a wide path across the plains for the white man and involved pushing the Indian tribes closer together. The Montana tribes of Gros Ventre, Assiniboine and Crows accepted specified boundaries and in return were given annuities. The area of the Crow Reserve included roughly the area south of the Musselshell and west of the Powder River.

With continued incursion of whites into the area and the desire to possess more land, supplemented by demands for the curtailment of the reservations, more agreements were reached and the Indians gave up the larger portions of their reserve.

GENERAL INFORMATION

The permanent settlement of this region began between 1880 and 1885 when a number of cattlemen located along the streams. Some years before, horse-stealing had been carried on along the Musselshell and stock had been ranged on the rich grazing land which was formerly an old-time haunt of the buffalo, but no one ever attempted to get title to property. Later, when the sheep and wool industry was found to be safer and more profitable than cattle raising exclusively, land was taken up along the streams for the purpose of controlling the water rights.

Musselshell is the oldest town in the County. A trading post was established in this vicinity on the north bank of the river as early as 1877. In 1885 a store and post office were opened. The old Fort Custer-Maginnis road crossed the river at this point and for a long while the place was known as "The Crossing."

The present city of Roundup had its inception in the fall of 1907 when the first coal mine was opened in anticipation of the coming of the railroad the following spring. A coal camp, consisting of temporary shacks covered with tar paper and tents, was established and the name Roundup was borrowed from the old town by that name located about two miles from the present site of the city. Old Roundup, a collection of log cabins housing

a store, saloon, post office, blacksmith shop, dance hall and a small school house, for thirty years had been the gathering place of the ranchers and cow punchers up and down the Musselshell River. Annually the cattlemen combined to hold their roundup of cattle on the flat where the present city is now located—hence the name.

In 1907 the Chicago-Milwaukee and Puget Sound Railroad entered the area and was completed to Butte in 1908. With the completion of the railroad a new coal mining area in Montana came into production known as the Musselshell field.

EARLY AGRICULTURE

From the early eighties up to the time of the construction of the Chicago-Milwaukee and Puget Sound Railroad the area was an open range country under the control of English and Scotch livestock companies for the greater part, with managers and cow hands of the same descent. These companies usually maintained ranch headquarters in the river valley where livestock could be fed. It was here that irrigation was first practiced in the area. After the completion of the railroad the migration of homesteaders began and the transition from a cattle and grazing country changed to farming. Fenced tracts of 160 and 320 acres began to appear, which resulted in most of the better range and tillable land being put under cultivation. By the summer of 1911 most of the government land had been taken up and developed into farms. To further develop the farming movement, commercial organizations of the various towns began to make insistent demands upon the Northern Pacific Railway for the opening of its lands. Recognizing the previous benefit of that policy, the Railway placed these odd numbered sections on the market. By 1915 most of the tillable land was under dry land cultivation. Dry land farming prospered and land values increased rapidly until 1918 under conditions of abnormal rainfall and high prices.

This type of settlement has run its course, and experience has reversed the trend. Instead of the Government providing additional homesteads they have been purchasing lands in Musselshell County to liquidate any assets that dry land farmers may have had and have encouraged the planting of grass to dry land for grazing use. Much of these lands have been incorporated into Grazing Districts. All of the lands adjacent to the Musselshell River in the Musselshell Valley, in which the greater part of the irrigable and irrigated lands are located, is contained in the Lower Musselshell Soil Conservation District.

MUSSELSHELL COUNTY ORGANIZATION

The area of Montana east of the Continental Divide had an unsettled career in its political supervision until the formation of the Territory of Montana in 1864. Included in the Louisiana Purchase in 1803, this whole area was under the control of the Territory of Indiana until 1805 when the District of Louisiana became the Territory of Louisiana. When Louisiana was admitted as a state in 1812 , the northern portion of the Purchase territory was governed as the Territory of Missouri. When Missouri was admitted as a state in 1821, the whole northern region was designated as "Indian Country," to be set aside for this use "forever". The process of breaking down this sanctuary was soon under way however, and in 1854 the Territory of Nebraska took over the area of the present Montana

east of the Divide. In all of these political divisions though, Montana country received almost no governmental services beyond supervision of Indian affairs.

The incorporation of the area into the newly created Territory of Idaho in 1863 brought the first subdivision into governmental units and local organization for governmental purposes. The first legislative assembly of Idaho Territory in 1863 created eight counties for the present Montana area. A movement to secure the organization of Montana Territory was completed on May 26, 1864.

An act of the first territorial assembly of Montana, approved February 2, 1865, created nine counties, namely: Missoula, Deer Lodge, Beaverhead, Jefferson, Edgerton, Gallatin, Choteau and Big Horn. Soon a legislative battle for new counties began, and in 1887 Montana had 16 counties; in 1895, 23 counties; in 1913, 35 counties, which from then has increased to our present 56 counties.

Musselshell, one of the newer counties in the state, was created February 11, 1911 from parts of Fergus, Meagher and Yellowstone counties. It was named after the Musselshell River which traverses it from east to west. It is located just south of the geographical center of Montana. On October 4, 1920, Golden Valley County was created from the western part of Musselshell County and the northern parts of Sweet Grass and Stillwater Counties, leaving the county with a land area of 2,903 square miles. It is approximately 65 miles from east to west and 42 miles from north to south. Musselshell County is bounded on the north by Fergus and Petroleum Counties; on the east by Rosebud and Yellowstone Counties; on the south by Yellowstone County; and on the west by Golden Valley County.

Roundup, the county seat, is the principal trading center for the county.

TRANSPORTATION

The area is served by the main line of the Chicago-Milwaukee, St. Paul and Pacific Railroad which traverses the county in an east-west direction along the valley of the Musselshell River. Following this same course is State Highway No. 6, while U. S. Highway No. 87 traverses the county from north to south. In addition, the Greyhound Bus Line, Roundup Transit Company and Canyon Bus Line offer passenger and small freight service. Freight lines, such as Consolidated and Northwest also serve the area. County roads are generally of improved earth and gravel construction. In parts of the county some of the roads are mere trails, but with good weather conditions are passable the greater part of the year.

CLIMATE

The climate in Musselshell County is distinctly continental in character and characterized by abundant sunshine, low relative humidity, light rainfall, and wide daily and seasonal variations in temperature.

Seasons are likely to open and close at unusual dates. Winters are moderately cold, with many open and mild. Cold waves occur almost every winter with varying severity, but they are not prolonged as a rule and are often broken for extended periods by the occurrence of chinook winds.

The warm days of summer are tempered by cool nights. While the summer season is usually short, it is made up to a large extent by long days of abundant sunshine which, aided by moderately high altitude and a clear, thin atmosphere, rapidly promotes crop growth and largely accounts for the high nutrient quality of the grains and grasses grown here.

At Roundup, with an elevation of 3,226 feet, a broken record including 1914 to 1931, shows an average annual precipitation of 14.96 inches with 8.39 inches falling in the May-September period. The average maximum temperature for the same period was 59.1 with the average minimum 32.1, or an average annual temperature of 45.6. The average date of last killing frost in the spring was May 9th, with September 29th the date of the average first killing frost, making an average frost-free period of 143 days. Killing frosts have occurred as late as May 31st and as early as September 11th.

At Melstone, with an elevation of 2,897 feet, a broken record including 1909 to 1931, shows an average annual precipitation of 12.53 inches with 8.61 inches falling in the May-September period. The average maximum temperature for the same period was 60.1 with the average minimum 32.4, or an average annual temperature of 46.2. The average date of the last killing frost, in the spring was May 6th, with September 22nd the date of the average first killing frost, making an average frost-free period of 139 days. Killing frosts have occurred as late as June 1st and as early as August 25th.

SOILS

Most of the arable soils of the county are inherently fertile and are suitable for continued profitable cultivation when supplied with adequate and properly distributed moisture. Soils in the stream valleys and bottoms and on the first terraces or benches are, in general, the most productive. Most of these soils are of medium texture and have a good natural drainage, are free working, and are not subject to baking. The semi-arid climate of the area has restricted plant growth and the leaching of soil chemicals on undeveloped areas. This has resulted in a high lime content and light coloration of soils. In general the soils along the valley proper are generally quite fertile, easily tillable and are favorably adapted to cultivation under irrigation methods.

CROPS AND LIVESTOCK

The agriculture of Musselshell County consists chiefly of the growing of hay, small grains and the raising of livestock. Most of the irrigated land is used to produce alfalfa hay, some of which is occasionally left for seed production. During the early settlement of the valley most of the land was owned by large ranch operators, with the irrigated land being used to grow feed for their livestock. At present many of these ranches have been sub-

divided until there are numerous small livestock operators. These smaller operators generally raise some grain in addition to their livestock needs. The principal crops raised on irrigated land are alfalfa, alfalfa seed, wild hay, wheat, oats, barley and potatoes. Sugar beets are not grown in the area at present.

Cattle and sheep of good quality are the major types of livestock produced. Livestock numbers are high in this area at the present time. Cattle numbers are increasing but sheep numbers are decreasing due to insufficient labor.

The grazing lands are recognized as being of good quality. To date the relationship of grass to winter feed has been in favor of grass. Large quantities of hay and all other feeds have been imported into the valley in the past in order to provide adequate winter feed supplies. It is hoped that with the water available in Deadman's Basin and with the construction of the north side and south side canals near Melstone, by the State Water Conservation Board, it will be possible to increase the production of feed through irrigation so as to reach a better balance between winter feed and range.

The farmers on the dry land benches adjoining the valley usually follow the summerfallow small grain system of farming and in many cases supplement their income with livestock.

Under dry land farming methods wheat is the main crop, with the largest acreage being located in the northern and southwestern parts of the county. Dairy cattle are kept on most farms—some with sufficient numbers only to supply home needs and others with larger herds from which the sale of milk or cream is used to supplement the farm income. Hogs are raised to supply the home demand for meat with the surplus sold to local markets. Flocks of poultry are kept on most farms to supply the home needs, with the surplus of eggs or fowl sold locally or bartered for groceries. Some farms have colonies of bees for honey production.

NATURAL RESOURCES—COAL

The third coal mining area in Montana to come into production was the Musselshell field. The mines in this district are located in the Bull Mountains and ranges that are a part of that highland. Their development came with the building of the Chicago-Milwaukee and Puget Sound Railroad, which was completed to Butte in 1908. The Republic Coal Company opened mines in the Musselshell District in 1907. Development of Number 2 mine of the Republic Coal Company at Klein started in the fall of 1908, and after its completion Number 1 mine was permanently abandoned about 1910. Work on the old Keene mine on Horse Thief Creek was started in the spring of 1909 by the Keene Coal Company. What was known as Number 4 mine was opened in 1910 by the Davis Coal Company, which is now abandoned. In 1916 the Jeffries Coal mine on Horse Thief Creek was opened—the property there being worked by Jeffries Coal Mining Company for about 12 years, when its activities were transferred to the M & M property just east of Roundup in 1928. This property is now in control and operated by G. J. Jeffries (Jeffries Coal Company). The Williams mine, under the control of David J. Williams, was first opened in 1921. In 1930 Bair-Collins acquired the Prescott land adjacent to the old Number 1 mine and opened the Prescott mine.

In the Bull Mountain field 26 coal beds have been mapped. The coal is classed as a good grade of sub-bituminous, with the veins ranging from six feet to twelve and one-half feet in thickness. At present the principal mines in the area are: Bair-Collins Company mine in the vicinity of Keene with the tipple located in Keene. About 55 men are employed. The estimated coal reserve in the Company holdings at the present production rate of about 150,000 tons a year should last about sixty years. Coal is sold only in carload lots.

The Roundup Coal Mining Company mine, which until recently was the largest commercial mine in the state, is located in Roundup. In 1948 the total production was 156,000 tons with 366,000 tons in 1945. About 250 men are employed. The Company controls seven sections of coal land and estimate they have enough reserve to operate for about eighty years.

The Jeffries Coal Company mine, located about five miles southeast of Roundup, lease their property from the United States. About 400 acres are covered by this lease with an estimated reserve of about 9,000 tons per acre. About thirty men are employed with a production of from 45,000 to 55,000 tons a year. The coal is hauled by truck to the tipple, which is located in Roundup.

The Republic Coal Company, a subsidiary of the Chicago, Milwaukee, St. Paul and Pacific Railroad which is located at Klein, is a captive mine with nearly all of the coal being used by the Railroad. About 209 men are employed with a production of 1,700 tons a day. The Company has a coal reserve estimated to last about thirty years.

With the exception of the Republic Coal Company, coal is shipped to Washington, Idaho, a corner of Iowa, North Dakota, South Dakota, Minnesota and all parts of Montana. The market is limited to this area because of freight rate restrictions. These mines use electric powered machinery with power furnished by the Montana Power Company. In addition to the larger mines there are about thirteen small operators in the county.

OIL

One of the most spectacular periods in the history of Musselshell County was that attending the discovery of oil in Devil's Basin, eighteen miles north of Roundup, in November, 1919. Announcement of the discovery of oil electrified the entire area. As a result of the oil excitement Roundup experienced a considerable building boom. Following the original oil discovery by the Van Duzen Oil Company large sums of money were spent in the search for oil in the Devil's Basin area and in other promising oil structures in the County. With the Cat Creek discovery fifty miles northeast of Roundup the excitement abated. However, investigations have quietly been pursued since that time, with considerable oil activity in the area at the present time. Known producing structures at this time are the Ragged Point field with three producing wells from Kibby sand at about 4, 400 feet, with an overall production of 400 barrels per day. This is a second grade crude that is trucked to Great Falls. The Gage field, which is owned by the Northern Ordinance Company, has four wells producing at about 50 barrels per day. The Texas Company is operating in the Big Wall structure and has two producing wells. No data is available. The

Amerada Company, operating in the Geneva structure about twelve miles north of Keene, has one producing well and drilling two new wells. The oil is piped to Keene. No data is available as to output or type of crude. Information as to the overall oil activity is not available, but fragmentary reports indicate heavy leasing and much exploration work being done in the county by Carter, Continental, Amerada, Texaco, Trigood Oil and others.

Thus far, coal and petroleum have been the only minerals found in appreciable quantities, although there are deposits of brick clay and building stone, and it has been reported that a deposit of sapphires is located in the county, with several specimens having been found.

WATER SUPPLY

The principal stream in Musselshell County from which water for irrigation is diverted is the Musselshell River, which drains an area of approximately 9,000 square miles. The North and South Forks of the Musselshell River, which unite near Martinsdale, have their origin in (a) North Fork, Little Belt and Castle Mountains, and (b) South Fork, Castle and Crazy Mountains. The Crazy Mountains bound the watershed on the south, the Castle Mountains on the west, and the Little Belts and the Big Snowy Mountains on the north. These mountains are all high in elevation (6,000 to 10,000 feet), for the greater part are well timbered, and during average years of precipitation are good watersheds.

Numerous small streams enter the main river below the Forks. The main tributaries between Martinsdale and Shawmut are: Little Elk, Big Elk and Lebo Creeks and American Fork entering the river from the south, and Daisy Dean, Haymaker, Hopley and Antelope creeks entering from the north. Below this point the principal tributaries are: Fish Creek, which rises in the Cayuse Hills east of the Crazy Mountains and flows northeast to join the Musselshell River near Ryegate; Careless, Cameron and Pole creeks which rise in the Big Snowy Mountains and flow southeast to join the Musselshell River near Ryegate and Roundup respectively; Willow Creek, which also rises in the Big Snowy range and flows east and north to its confluence with the Musselshell; Flatwillow Creek which, with its two large tributaries Box Elder and McDonald creeks, rises on the northeastern slopes of the Big Snowy Mountains and flows east to join Box Elder Creek, which flows east to join the Musselshell River.

A study of available stream flow records covering a twenty year period at Harlowton indicates that the Musselshell River may be classed as an intermittent stream because of the usually high runoff in the spring and a deficiency of water for irrigation after July for areas lower down the stream. In order to improve this situation and provide additional irrigation water the State Water Conservation Board has constructed three storage reservoirs in the Musselshell River Drainage Basin. Two of these, the DuRand with a storage capacity of 7,029 acre-feet on the North Fork, and Martinsdale, an off-stream reservoir near the South Fork with a storage capacity of 23,185 acre-feet, provide additional water for irrigation in the Musselshell Valley above Harlowton. The third, an off-stream reservoir, is Deadman's Basin with a usable storage capacity of 52,000 acre-feet, making a total usable capacity of 82,214 acre-feet for the three reservoirs. The State Water

Conservation Board has filed water rights on all unappropriated water in the Musselshell Valley in connection with these reservoirs.

According to plans, the Board stores flood water during the flood season and in this way does not interfere with prior water rights on the streams during the irrigation season. The plan of operation is that water users will use the natural flow as long as available and then stored water will be released from the reservoirs for later irrigation needs.

DEADMAN'S BASIN PROJECT

The Deadman's Basin Project is located in Wheatland, Golden Valley and Musselshell Counties. This Project consists of a large diversion canal, which diverts water from the Musselshell River into a natural bench reservoir known as Deadman's Basin, and two outlet canals. The reservoir has a total storage capacity of 57,000 acre-feet, but 5,000 acre-feet of this amount is dead storage—thus giving a useful capacity of 52,000 acre-feet.

The supply canal diverts water from the Musselshell River in Wheatland County at a point about two miles below Winnecook, or about eight miles below Harlowton. It has a normal carrying capacity of 600 second-feet with three feet of freeboard, which give a velocity of 2.72 feet per second. It is possible to crowd the flow during high water periods to 787 second-feet, which would result in two feet of freeboard and a velocity of 2.92 feet per second. From the intake at the river to the discharge at the Basin the supply canal is 60,300 feet long. The intake structure of the supply canal consists of a concrete overflow weir and headgates built integrally. The overflow wall of the weir is 6 feet high and 184 feet long. On the right end of the weir an earth dyke 800 feet long prevents the Musselshell River from cutting around the weir, and on the left side of the headgate an earth dyke 500 feet long protects the headgate structure. Flow into the canal is controlled by two radial gates each 14 feet long by 6 feet high. The canal is carried under the railroad and highway by double concrete box culverts 7 feet by 6½ feet, 273 feet long, which includes two 20 foot transitions. Numerous concrete spillways along the canal protect it from being loaded beyond capacity.

At Deadman's Basin it was necessary to construct an earth fill dam across a low portion of the rim and a low earth fill dyke at another place. The dam is 1,065 feet long and the dyke is 625 feet in length. The dam has a maximum height above the natural surface of the rim of 25 feet, while the dyke rises only 12 feet above the rim, or only the amount of the freeboard. The following data applies to both structures: top width 26 feet, upstream slope 3:1 below water line and 2:1 above water line, and downstream slope 2:1. Elevations are: top of dam and dyke 3,923 feet; spillway crest 3,911 feet; lowest part of the Basin rim 3,898 feet; botton of cutoff trench (dam) 3,988 feet and flow line of outlet 3,872 feet. The spillway has a crest length of 30 feet, is 12 feet below the top of the right end of the dam and is capable of discharging a flood of 1,000 second-feet with a freeboard of 7 feet. The flooded area of the reservoir is 1,895 acres at spillway crest, or 1,980 acres with 5 feet of water over the spillway. The dam and dyke contain approximately 82,200 cubic yards of fill.

The outlet tunnel through the rim was driven through shale and sandstone under 110 feet of the dam sections. Under the balance of the fill section there is a concrete con-

duit 7 feet 6 inches in diameter. The total length including tunnel, conduit and end structures is 345 feet. An open ditch 1,330 feet long was dredged from the low spot in the reservoir to the entrance of the outlet tunnel. Water is controlled by two sluice gates, each 5 feet by 5 feet, operated through a concrete tower from the top of the dam. An outlet canal approximately two miles long allows the water to return from the reservoir to the Musselshell River below Barber.

Another branch of the outlet canal, approximately seven miles long, carries water out on the Franklin Bench and this water drains back into the Musselshell River through Careless Creek east of Ryegate.

Development of this project has been subjected to considerable colorful history. Various attempts had been made to build the project through private financing, state projects, etc., which covered a period of at least twenty-five years. Finally, when the F.E.R.A. came into existence the local people were successful in getting work initiated by that agency. When the W. P. A. replaced the F. E. R. A. it took the work over under sponsorship of the three counties involved and the State Water Conservation Board. After the sponsorship funds were exhausted the work was abandoned with the main supply canal about seventy per cent finished and no other work accomplished. This accomplishment covered a period from 1934 to about July 1, 1938 when the work ceased. Nothing further was done until May of 1939 when the State Water Conservation Board undertook to sponsor a new W. P. A. project, providing the Board could secure a loan of $135,000 from the Reconstruction Finance Corporation. This loan was authorized and work resumed in the summer of 1940.

When the W. P. A. ceased work in July, 1938, the only work that had been done was on the main supply canal with the following expenditures: F. E. R. A., $101,651.51; W. P. A., $364,000.00; S. W. C. B., $55,243.83; Counties, $25,000.00; or a total of $545,895.34.

Work under F. E. R. A. involved the removal of 193,000 cubic yards of earth excavation and 16,000 cubic yards of rock. Under the former W. P. A. project there was 968,-163 cubic yards of earth and 23,128 cubic yards of rock removed. Under the two agencies or up to the last operation before the new work was begun in 1940, there had been excavated a total of 1,161,163 cubic yards of earth and 39,128 cubic yards of rock. In order to complete the canal, W. P. A. let a contract with Lobnitz Brothers of Ashton, Idaho, which required the removal of 1,000,000 cubic yards of earth and rock, with the balance of the work being done by W. P. A. labor.

In order to complete the Project, the State Water Board made an application to the W. P. A. under date of March 21, 1940, in which the cost of completion was estimated at $541,572.00, of which the W. P. A. was to furnish equipment, supplies and labor in the sum of $392,113.00 and the Board to provide equipment, material and superintendents in the amount of $149,459.00. In addition thereto the W. P. A. agreed to make a contractual expenditure in the sum of approximately $100,000.00.

The Board had heretofore made application to the R. F. C. for a loan in the amount of $135,000.00, to provide part of its sponsorship. This application was approved by the R. F. C. on February 28, 1940—the loan evidenced by water conservation revenue bonds Ser-

ies "W", dated May 1, 1940, interest at 4 per cent per annum, with first principal in the amount of $2,500.00 due May 1, 1946, and increasing annual payments to $7,500.00 on May 1, 1975, secured by a Trust Indenture dated May 1, 1940, between the Board and the Union Bank & Trust Company of Helena, as Trustee.

As security for the loan, the Board entered into a Water Marketing Contract with Deadman's Basin Water Users' Association, wherein that Association agreed to pay the Board the sum of 55 cents for each acre-foot of water contracted to be sold for the first four years, and 75 cents per acre-foot for the remaining thirty years, and agreed to enter into Water Purchase Contracts with individual water users aggregating not more than 20,000 acre-feet.

The sums due under the above mentioned Water Marketing Contract and Water Purchase Contracts are sufficient to repay the loan and reimburse the Board for any funds expended by it from the revolving fund.

As the irrigation systems in the Musselshell Valley are largely privately owned by individuals or groups of individuals, the responsibility for operation and maintenance is placed on the individuals concerned. In some instances the Milwaukee Railroad assumed responsibility in connection with the maintenance of structures when it obtained right-of-way for the railroad. Deadman's Basin Project on the other hand is owned and administered by the State Water Conservation Board.

ARTICLES OF INCORPORATION

of

DEADMAN'S BASIN WATER USERS' ASSOCIATION

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned, pursuant to and in conformity with the provisions of Chapters 12 to 23, Civil Code, Revised Codes of Montana, 1935, and Acts amendatory thereof or supplemental thereto, associate ourselves together, not for profit, and do hereby adopt the following Articles of Incorporation:

ARTICLE 1

The corporate name of this corporation is hereby declared to be Deadman's Basin Water Users' Association.

ARTICLE II

The objects and purposes for which this corporation is formed are as follows:

1. To appropriate, purchase, market, sell, pump, divert, develop, furnish, distribute, lease and dispose of the waters of the Musselshell River and tributaries, which will be impounded by means of a dam or dams, and a storage reservoir located in Wheatland and Golden Valley Counties, Montana; the waters of said Musselshell River and tributaries being diverted therefrom by a supply canal, the diversion point of which is located in or about the NW¼ of Section 8, Twp. 7 N., R. 17 E., Wheatland County, Montana, and the re-

servoir in which said waters will be impounded being located in Sections 13, 22, 23, 24, 25, 26, 27, 35 and 36, Twp. 7 N., R. 18 E., and Sections 19 and 30, Twp. 7 N., R. 19 E., and such other structures as may be necessary to carry out the purposes of the Association and the diversion of water from the Musselshell River and tributaries, and from all other available sources of supply, together with the return flow of all of the foregoing waters furnished or supplied by seeping or overflowing from the previous place of use of such waters, and the waters from other dams, reservoirs, diversion canals, distributing canals, laterals, ditches, pumping units, mains, pipe lines and water works systems; said waters to be used for irrigating lands adjacent to and below said dams, reservoirs, laterals and canals and for other useful and beneficial purposes.

2. To enter into and carry out agreements with the State of Montana, the State Water Conservation Board, the United States of America, or any instrumentality or agency thereof, any person, firm, association, corporation, private, public or municipal with reference to the purchasing, marketing, furnishing, distributing and selling of the aforesaid waters, and of the privilege of obtaining such waters when available, and the diversion, development, disposition and ultilization of such waters, the charging, collecting and disposition of rents and revenues for such waters and privileges, the operation, maintenance, repair, alteration, construction, reconstruction and supervision of the means of conserving and distributing such waters.

3. To construct, reconstruct, maintain, repair, alter, use, control and operate dams, reservoirs, irrigation works and systems, drainage works and systems, diversion canals, distributing canals, lateral ditches, pumping ditches, pumping units, mains, pipe lines, waterworks systems and other means of conserving and distributing the aforesaid waters.

4. To lease, sell or otherwise dispose of water, water rights, lands, easements and / or property which it may acquire.

5. To acquire, own and hold such real and personal property as may be necessary or convenient for the transaction of its business.

6. To incur indebtedness upon its bonds, notes, contracts or other evidences of indebtedness, and to secure the same by mortgages, deeds of trust, pledges of any or all of its revenues and contracts, or in any other manner, subject, however, to the approval of any such indebtedness by resolution of the State Water Conservation Board.

7. To acquire, hold and dispose of stock in other corporations, domestic or foreign.

8. To acquire by purchase, forfeiture or in any other legal manner, shares of the capital stock of this corporation, and to acquire and exercise options thereon, and to dispose of, re-issue or cancel same as the Board of Directors may determine.

9. To have and exercise all the powers and to perform any and all acts necessary, convenient or appropriate to carry out any one or more of the said purposes or anything incident hereto, or which shall at any time appear conducive or expedient for the protection or benefit of the Association or its shareholders, and to that end to enter into any contract, agreement or other arrangement with the State of Montana, the State Water Con-

servation Board, the United States of America or any instrumentality or agency thereof, or any person, firm, association, corporation, private, public or municipal, or any state of foreign government.

10. To make and promulgate by-laws for the government and control of this corporation. The by-laws, or amendments thereto, adopted by the Board of Directors shall be and become effective only after their approval by the State Water Conservation Board.

11. The powers herein granted and conferred, shall be exercised only with the approval of the State Water Conservation Board.

ARTICLE III

The principal place of transacting the business of the corporation shall be at Roundup, in the County of Musselshell, State of Montana.

ARTICLE IV

This corporation shall have continual existence as provided in Chapter 185, Laws of Montana, 1937.

ARTICLE V

The number of directors who shall manage the affairs of this corporation shall be five (5), and the names and residences of those who are appointed for the first three months, and until their successors are elected and qualified are as follows:

L. W. Goffena	Roundup, Montana
O. P. Balgord	Lavina, Montana
J. Minneman	Barber, Montana
Marguerite M. Jacobs	Musselshell, Montana
Magnus Lindstrand	Roundup, Montana

ARTICLE VI

The capital stock of said corporation shall be Fifty Thousand ($50,000.00) Dollars, which shall be divided into fifty thousand (50,000) shares of the par value of One Dollar ($1.00) each. Each shareholder of the capital stock of this corporation shall be entitled to one (1) vote for each share of stock owned by him.

Capital shares of the stock of this corporation shall be subject to purchase, sale or forfeiture under such terms and conditions as are provided by the By-Laws of the corporation and its subscription and pledge agreements with shareholders. Except with the consent of the corporation, no stock of this corporation shall be transferred on the books of the corporation so long as the owner or owners thereof are obligated in any way to the corporation, whether such obligations be matured or unmatured or be under a subscription agreement or note, a water purchase contract or otherwise.

The private property of the stockholders of this corporation shall not be liable for

the obligations of the corporation except as in the By-Laws of the corporation otherwise provided.

ARTICLE VII

That the amount of the Captial Stock actually subscribed is Twenty-Five ($25.00), as follows:

Name	Amount	
L. W. Goffena	5 shares	$5.00
O. P. Balgord	5 shares	$5.00
J. Minneman	5 shares	$5.00
Marguerite M. Jacobs	5 shares	$5.00
Magnus Lindstrand	5 shares	$5.00

Witness our hands and seals this 22nd day or June A. D. 1940.

/s/ L. W. Goffena
O. P. Balgord
J. Minneman
Marguerite M. Jacobs
Magnus Lindstrand

STATE OF MONTANA)
) ss.
County of Musselshell)

On this 22nd day of June, A. D. One Thousand Nine Hundred and Forty, personally appeared before me, a Notary Public for the State of Montana, L. W. Goffena, O. P. Balgord, J. Minneman, Marguerite M. Jacobs and Magnus Lindstrand whose names are subscribed to the foregoing instrument as the parties thereto, personally known to me to be the same persons described in and who executed the said foregoing instrument, as the parties thereto and who each of them duly acknowledged to me that they each of them, respectively, executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

/s/ R. A. Buzzard,
Notary Public for the State of Montana
Residing at Helena, Montana
My Commission expires June 1, 1942.

(SEAL)

Filed in the Clerk and Recorder's Office
Recorded in Secretary of States Office,
Helena, Montana—S-3, Page 152.

MUSSELSHELL-MELSTONE CANALS

(Under Construction)

Field work and actual construction is under way toward the development of 14,500 acres of irrigable land by the State Water Conservation Board in the Musselshell Valley, east of Roundup. The proposed plan calls for the construction of a concrete overflow diversion weir across the Musselshell River 182 feet long and 6 feet high; a main canal 3,000 feet long with a capacity of 220 second-feet to its division; a canal 33.3 miles long with a capacity of 135 second-feet on the south side of the Musselshell River, and a canal 15.4 miles long with a capacity of 100 second-feet on the north side of the river. The total excavation is estimated to be approximately 787,000 cubic yards. The water supply is to come from the Musselshell River and storage water from Deadman's Basin Reservoir.

In addition to the canals the Board also plans to install pumps to get water to some of the terraced land. The estimated cost of this project is approximately $300,000.00 The money used to develop the canals is from the State Post-War fund and also legislative appropriations to the revolving fund. Earth work on the canals will be completed this fall. Bids were opened September 1 to build a diversion dam, head works, and a few small structures down to the division of the canal. Contracts will be let later for finishing the remaining structures.

Briefly the water contract plan is this: The canal user pays 75 cents per acre plus the operation and maintenance charge for the use of the canal in delivering his water. This entitles him to a seasonal flow of two acre feet per acre. Any water that he can divert from the natural flow of the stream up to June 15th will be considered free water, and will be subtracted from his two-acre feet. The balance of the two-acre feet which he receives after June 15th is considered as storage water from Deadman's Basin and for this amount he will have to pay the Deadman's Basin Water Users' Association 75 cents per acre foot plus operation and maintenance charges. For the past several years, the operation and maintenance charge on Deadman's Basin has been only 10 cents per acre foot.

There is one point about the contracts for canal use and that is the water subscribed for is dedicated to a definite piece of land and cannot be used on other land. This phase is different from any of the other Water Board contracts. If a farmer has, say, 160 acres and he wishes water next year for only 40 acres, he can take out a contract for the 40 acres. Next year if he clears up another 40 acres, he can take out a new contract for the second 40, etc. In this way, each contract is separate and has no relation to the others even though the land is owned by the same man.

On April 2, 1949, the State Water Conservation Board filed a notice of appropriation in the Musselshell County Courthouse for 250 cubic feet of water to be diverted from the Musselshell River by means of a diversion dam located in the Northeast Quarter of Section 28, Township 9 North, Range 29 East, and the canal running in an easterly direction therefrom. The purpose is to be for irrigation of lands in Sections 1, 2, 11, 12, 13, 14, 15, 22, 23 and 24, Township 9 North, Range 29 East; Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, and 12, Township 9 North, Range 30 East; Sections 5, 6 and 7, Township 9 North, Range 31 East; Sections 31, 32, 33, 34, 35, and 36, Township 10 North, Range 30 East; Sections 2, 3, 9,

10, 11, 14, 15, 16, 21, 22, 23, 27, 28, 29, 30, 31, 32, 33, and 34, Township 10 North, Range 31 East; Sections 9, 16, 21, 22, 26, 27, 34, 35, and 36, Township 11 North, Range 31 East; and for the watering of stock, domestic and municipal and other beneficial purposes.

The above declaration was made and filed under provisions of Section 349.18 of the Revised Codes of Montana..

Another part of the State Water Conservation Board overall Musselshell Basin development plan is known as the Upper Musselshell Storage Project. This Project was planned to supply supplemental irrigation water to 29,000 acres and a full supply for 6,000 acres. The effect of the upper project on the lower project is that it lowers the flood stages of the Musselshell River at Winnecook where the intake canal diverts to Deadman's Basin Storage Reservoir—thus saving flood water which would otherwise be lost because of the insufficient carrying capacity of said canal. It also increases the fall and winter flow from return ground water. Also, a portion of the peak flood diverted to the upper reservoir can be reclaimed at Deadman's Basin as return flow during late fall and winter.

UPPER MUSSELSHELL PROJECT

This project consists of two storage reservoirs, three diversion canals, one outlet canal and one distribution canal. The project is designed to serve supplemental irrigation to about 28,000 acres of land. The major part of the project lands are located in the Musselshell valley between Harlowton and Martinsdale, while a minor part is in the North Fork of the Musselshell valley, between Martinsdale and Delpine.

The upper reservoir, called DuRand Reservoir, is located on the North Fork about one-half mile above Delpine, and has a storage capacity of 7,029 acre-feet at the elevation of spillway crest. In addition to the North Fork drainage, water is also fed into the reservoir by a diversion canal from Checkerboard Creek. This canal is three miles long and has a carrying capacity of 51 second-feet. Drainage area tributary to the reservoir from North Fork is 48.2 square miles and from Checkerboard 21.3 square miles, or a total of 69.5 square miles, all of which is moderately high mountains and is lightly timbered.

The Lower, or Martinsdale Reservoir, is located in a basin about one mile southeast of the town of Martinsdale, and contains a storage capacity of 23,185 acre feet at the elevation of spillway crest. Water is fed into it by a diversion canal from the South Fork of Musselshell River; said canal is 2.5 miles long, and has a carrying capacity of 400 second-feet. Another diversion canal was constructed to carry water from the North Fork to the South Fork, emptying just above the diversion canal to the Martinsdale Reservoir. This canal assures a water supply to the reservoir from both forks of the river. Said canal is 11.5 miles long, and has a capacity of 104 second-feet. The drainage area of the South Fork above the intake canal is 285 square miles, and about 100 square miles of the North Fork drains to the Martinsdale Reservoir, or a total of 385 square miles of moderately high timbered area. The outlet canal, which conveys stored water from the Martinsdale Reservoir back to the river, is 2.5 miles long and has a capacity of 330 second-feet.

The distribution canal, known as the Two Dot canal, diverts from the north bank of

the river, just below the junction of the North and South Forks, and courses 32 miles to its end, about two miles northwest of Harlowton. The canal has an initial carrying capacity of 123 second-feet, and terminates with a capacity of 5 second-feet. It serves water to approximately 5,000 acres of land.

The DuRand Dam is an earth, sand, gravel and rock fill, having a total crest length of 550′ and top width of 30′. The front slope is 3:1 below water line and 2:1 above water line. Downstream slope is 2:1. Elevations are: top of dam, 5,337 feet; spillway crest, 5,325feet; natural creek bottom, 5,237 feet; bottom depth of cutoff trench, 5,222 feet; flow line of outlet, 5,247.15 feet. From these elevations, the maximum height of dam above natural creek bed is 100 feet and above the bottom of cutoff trench, 115 feet. The spillway crest is 12 feet below the top of the dam. The dam contains approximately 241,600 cubic yards of material.

The outlet conduit rests on solid rock near the middle of the dam and the concrete spillway is at the left end of the dam. The concrete lined outlet conduit is 54 inches by 54 inches inside and equipped with two gates operated through a concrete tower from the top of the dam. The operating gate is a 48 inch diameter Dow disc arm pivot valve, while the emergency is a 48 inch diameter gate valve. The spillway has a crest length of 64 feet and is capable of discharging a flood of 6,000 second-feet with a freeboard of 3 feet. The flooded area of the reservoir covers 272 acres.

The Martinsdale Reservoir was formed by the construction of two earth, sand and gravel fill dams which are designated as the North Dam and the South Dam. The North Dam has a crest length of 1,000 feet and top width of 23 feet. Elevations are: top of dam, 4,791 feet; natural coulee bottom, 4,695 feet; bottom depth of cutoff trench, 4,675 feet. From these elevations the maximum height of the dam above natural coulee bed is 96 feet and above the bottom of cutoff trench is 116 feet. The South Dam has a crest length of 1,635 feet and top width of 23 feet. The elevations are: top of dam, 4,791 feet; natural coulee bottom, 4,742 feet; bottom depth of cutoff trench, 4,729 feet. From these elevations the maximum height of dam above natural coulee bed is 49 feet and above the bottom of cutoff trench is 62 feet.

The slopes are the same for both dams, being: front slope, 3:1 below water line and 2:1 above water line, downstream slopes are 2:1. There is only one spillway, outlet conduit and one set of control gates. The spillway crest elevation is 4,779 feet or 12 feet below the tops of the dams. It has a crest length of 10 feet and is capable of discharging a flood of 600 second-feet with a freeboard of 4½ feet. It is located at the right end of the South Dam. The outlet conduit is built of concrete pipe, 60 inches in diameter and laid on sandstone near the right abutment of the North Dam. Elevation of the flow line is 4,715 feet. There are two gates operated through a concrete tower from the top of the dam. The operating gate is 54 inches diameter Dow disc arm pivot valve, while the emergency is a 54 inch diameter gate valve. The two dams together contain approximately 716,500 cubic yards of material. The flooded area of the reservoir covers 985 acres. Rights of Way purchased for the entire project, including reservoir, borrow pits, canals, etc., totaled 2,276.4 acres.

HISTORY:

The State Water Conservation Board received a loan and grant offer from the federal government, dated October 2, 1937, which was accepted on October 6, 1937. This offer called for the construction of two reservoirs known as "DuRand" and "Martinsdale"; a supply canal known as "Checkerboard Canal"; a supply canal known as "Martinsdale Canal"; and an "Outlet Canal", at an estimated cost of $776,364.00, of which $349,364.00 was to be a grant and $427,000.00 a loan, evidenced by water conservation revenue bonds. It required the formation of the Upper Musselshell Water Users' Association, and the sale of 30,000 acre-feet of water purchase contracts, acceptable to the Finance Division of the PWA. Owing to the question of a sufficiency of water supply for the Martinsdale Reservoir, the PWA required the construction of an additional diversion canal, known as the "North Fork Diversion Canal" in order that the surplus waters of the North Fork of the Musselshell River could be diverted to the South Fork of the Musselshell River, and then into the Martinsdale Reservoir. In order to secure sufficient water purchase contracts acceptable to PWA, it was necessary to construct the "Two Dot Canal" to distribute water to lands not irrigable from any existing ditches from the river. This enlarged in a considerable degree the scope of the project and accounts for the cost over and above the original estimate.

The Upper Musselshell Water Users' Association was incorporated under the laws of Montana on October 22, 1927. Water purchase contracts in the amount of 30,000 acre feet of water on contracts acceptable to PWA were secured and approved by the Association on May 31, 1938, and by the Board on June 1, 1938. The bond transcript was then completed and the bonds sold to the government on December 3, 1938.

Bids for the construction of the project were received on March 17, 1938, the low bidder being Peter Kiewit Son's Company, of Omaha, Nebraska, ($619,804.30) and contract was awarded to said contractor on the same day, subject to approval of PWA. This approval was received on March 30, 1938. Work was started on April 1, 1938 and completed September 20, 1939.

OPERATIONS:

The project operated during 1940 for the first time. Owing to the extremely dry fall of 1939 and lack of snow fall and spring rains during 1940, there were only 13,293 acre-feet of water in storage for use during the season. This was proportioned among water purchasers, and by its use many crops were grown that otherwise would have been a total failure. Since that time there has never been a shortage of stored water.

FINANCES:

To secure funds to construct the project, the Board issued its water conservation revenue bonds, Series "N" in the amount of $427,000.00, dated May 1, 1938, secured by a trust indenture of the same date, executed by the Board and the Montana National Bank of Billings, Montana, as trustee. The indenture provides for the pledge of all of the revenues of the project for the payment of interest on and principal of the bonds. These bonds bear interest at 4% per annum, payable May 1st of each year, commencing with the year 1939, and with first bond principal in the amount of $9,000.00, due May 1, 1942, and increasing annual payments to the sum of $25,000, due May 1, 1968.

The security mentioned consists of a water marketing contract between the Board and the Association, and water purchase contracts entered into between each individual water purchaser, the association and the Board.

The original list comprises 128 water purchase contracts totaling 30,000 acre-feet of water, at $1.10 per acre-foot per year, commencing with the year 1939 to and including 1967. The total sums due under the contracts are sufficient to pay all interest and principal, and provide a reserve of approximately 23%.

ARTICLES OF INCORPORATION

of

UPPER MUSSELSHELL WATER USERS' ASSOCIATION

KNOW ALL MEN BY THESE PRESENTS: That we, the undersigned, pursuant to and in conformity with the provisions of Chapters 12 to 23, Civil Code, Revised Codes of Montana, 1935, and Acts amendatory thereof, or supplemental thereto, associate ourselves together, not for profit, and do hereby adopt the following Articles of Incorporation.

ARTICLE I

The corporate name of this corporation is hereby declared to be UPPER MUSSELSHELL WATER USERS' ASSOCIATION.

ARTICLE II

The objects and purposes for which this corporation is formed are as follows:

1. To appropriate, purchase, market, sell, pump, divert, develop, furnish, distribute, lease and dispose of the waters of the North Fork of the Musselshell River and tributaries and the South Fork of the Musselshell River and tributaries, Meagher and Wheatland Counties, Montana, and such other waters as may be deemed advisable.

2. To enter into and carry out agreements with the State of Montana, the State Water Conservation Board, the United States of America, or any instrumentality or agency thereof, any person, firm, association, corporation, private, public or municipal with reference to the purchasing, marketing, furnishing, distributing and selling of the aforesaid waters, and of the privilege of obtaining such waters when available, and the diversion development, disposition and utilization of such waters, the charging, collecting and disposition of rents and revenues for such waters and privileges, the operation, maintenance, repair, alteration, construction, reconstruction and supervision of the means of conserving and distributing such waters.

3. To construct, reconstruct, maintain, repair, alter, use, control and operate dams, reservoirs, irrigation works and systems, drainage works and systems, diversion canals, distributing canals, laterals, ditches, pumping ditches, pumping units, mains, pipe lines, waterworks systems, and other means of conserving and distributing the aforesaid waters.

4. To lease, sell or otherwise dispose of water, water rights, lands, easements and / or property which it may acquire.

5. To acquire, own and hold such real and personal property as may be necessary or convenient for the transaction of its business.

6. To incur indebtedness upon its bonds, notes, contracts or other evidences of indebtedness, and to secure the same by mortgages, deeds of trust, pledges of any or all of its revenues and contracts, or in any other manner, subject, however, to the approval of any such indebtedness by resolution of the State Water Conservation Board.

7. To acquire, hold and dispose of stock in other corporations, domestic or foreign.

8. To acquire by purchase, forfeiture or in any other legal manner, shares of the capital stock of this corporation, and to acquire and exercise options thereon, and to dispose of, re-issue or cancel same as the Board of Directors may determine.

9. To have and exercise all the powers and to perform any and all acts necessary, convenient or appropriate to carry out any one or more of the said purposes or anything incident thereto, or which shall at any time appear conducive or expedient for the protection or benefit of the Association or its shareholders, and to that end to enter into any contract, agreement or other arrangement with the State of Montana, the State Water Conservation Board, the United States of America or any instrumentality or agency thereof, or any person, firm, association, corporation, private, public or municipal, or any state or foreign government.

10. To make and promulgate By-laws for the government and control of this corporation. The By-laws, or amendments thereto, adopted by the Board of Directors shall be and become effective only after their approval by the State Water Conservation Board.

11. The powers herein granted and conferred, shall be exercised only with the approval of the State Water Conservation Board.

ARTICLE III

The principal place of transacting the business of the corporation shall be at Harlowton, in the County of Wheatland, State of Montana.

ARTICLE IV

This corporation shall continue in existence for the term of forty (40) years from and after the filing of these Articles of Incorporation.

ARTICLE V

The number of directors who shall manage the affairs of this corporation shall be five (5) and the names and residences of those who are appointed for the first three months,

and until their successors are elected and qualified are as follows:

Name	Residence
E. J. Settle	Martinsdale, Montana
John Duncan	Martinsdale, Montana
Sanford M. Holliday	Martinsdale, Montana
H. C. Klock	Harlowton, Montana
Chas. F. Williams	Two Dot, Montana

ARTICLE VI

The capital stock of said Corporation shall be fifty thousand ($50,000.00) Dollars, which shall be divided into fifty thousand (50,000) shares of the par value of One Dollar ($1.00) each. Each shareholder of the capital stock of this corporation shall be entitled to one (1) vote for each share of stock owned by him.

Capital shares of the stock of this corporation shall be subject to purchase, sale or forfeiture under such terms and conditions as are provided by the By-laws of the corporation and its subscription and pledge agreements with shareholders. Except with the consent of the corporation, no stock of this corporation shall be transferred on the books of the corporation so long as the owner or owners thereof are obligated in any way to the corporation, whether such obligations be matured or unmatured, or be under a subscription agreement or note, a water purchase contract or otherwise.

The private property of the stockholders of this corporation shall not be liable for the obligations of the corporation except as in the By-laws of the corporation otherwise provided.

ARTICLE VII

That the amount of the Capital Stock actually subscribed is twenty-five ($25.00) Dollars, as follows:

Name	Amount
E. J. Settle	$5.00
John Duncan	5.00
Sanford M. Holliday	5.00
H. C. Klock	5.00
Chas. F. Williams	5.00

Witness our hands and seals this 11th day of September, A. D., 1937.

/s/ E. J. Settle
John Duncan
Sanford M. Holliday
H. C. Klock
Chas. F. Williams

STATE OF MONTANA)
) ss.
County of Wheatland)

On this 11th day of September, A. D., 1937, personally appeared before me, a Notary Public for the State of Montana, E. J. Settle, John Duncan, Sanford M. Holliday, H. C. Klock, and Chas. F. Williams, whose names are subscribed to the foregoing instrument as the parties thereto, personally known to me to be the same persons described in, and who executed the said foregoing instrument, as parties thereto, and who, each of them, duly acknowledged to me that they each of them respectively, executed the same.

In witness whereof, I have hereunto set my hand and affixed my official seal the day and year in this certificate first above written.

A. A. Poirier
Notary Public for the State of Montana
Residing at Harlowton, Montana
(SEAL) My commission expires Jan. 15, 1940.

In the formation of State Projects the terms "Water Marketing" and "Water Purchase Contracts" are often referred to. In order to clarify the meaning of these two terms they are explained briefly herewith:

WATER MARKETING CONTRACT

This is an agreement between the Association and the State Water Conservation Board, whereby the Board agrees to sell to the Association all of the available water of the Project, and the Association agrees to distribute same to water purchasers; and provides method of payment of sums due, levying of assessment for operation and maintenance cost, time of notification of such levy to be given water purchasers, time of default and remedies in the event of default.

WATER PURCHASE CONTRACT

This is a contract entered into between the individual water purchasers, the Association and the State Water Conservation Board, whereby the individual agrees to purchase a definite amount of water, and to pay therefore a definite sum of money on or before a definite day of each year, until a definite future date; in addition to such definite annual sum the individual agrees to pay such additional sum or sums as may be required annually as his proportionate share of the cost of operation and maintenance of the Association. This contract is void unless the water purchaser executes a Subscription and Pledge Agreement.

SUMMARY OF IRRIGATED LAND BY RIVER BASINS IN THE FOLLOWING COUNTIES COMPLETED TO DATE:

Big Horn, Carbon, Custer, Musselshell, Rosebud, Stillwater and Yellowstone

River Basin	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Big Horn River Basin	46,915.56	14,850.65	61,766.21
Little Big Horn River Basin	17,134.26	9,843.52	26,977.78
Clarks Fork Basin	33,285.96	7,328.00	40,613.96
Missouri River Basin	54.60	62.00	116.60
Musselshell River Basin	7,949.05	13,555.10	21,504.15
Powder River Basin	8,263.60	1,803.60	10,067.20
Rosebud Creek Basin	1,398.50	3,012.20	4,410.70
Rosebud River Basin	11,831.00	4,724.00	16,555.00
East Rosebud River Basin	4,587.50	9,095.47	13,682.97
Rock Creek Basin	58,482.15	16,866.77	75,348.92
Stillwater River Basin	11,661.20	3,458.50	15,119.70
Tongue River Basin	22,136.56	7,479.48	29,616.04
Yellowstone River Basin	153,914.01	29,879.89	183,793.90
Totals	377,613.95	121,959.18	499,573.13

It was necessary to cover 7,693,777.00 acres in the above basins in order to complete the survey.

IRRIGATION SUMMARY OF MUSSELSHELL COUNTY BY RIVER BASINS

(Continued)

MUSSELSHELL RIVER BASIN

Name of Ditch	Source	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Musselshell Ditch Co.	Musselshell River	1,181.00	360.00	1,541.00
Naderman Ditch	Musselshell River	579.00	150.00	729.00
S.W.C.B. North Side Canal	Musselshell River	0	3,627.00	3,627.00
S.W.C.B. South Side Canal	Musselshell River	0	2,950.00	2,950.00
Private Ditches—Regular Irrigation				
Private (Pump)	Fletcher Coulee and Half Breed Creek	43.00	3.00	46.00
Private	Musselshell River	2,054.00	1,155.00	3,209.00
Private (Pump)	Musselshell River	1,462.00	725.00	2,187.00
Private (Pump)	Musselshell River and Goulding Creek	16.00	0	16.00
Private	Parrot Creek	3.00	0	3.00
Private	South Willow Creek	414.00	1,501.00	1,915.00
Private	Unnamed Coulee, Trib. to Musselshell River	.25	0	.25
Grand Total of Regular Irrigated Acreage		5,752.25	10,471.00	16,223.25

IRRIGATION SUMMARY OF MUSSELSHELL COUNTY BY RIVER BASINS

(Continued)

Private Ditches—Flood Irrigation

Name of Ditch	Source	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Private	Alkali Creek	0	14.00	14.00
"	Cameron Creek	13.00	21.00	34.00
"	Carpenter Creek	5.00	0	5.00
"	Fattig Creek	0	18.00	18.00
"	Goulding Creek	85.00	20.00	105.00
"	Half Breed Creek	0	26.00	26.00
"	Hawk Creek	0	41.00	41.00
"	Hay Coulee	20.00	0	20.00
"	Horse Thief Creek	32.00	45.00	77.00
"	Howard Coulee	37.00	0	37.00
"	Jones Creek	0	50.00	50.00
"	Keggy Coulee	0	58.00	58.00
"	Little Wall Creek	0	5.00	5.00
"	McLeane Coulee	0	187.00	187.00
"	North Willow Creek	148.00	711.00	859.00
"	Parrot Creek	0	31.00	31.00
"	Pole Creek	280.00	174.00	454.00
"	Rehder Coulee	0	8.00	8.00
"	Sand Creek	0	28.00	28.00
"	Schnall Creek	6.00	0	6.00
"	South Willow Creek	1,414.00	1,336.50	2,750.50
"	Unnamed Coulee, Trib. to Lost Horse Creek	4.00	0	4.00
"	Unnamed Coulee, Trib. to Musselshell River	15.00	0	15.00
"	Unnamed Coulee, Trib. to Pole Creek	37.00	0	37.00
Grand Total of Flood Irrigated Acreage		2,096.00	2,773.50	4,869.50
GRAND TOTAL OF ALL IRRIGATED ACREAGE		7,848.25	13,244.50	21,092.75

IRRIGATION SUMMARY OF MUSSELSHELL COUNTY BY RIVER BASINS

(Continued)

Yellowstone River Basin

Name of Ditch	Source	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Private Ditches — Regular Irrigation		0	0	0
Grand Total of Regular Irrigated Acreage		0	0	0
Private Ditches — Flood Irrigation				
Private—	Razor Creek	81.00	0	81.00
Grand Total of Flood Irrigated Acreage		81.00	0	81.00
GRAND TOTAL OF ALL IRRIGATED ACREAGE IN YELLOWSTONE RIVER BASIN		81.00	0	81.00

Summary

Regular Irrigation			
Musselshell River Basin	5,752.25	10,471.00	16,223.25
Yellowstone River Basin	0	0	0
Total Regular Irrigation	5,752.25	10,471.00	16,223.25
Flood Irrigation			
Musselshell River Basin	2,096.00	2,773.50	4,869.50
Yellowstone River Basin	81.00	0	81.00
Total Flood Irrigation	2,177.00	2,773.50	4,950.50
GRAND TOTAL ALL BASINS	7,929.25	13,244.50	21,173.75

COOLEY-GOFFENA IRRIGATION SYSTEM

The Cooley-Goffena Irrigation System is located on the north side of the Musselshell River in the vicinity of the town of Musselshell. Water is diverted by gravity from the Musselshell River in the northwest quarter of the southwest quarter of Section 26, Township 9 North, Range 28 East. At the point of diversion the Chicago, Milwaukee, St. Paul & Pacific Railroad constructed and maintains a concrete dam across the Musselshell River. From the headgate the main canal extends in an easterly direction and is approximately 11 miles in length.

What is now known as the Cooley-Goffena Irrigation System was at one time two separate systems that were constructed by Handel Brothers and John R. Cooley et al. On November 30, 1891, George W. Handel filed on 2,000 miner's inches of water to be diverted from the Musselshell River at a point on the north bank about 560 feet due east of the quarter corner between Section 29, Township 9 North, Range 28 East and Section 30, Township 9 North, Range 29 East. The purpose was to be for irrigation and other uses. The system was described as a ditch 72 by 48 inches. The land description of intended place of use was given as the east half of the southeast quarter of Section 20, and all of Section 21, Township 9 North, Range 29 East. The date appropriated was given as November 14, 1891. This notice of appropriation is on file in Book 1, Page 54 of Water Right Records in the Musselshell County Courthouse.

On June 17, 1918, Handel Brothers Company, as a result of a sale described further, filed on 975 miner's inches of water from the Musselshell River. This notice of appropriation is on file in Book 13, Page 179 of Water Right Records in the Musselshell County Courthouse.

Two filings were also made by John R. Cooley et al for 2000 miner's inches each. The first shows the date appropriated as January 14, 1892, with the date filed on given as January 25, 1892. The second gives the date appropriated as January 30, 1892, with the dated filed as February 13, 1892. Both notices of appropriation made by Cooley are on file in the Musselshell County Courthouse and also in the Fergus County Courthouse. John R. Cooley was associated with Bill Jacobs and the system was known as the Cooley-Jacobs Ditch. As time passed Jacobs sold his half interest less 25 miner's inches to Handel and the name became Cooley and Handel. Later Handel and his brothers went bankrupt and his water rights of 975 inches in the Cooley system, as well as Handel's own system, passed to the Musselshell Valley Farming and Livestock Corporation. Cooley in the meantime died, after refusing to deliver Handel's half of the water to Handel Brothers. The Musselshell Valley Farming and Livestock Corporation took the matter to court and as a result was allowed to tap the Cooley ditch. At the present time the Handel Brothers ditch is only in part used by Cooley and Goffena.

Goffena acquired his interest and water rights in the system from the Musselshell Valley Farming and Livestock Corporation which results in his owning 50 per cent of the system and Cooley owning the other 50 per cent. In addition, Jacobs still holds 25 miner's inches of water of the original 2000 inches filed by Cooley, and Goffena is obligated to furnish him this amount of water.

According to Goffena, Cooley has done very little irrigating in the past and as a re-

sult has not contributed to the operation and maintenance of said ditch; therefore, in order for Goffena to receive the necessary water to irrigate his crops and supply Jacobs his 25 inches, it has been necessary for him to keep the system in good repair. He did not have figures available to show the actual operation and maintenance charges. Supplemental water is purchased from the Lower Musselshell Water Users' Association, which in turn receives its water from the Deadman's Basin Storage reservoir.

When the Chicago, Milwaukee, St. Paul & Pacific Railroad entered the area in about 1907, because of the line location it became necessary in many places for the railroad to relocate existing ditches and dams cut off by the road bed. The data to follow deals with the systems affected that are now a part of the Cooley-Goffena irrigation system. The dam of the Handel Brothers irrigation system, which was later transferred to the Musselshell Valley Farming and Livestock Corporation, was not disturbed. The railroad did provide a new headgate, two culverts to carry water under the track, and 1240 feet of wooden flume along the north side of the line to replace the portion of ditch which had been destroyed. These constructions were all located in the northwest quarter of Section 30, Township 9 North, Range 29 East. The railroad also relocated the ditch for a short distance in the southeast quarter of Section 20, Township 9 North, Range 29 East. At the present time the dam is no longer present, and the system is not in use.

For the irrigation system originally known as the Cooley and Jacobs ditch, the original dam located in the northeast quarter of Section 26, Township 9 North, Range 28 East, was cut out by the channel change the railroad made in the Musselshell River. To replace this dam the railroad constructed a new dam in the northwest quarter of the southwest quarter of Section 26, Township 9 North, Range 28 East, and from here a culvert under the track, with a headgate ditch 1000 feet long constructed to connect with the old river channel which the railroad deepened so it would carry water to the Cooley-Jacobs intake at the original dam site. This has since been changed and the ditch extended further down from where it spilled into the old river channel so that at present only about one-fourth mile of river channel is being used to carry water to the original headgate. Part of the ditch was also relocated in the northwest quarter of Section 30, Township 9 North, Range 29 East. According to our records, in 1948 there were 400 acres being irrigated under the Cooley-Goffena ditch, with a potential acreage under existing facilities of 30.00 acres, or a maximum irrigable area of 430.00 acres.

GOFFENA-SUDAN DITCH

The Goffena-Sudan Ditch diverts water by gravity from the Musselshell River at a point in the southwest quarter of Section 5, Township 8 North, Range 27 East in Musselshell County. At the point of diversion a submerged rock and brush dam has been constructed across the river which raises the water sufficiently to enable it to flow into the ditch headgate which is of concrete and steel construction. From this point the ditch follows an easterly direction and is approximately 18 miles in length.

This system has had an interesting history, part of which is contained herewith: Richard L. Groom and John L. Bauman constructed the first part of the system and on

April 7, 1890, filed a notice of appropriation for 2000 miner's inches of water to be diverted from the Musselshell River. The point of diversion was described as a point in Section 5, Township 8 North, Range 27 East. The purpose was to be for irrigation and milling uses. The system was described as a dam and ditch, with said ditch being 72 inches wide by 24 inches deep. The date of appropriation was given as April 1, 1890. The above notice of appropriation is recorded in Book 1, Page 18, of Water Right Records in the Musselshell County Courthouse.

Later, William Bethke took over Bauman's part of the 2000 inches, which was later transferred to Goffena, and Groom's part was transferred to the Arkwright Sheep Company and then to Sudan. No agreement has been reached as to the actual amount of inches now owned by each party.

This system during early stages of development was owned by Bethke and the Arkwright Sheep Company. The following agreement pertains to the portion of the ditch that was owned by Bethke, giving the Arkwright Sheep Company permission to enlarge it to sufficient size so as to supply his normal amount of water plus the additional amount needed by the Arkwright Sheep Company in their extension of the Bethke ditch. The ditch was extended from Lot 5 into Lots 1 and 2 in Section 2, Township 8 North, Range 27 East, and from there into Sections 34 and 35 in Township 9 North, Range 27 East. The extension and enlarging work was first begun in March of 1901 and water was first delivered in June of 1902. The water rights in the Arkwright portion of the system has since been acquired by Goffena.

THIS AGREEMENT made this 22nd day of August, 1900 by and between Wm. Bethke and Caroline Bethke, his wife, of Milner, Fergus County, Montana.

The parties of the first part, and the Arkwright Sheep Company, a corporation, of the same place, the party of the second part Witnesseth:

That for and in consideration of the promises and agreements made to be fulfilled by the said second party, the said first parties grant unto the said second party a right of way for an irrigation ditch through the premises and lands now owned by said first parties.

The said ditch to be made by widening the ditch now owned by the said first parties to an average width of six feet through the said lands of said first parties. Also it is hereby agreed that said second party shall widen the ditch now owned by said first parties from western boundary of first parties' lands through Sec. 3, Twp. 8 N., R. 27 West to an average width of about 8 feet, putting in a wider substantial flume where there now is one on said section. The said ditch so widened to be owned jointly by both parties.

The said second party for the right of way as aforesaid agrees to repair the dam, replace old headgate with larger new one, and clean and put in first class order the ditch now owned jointly by both parties. It being understood and agreed that the expense of cutting the new ditch and the repair of dam and cleaning old ditch shall be borne entirely by said second party.

In witness whereof we have hereunto set our hands in duplicate this 28th day of Sept., 1900.

Caroline Bethke
Wm. Bethke
The Arkwright Sheep Company
By H. D. Arkwright, Vice-Pres.

Witness: Mrs. Adelia Page

The following to be incorporated in above agreement:

Party of the second part agrees to do the work of widening the ditch during that part of the year while water is not needed for irrigating.

The next to enter the scene of early development was Hartford D. Arkwright who, on May 27, 1904, filed a notice of appropriation for 7½ cubic feet of water to be diverted from the Musselshell River in the east half of Lot 5, Township 8 North, Range 27 East. The date of appropriation was given as November 4, 1903. The purpose was to be for irrigation and watering stock. The system was described as a dam 200 feet in length and 20 feet in width across the top, and four feet in height, from which dam and at the southeast end thereof will be constructed a main ditch, which will be three feet average width on the bottom thereof and averaging one foot in depth, and one and three-quarters of a mile in length, which ditch will extend in an easterly direction from said dam to and across Lots 1, 2, 3, and 4 in Section 6, Township 8 North, Range 28 East. That in said ditch will be constructed a flume at the west end of said ditch, which flume will be constructed of lumber and will be 18 inches across the bottom thereof and one foot in depth. The above notice of appropriation is on file in the Musselshell County Courthouse in Book 2, Page 191 of Water Right Records. It is also on file in the Yellowstone County Courthouse.

According to L. W. Goffena, Hartford D. Arkwright constructed a wing dam in the spring of 1903 at the site of the later Krueger-Spendiff dam. The wing dam was insufficient to enable him to divert water by gravity, so in the fall of 1903 he installed a pump. Later the control by lease of this land was transferred to Handel Brothers. In 1911 they installed a 12-inch centrifugal pump operated by a 75-horse power steam-driven engine at the same location. Water was pumped onto the said lands during the irrigation seasons in 1911 and 1912 by this system. In addition to irrigating the lands in Section 6, Township 8 North, Range 27 East, land was also irrigated in Section 36, Township 9 North, Range 27 East.

On October 15, 1912, at a State land sale, Goffena purchased the southeast quarter of Section 36, Township 9 North, Range 27 East. In order to complete this sale he had to purchase all of the irrigation improvements made by Handel Brothers, which was done. In 1913, 1914 and 1915 Goffena irrigated the land by means of pumping with the pump installed in the same location. In 1917 Goffena made arrangements with George Spendiff whereby in return for work rendered on the Spendiff system he was entitled to locate a pump on the southwest quarter of Section 36, Township 9 North, Range 28 East and pump water from the Spendiff ditch onto the lands he was farming. This arrangement continued until the Spendiff dam was washed out by spring flood waters. After this the pump was moved to the original Arkwright pump location.

Soon after Hartford D. Arkwright started his irrigation enterprise Gotthold J. Krueger and George Spendiff started the construction of a dam and ditch in the area. On

June 6, 1904, they filed a notice of appropriation in Book 2, Page 193 of Water Right Records in the Musselshell County Courthouse for 30 cubic feet of water to be diverted from the Musselshell River in Section 1, Township 8 North, Range 27 East. The date appropriated was given as May 31, 1904. The purpose was for irrigation. The system was described as a dam and ditch, ditch being 6 by 3 by 15 feet. The land description of intended place of use was described as lands in Sections 30, 31, 32 and 33 in Township 9 North, Range 28 East. The notice of appropriation is also filed in the Yellowstone County Courthouse.

After the dam went out and water was no longer available in the Krueger-Spendiff ditch, Goffena, in 1935, constructed a 30 inch steel siphon, 160 feet long, across the Musselshell River immediately below the location of the dam site, through which he diverts water from the original Bethke ditch into parts of the old Hartford D. Arkwright and Krueger-Spendiff systems.

At the time of the construction of the siphon it was Goffena's intention to irrigate parts of Section 1, Township 8 North, Range 27 East; Section 6, Township 8 North, Range 29 East, and the southeast quarter of Section 36, Township 9 North, Range 27 East, also to furnish water temporarily to sections 30 and 31, Township 9 North, Range 28 East. From the location of the siphon part of the old Arkwright ditch has been rebuilt along with a new section of ditch which carries water to a point along the old channel of the Musselshell River in Section 36, Township 9 North, Range 27 East. This water is then spilled into the old Krueger-Spendiff ditch which is used to irrigate lands in Section 36, Township 9 North, Range 27 East, and Sections 30 and 31, Township 9 North, Range 28 East. Goffena plans to rebuild the upper portion of this system and make the diversion point upstream above the original point of diversion. Thus we have in part the makings of what is now known as the Goffena-Sudan irrigation system. The system is locally known as the Goffena ditch, as the greater part of the ditch serves Goffena's land or the land owned by the Goffena Ranch and Livestock Company. Goffena has contracted for 800 acre feet of stored water from Deadman's Basin Reservoir which he purchased through the Deadman's Basin Water Users' Association, and Sudan buys 250 acre feet. Under this system there are no assessments for operation and maintenance charges, with the work on the system being done and paid for by the parties involved, as the need for repair work arises.

As a result of channel changes made in the Musselshell River by the Chicago, Milwaukee, St. Paul and Pacific Railroad when they constructed their line in to the area in 1907, some construction relative to ditch relocation was done by the Railroad which affected this system.

According to our records, in 1948 there were 891.00 acres being irrigated under the Goffena-Sudan ditch, with a potential acreage under existing facilities of 108.00 acres, or a maximum irrigable area of 999.00 acres.

LAKE MASON NATIONAL WILDLIFE REFUGE

Lake Mason National Wildlife Refuge is located in Musselshell County and is administered by the U. S. Department of Interior, Fish and Wildlife Service through the Fort Peck Game Range. There are 6,884.12 acres of land involved in the refuge, of which 1,250 acres are marsh and water. All of this is in private ownership—the Fish and Wildlife Service having easements. The area was developed primarily for the use of migratory waterfowl.

The refuge is made up of two main areas some twelve miles apart and connected by a narrow strip of land bordering Willow Creek. The northern most area, Miller Lake is fed by a drilled well to the north. A canal was constructed to lead the water from the well to the lake. Another canal conveys the water from Miller Lake into Willow Creek. Lake Mason's water level, in turn, is governed by the amount of water reaching it through Willow Creek.

An estimated $42,000 has been spent by the federal government to improve the area. This amount includes the material and labor for the construction of two spillways, two headgates, two dikes, a drilled artesian well, and miscellaneous ditches and canals.

MUSSELSHELL DITCH COMPANY

The water right appropriation for the Musselshell Ditch Company dates back to October 19, 1891, when Charles W. McLean appropriated 2,000 miner's inches of water to be diverted from the north bank of the Musselshell River at a point 60 feet due east of a point 1,240 feet due south of the northwest corner of Section 14, Township 9 North, Range 29 East. This appropriation was filed November 12, 1891, and is recorded in Book 1, Page 50 of Water Right Records in the Musselshell County Courthouse, and Book 2, Page 29 of Water Right Records in the Fergus County Courthouse. The ditch was described as being 68 inches wide and 48 inches deep. The land description of the intended place of use was given as the SE¼NW¼, S½NE¼, NE¼SE¼ of Section 12, Township 9 North, Range 29 East.

The Musselshell Ditch Company became incorporated on January 6, 1893, and this above described McLean water right was transferred by sale to this company in writing, dated January 19, 1893. At this time the company was made up of McLean, N. C. Brockway, and W. B. Cooley.

About ten years after the incorporation of the Musselshell Ditch Company, Mordecai Chandler appropriated 600 miner's inches of water on October 1, 1903. This water was to be diverted from the north bank of the Musselshell River at a point 100 feet west of the existing headgate of the Musselshell Ditch Company. This appropriation was filed on October 12, 1903, and is recorded in Book 1, Page 148 of Water Right Records in the Musselshell County Courthouse, and Book 3, Page 616 of Water Right Records in the Fergus County Courthouse. The ditch was described as being 60 inches wide and 12 inches deep. This ditch was completed on June 2, 1904. The land description of intended place of use was

given as the East half of Section 7, Township 9 North, Range 30 East, the W½NW¼, NE¼NW¼, and the NW¼SW¼ of Section 8, Township 9 North, Range 30 East.

The original dam in the northwest quarter of Section 14, Township 9 North, Range 29 East was used jointly by the Musselshell Ditch Company and M. Chandler until 1907 when the Chicago, Milwaukee, St. Paul and Pacific Railroad Company came through the valley. The railroad made numerous channel changes in the Musselshell River to avoid building an excess number of bridges. One of these channel changes by the railroad rendered the original Musselshell Ditch Company and Chandler dam and headgates useless. The right-of-way deed from the ditch company required the railroad to build a new dam and headgate in the southeast quarter of Section 15, Township 9 North, Range 29 East. From this location the railroad constructed a ditch 4100 feet long and a double headgate in the northwest quarter of Section 12, Township 9 North, Range 29 East, where connection was made with the existing ditches of both systems. In addition, the railroad also had to relocate these existing ditches for a little less than half a mile in the northeast quarter of Section 12, Township 9 North, Range 29 East. It is this above described dam and ditch built by the railroad in combination with the older ditch leading from the double headgate which makes up the present system used by the Musselshell Ditch Company.

The project is located in the vicinity of Geneva on the north side of the Musselshell River. The length of the main canal from the double headgate is approximately 14 miles. The main canal of the Chandler ditch runs almost parallel with the ditch of the Musselshell Ditch Company, and its length from the double headgate is approximately 7 miles.

The Musselshell Ditch Company has gone to court twice with M. Chandler. In the first case, entered June 27, 1923, the action was prosecuted to determine the respective rights of the two parties to the use of the waters of the Musselshell River. The Musselshell Ditch Company was decreed owner of a water right for 1650 miner's inches, prior in time and superior in right to the decreed 337 miner's inches water right of M. Chandler.

In the second case, entered December 28, 1932, the question as to the respective rights of the two parties in and to any headgates, ditches, or canals used in conveying water from the Musselshell River was determined. In the main, this case perpetually enjoined and restrained the Musselshell Ditch Company from wasting the waters of the Musselshell River, from carrying any surplus water in their canal, and from closing down M. Chandler's headgate and preventing the waters of the Musselshell River from being conveyed through his canal whenever more water of the Musselshell River was available for the use of the Musselshell Ditch Company than they were entitled to or more than they needed or required. It was also decreed that whenever the lands of the Musselshell Ditch Company did not require all of the decreed 1650 miner's inches, they should close the headgate of their canal sufficiently so as to allow M. Chandler the use of the surplus water when needed.

The Musselshell Ditch Company's Articles of Incorporation were renewed for 40 years on May 1, 1915. The amount of capital stock of said corporation was stated to be $5,000, consisting of 100 shares of the par value of $50.00 each. McLean, Brockway and Cooley each subscribed to 33 1-3 shares of the capital stock.

In these Articles of Incorporation it was stated that the purpose for which the cor-

poration was formed was to acquire, construct, own, and use irrigating ditches and water ditches, and to repair the same, and to acquire water and water rights for use in said ditches, for irrigating the farms, ranches and lands of the stockholders of said corporation, contiguous to said ditch hereinafter described, and for irrigating lands hereafter acquired by said stockholders in the vicinity of said ditch, and for supplying and furnishing water to other farmers and ranchers in the neighborhood of said ditch for a consideration or price, whenever there may be a surplus of water over and above the quantity required by said stockholders for irrigation of their respective lands; and to acquire, purchase, lease, own, and use any lands that may be or may become necessary to divert said waters into said ditches, and conduct said waters through said ditches and to the places of use for irrigating the lands, farms, and ranches aforesaid, and for diverting, conducting, using, holding and storing of said water.

In 1948 the company consisted of five owners. William Jacques owned 33 1-3 shares, or 1-3 of the total shares; William Cooley owned 33 1-3 shares, or 1-3 of the total 100 shares; and the final 1-3 of the total 100 shares was divided among Norman Halmberg who owned ½ of 33 1-3 shares, J. C. Burrington who owned ¼ of 33 1-3 shares, and F. V. Watts who owned ¼ of 33 1-3 shares.

Each of these five users keep up his proportionate share of the ditch, and the only assessments are for repairs that have to be contracted out.

The canal for the Musselshell Ditch Company diverts the water by gravity, and in 1948 there were 1,181.00 acres being irrigated, with a potential acreage under existing facilities of 360.00 acres, or a maximum irrigable acreage of 1,541.00 acres. Since the natural stream flow of the Musselshell River is often not adequate to irrigate all the lands under cultivation, most of the users purchase additional water from the Lower Musselshell Water Users' Association, who in turn buy the stored water of Deadman's Basin Storage Reservoir from the State Water Conservation Board.

NADERMAN DITCH COMPANY

The Naderman Project is located on the north side of the Musselshell River between the town of Roundup and the Bundy station. Water is diverted by gravity from the Musselshell River at a point in the southwest quarter of the southeast quarter of Section 23, Township 7 North, Range 24 East. At the point of diversion a concrete dam has been constructed across the river and water from the dam is diverted through a concrete headgate structure with gates 3 feet by 4 feet in size to the main canal. The headgate and dam are in good repair. From the point of diversion the main canal follows a northeasterly direction and is about 11 miles in length. The canal is in fair condition, it having been cleaned above Kern or Currant Creek and enlarged below it in 1947.

The Naderman Ditch Company is not incorporated but is operated as a mutual ditch company with seven users participating. The members are assessed for operation and maintenance according to the number of acres irrigated and the distance they are from the headgate, i.e., the user on the very end of the ditch paying the largest percentage with the next user up the ditch paying the next largest, etc.

Since the natural stream flow of the Musselshell River is not adequate for irrigation needs during the entire irrigation season additional water is purchased by individual water users from the Lower Musselshell Water User's Association, who in turn buy stored water from the State Water Conservation Board. The said water is released from Deadman's Basin Storage Reservoir by means of an outlet canal to Careless Creek and down said creek to the Musselshell River from which it is diverted.

In addition to the land irrigated by gravity three users employ pumps to carry water to land that cannot be reached by gravity. Two of these obtain water directly by lateral ditch from the main canal while the other picks up water from the old river channel that has water spilled into it from the Naderman System. According to the information we were able to obtain, this latter user contends he has a free right because of a filing made by Hart. This claim is disputed by the users under the Naderman System. This matter will no doubt end up in a court case in order to determine the rights of the claimant.

What is now known as the Naderman Ditch Company system was started by John P. Naderman who, on May 1, 1897, appropriated 1,000 miner's inches of water to be diverted from the Musselshell River in the southwest quarter of the southwest quarter of Section 13, Township 7 North, Range 24 East. Naderman built a dam and headgate in the above described location, and a ditch extending in a northeasterly direction for about three miles. The ditch was described as being 10 feet wide and 3 feet deep. The first use of the Naderman system was in 1898. The notice of appropriation was filed on October 29, 1900 and recorded in Book 3, Page 152 of Water Right Records in the Fergus County Courthouse.

The system had been in use for nine years when the Chicago-Milwaukee St. Paul & Pacific Railroad came through the Musselshell Valley in 1907, but because of channel changes made by the railroad in the Musselshell River, in order to avoid building bridges, the original Naderman dam and headgate were made useless. At this time the system belonged to H. H. Porter and generally known as the Elso Dam and Irrigation System. To compensate for the damage done, in January, 1908, the railroad constructed a new dam in the northwest quarter of the southeast quarter of Section 23, Township 7 North, Range 24 East. In addition to the dam, a culvert with a headgate and the necessary ditch to bring water to the old river channel were also constructed. Water was spilled into the channel from which it was diverted by the original headgate. This practice of spilling water into the old river channel is still in use and a dirt and brush dam has been constructed across the old channel in order to faiclitate diverting the water into the headgate and main canal.

This dam was expensive to maintain and by failing repeatedly when water was needed for irrigation caused many settlements for damages. On January 30, 1920, the railroad obtained full release from Porter, et al (successors of Naderman) from the maintenance of the dam, headgate and ditches on or off the right-of-way that had been constructed by the railroad. As part of the release contract the railroad constructed a new culvert and furnished the necessary cement and gravel for a permanent dam which Porter constructed in 1921. At the same time Porter also constructed a connecting ditch connecting the new dam to the ditch that had been formerly built by the railroad. As it now

stands, outside of the culverts under the track, the railroad is under no obligation regarding this system.

In 1948 there were 579.00 acres being irrigated under the Naderman Ditch Company system, with a potential acreage under existing facilities of 150.00 acres, or a maximum irrigable acreage of 729.00 acres.

PROPOSED NEWTON CANAL PROJECT

Plans for the proposed Newton Ditch Irrigation Project were submitted to the State Water Conservation Board in 1938. These plans called for the construction of a concrete diversion weir across the Musselshell River at a point about 1.5 miles above the town of Roundup in Musselshell County, with flash board arrangement for the purpose of raising the water level in the stream.

This ditch was to consist of certain reconstructed portions of the old Newton Ditch, the Lowther and Clifton Ditch, and the Arkwright Sheep Company Ditch present in this area along the Musselshell River. The necessary flumes, bridges, and other pertinent structures would be installed along the canal.

The old Newton Ditch had been in use until the Chicago, Milwaukee Railroad was built through the valley in 1907. The railroad rendered the original dam and headgate of the system in the southeast quarter of Section 14, Township 8 North, Range 25 East useless by the channel change made below this original dam. The railroad then constructed a new dam in 1907 in the northeast quarter of Section 23, Township 8 North, Range 25 East, a ditch from the dam through the culvert to the old river channel north of the new dam site, and lead the water along that channel to the original headgate in the southeast quarter of Section 14, Township 8 North, Range 25 East. The railroad was also required by deed to build a flume in the northwest quarter of Section 18, Township 8 North, Range 26 East, and a piece of new ditch in the southwest quarter of the northwest quarter of Section 17, Township 8 North, Range 26 East.

The new dam was washed out in June, 1908, so the railroad immediately built a new intake in the northeast quarter of the southwest quarter of Section 23, Township 8 North, Range 25 East, and a ditch from there to the culvert in the northwest quarter of the northwest quarter of Section 23, Township 8 North, Range 25 East to restore Newton's water supply. Today, the intake in the northeast quarter of the southwest quarter of Section 23, Township 8 North, Range 25 East is not in use, nor is any part of the ditch. In fact, it has been obliterated through the town of Roundup.

During construction the railroad did not disturb the dam of the Lowther and Clifton Irrigation System located in Musselshell County. This dam, which at the present time is out, was located on the Musselshell River in the southwest quarter of Section 17, Township 8 North, Range 26 East. The railroad did have to relocate the ditch in the south half of Section 9, Township 8 North, Range 26 East, and build a lateral in the northeast quarter of Section 10, Township 8 North, Range 26 East. They were also obligated by the right-of-way deed, and because of the channel change in the river, to construct a flume in the southeast quarter of Section 8, Township 8 North, Range 26 East.

Another flume was constructed in the south half of the northwest quarter of Section 17, Township 8 North, Range 26 East. This system has not been in use for many years.

For the Arkwright Sheep Company Irrigation System in Musselshell County, the railroad relocated the ditch in several places and constructed necessary laterals to avoid building an excess number of bridges in this area along the Musselshell River. The railroad also built a new headgate in the north half of the northwest quarter of Section 2, Township 8 North, Range 27 East. The two dams of the system were not disturbed. At the present time, the dam which had been located in the northeast quarter of the northwest quarter of Section 11, Township 8 North, Range 26 East, is out, and the ditch from here now known as the Milner-Newton is not in use. The other dam, however, located in the southwest quarter of the southwest quarter of Section 5, Township 8 North, Range 27 East, is still present and the ditch from it is in use by Goffena and Sudan and is now known by that name.

These numerous channel changes made by the railroad gradually affected the usefulness of the facilities until the land owners in the ditch area expressed desire in 1938 for the proposed Newton Ditch Irrigation Project, and signed up for 3,092 acre-feet of water.

The estimated capacity of the reconstructed canal was to have been approximately fifty second feet. The dam was to have diverted approximately 7,500 acre-feet of water during the irrigation season for the lands lying along the Musselshell River east of Roundup.

The canal itself, from the point of diversion in Section 22, Township 8 North, Range 25 East, was to stretch approximately parallel with the river in an easterly direction to a point about 12 miles east of the town of Roundup where it was to be discharged from the canal back into the main channel of the river.

The lands of the project lay well for irrigation. The soil in the area was considered to be very fertile as shown by the quality of the crops raised by dry farming and irrigation methods at that time. The natural drainage of the area was sufficient so that there would have been very little need for artificial drainage.

The purpose of the project was to provide a supplemental water supply to the area to provide a livelihood for a substantial number of farmers. With the increased added production it was estimated that a larger community would be supported, and with the decrease in each farm area it was further expected that many of the coal miners in the adjacent area would resort to agricultural pursuits during the summer months when most of the mines were shut down.

The cost of the proposed diversion dam and canal was estimated at about $130,-909.00. This included preliminary expenses, cost of lands and rights-of-way, and construction costs. Of this, the estimated loan was to be $72,000.00 or fifty-five per cent, and the estimated grant to be applied for from the PWA was $58,909.00 or forty-five per cent.

Since the number of irrigable acres contemplated on completion of the project was to have been 3,000, the net loan per irrigable acre would have been $24.00 to total the $72,000 applied for. The total annual charge per acre on the 3,000 irrigable acres would

have been $2.55. This would include $1.39 for the average annual debt payment, 41 cents for the estimated reserve charge and 75 cents for the estimated maintenance and operation. It was estimated that the annual net return per acre would be $14.00. It was believed that in consideration of the condition and facilities that already existed, and the service that would be rendered, that the project would very successfully carry the charges indicated.

For this project it was proposed that the State Water Conservation Board would issue $1,000 revenue bonds against the income of the project at an interest rate of four per cent annually. These bonds would be payable from the net revenue derived from the sale of water, and would mature serially in thirty annual installments. They would be redeemable in whole or in part at the option of the applicant on any interest day, in the inverse order of maturity, at a price equal to the principal amount thereof, plus the accrued interest at the time of redemption.

This proposed project is included in this report because, although the proposal did not materialize at this time, interest in the project has been revived and it is expected that work will begin in this area in the near future.

ROUNDUP—CITY WATER DEPARTMENT

On July 15, 1909, James U. Gridley formed the Roundup Water Company and secured a franchise to supply the City of Roundup with water for 25 years. This arrangement continued for a number of years. On December 9, 1913, City ordinance No. 84 was passed which authorized the purchase of the water works plant, system, water supply, and franchise of the Roundup Water Company by the City of Roundup. A special election was held January 6, 1914, and the vote was in favor of the purchase. As a result, water purchase bonds in the amount of $60,000.00 were issued. On March 9, 1914, these were sold to the Continental and Commercial Trust and Savings Bank of Chicago at 6 per cent interest, payable semi-annually on the first of January and the first of July of each year, being redeemable January 1, 1929, and payable January 1, 1934. These bonds are all paid and, as of July 1, 1949, the City Water Department had a surplus of $54,000.00 in reserve. The total cost of the water plant and equipment is valued at $132,154.37. The method of purification is by chlorination. The total amount of water used by all methods during the 1948-1949 fiscal year was 175,948,400 gallons. The maximum water obtained by all methods during any one day was 1,737,200 gallons. During this same period there were 906 water services in use, serving an estimated 5,000 persons.

The pumping plant is located near the fairgrounds south of the City of Roundup, and from there water is piped to a reservoir, having a capacity of 1,000,000 gallons, which is located on a hill north of the city.

At the pumping plant water is obtained from two sources, the Musselshell River and the old Number One mine. Water that is obtained from the Musselshell River is by means of four connecting 15-inch tile pipe which divert the water to a well and sump from which it is pumped. Water obtained from the old Number One mine is lifted 90 feet through a 5-inch steel pipe from one of the abandoned mining levels by means of a 400-gallon per

minute Pamona pump that develops a 100 foot head driven by a 15 horse power General Electric motor. This water is piped to the sump and is used as a supplemental supply in case the river goes dry.

At the main pumping plant two centrifugal pumps are in use, one having a capacity of 1,250 gallons per minute, driven by a 125 horse power electric motor, and the other with a capacity of 750 gallons per minute and driven by a 75 horse power electric motor. This combination develops a 300 foot head.

It was reported that the water system was in good repair with the exception of the storage reservoir, which the City plans to replace at a cost of $55,000.00. It is to be of the same capacity as the one now in use. In the past the water supply has been short from the Musselshell River, but since the establishment of the storage reservoirs on the upper part of the river, the supply has been adequate. The City has purchased 500 acre feet of stored water from Deadman's Basin storage reservoir through the Lower Musselshell Water Users' Association.

SOUTH WILLOW CREEK WATER RESTORATION AND STORAGE PROJECT

In 1935 the State Water Conservation Board completed plans to develop the South Willow Creek Water Restoration and Storage Project. This plan called for two reservoirs —one on Willow Creek with an estimated capacity of 3000 acre feet and another on Jones Creek with a capacity of 1087 acre feet. In addition to the reservoirs it was planned to drill four artesian wells to augment the stored water supply. Under this proposed plan a flood water canal, or supply canal, was to divert flood waters from South Willow and Whoop-Up creeks and would also carry water from the artesian wells into Lake Mason. By doing this it was contemplated to restore water to the creek bed so as to make water available for irrigation of pasture land adjoining the stream. In addition to the irrigation benefits it was planned to make Lake Mason the nesting place for ducks during the spring and summer months and a resting place in the fall during migration. (Since this time Lake Mason has become a water fowl refuge.) Under this plan it was estimated that between 6,000 and 7,000 acres would be irrigated for hay and pasture. In the area where the proposed artesian wells were to be drilled one well at the time was flowing 30,000 barrels of water daily.

The total estimated cost of the project was $62,852. Of this amount $24,964 was to be spent on the South Willow Creek reservoir and $9,958 on the Jones Creek reservoir.

The proposed South Willow Creek Water Restoration and Storage Project is located in Musselshell County and is situated along South Willow Creek and Jones Creek which are tributaries of the Musselshell River which flows into the Missouri River. Lands, reservoirs and canals included in this project are in Townships 10 and 11 North, Ranges 23 and 24 East of the Montana Principal Meridian. This project was proposed for

irrigation of agricultural lands that were being irrigated but in need of supplemental water supply during the irrigation season. The primary purpose was to regulate the stream flow by storage of the flood waters from South Willow Creek and its tributaries lying above Section 19, Township 11 North, Range 23 East and Jones Creek and its tributaries lying above Section 14, Township 11 North, Range 23 East, together with waters to be developed from artesian wells to be drilled in the northwest corner of said township. Flood waters were to be diverted from South Willow Creek at the mouth of Whoop-Up Creek in Section 19 through a canal to be constructed on the northeast quarter of Section 20 where the water was to be spilled into a natural coulee. In the northwest quarter of Section 28 a supply canal was to be built, taking up the water from said coulee and diverting it into a natural lake bed which was to be one of the storage reservoirs.

Flood water from Jones Creek was to be stored in a reservoir to be built in the stream bed in Section 14, Township 11 North, Range 23 East. The proposed artesian wells were to be drilled in the sections immediately north and west of Section 20 in the same township. Water from these wells was to be diverted by small ditches either into the Whoop-Up Creek drainage and mixed with the flood waters to be taken into the reservoir from South Willow Creek, or directly to the reservoir, whichever was the most feasible according to the well locations. An outlet canal starting from the South Willow Creek reservoir at the dam site was to carry surplus water and water to be used for irrigation back into South Willow Creek, discharging it near the center of Section 33, Township 11 North, Range 23 East.

A water users association known as the South Willow Creek Water Users' Association Project was formed and made application in behalf of the State Water Conservation Board to the United States of America for a loan and grant to aid in financing the construction of the two reservoirs, diversion dam and pertinent works and the drilling of the artesian wells. As security for the loan requested for the construction of this project, the State Water Conservation Board agreed to issue revenue bonds. The repayment of these bonds was to be secured by a pledge of all revenues from the project. It was planned that the water users under this project would organize a corporation, which corporation would have control of the operation of the project subject to the supervision of the State Water Conservation Board. The water users under this project were to subscribe to one share of stock in said corporation for each acre foot of water which they contracted to purchase from the Board and the water users corporation.

It was estimated that the loan for this project would be $34,569.00 and that the grant would be $28,283.00. Considerable work was done relative to engineering plans on this project, with some construction work being accomplished. In addition to the engineering plans, formation of a corporation, etc., the State Water Conservation Board filed on all of the unappropriated waters on South Willow Creek and tributaries and Jones Creek and tributaries. These appropriations were filed October 23, 1935.

At the present time there has been quite a bit of activity relative to the development of small irrigation structures to utilize the flood waters of South Willow Creek for the irrigation of alfalfa hay and wild grasses. This activity is confined mostly to the area above Lake Mason. There is some irrigation immediately east of Lake Mason and some

scattered flood irrigation between Lake Mason and the Musselshell River. Waters are also used and filed on by the United States Government to supply water for its migratory water fowl refuge of which Lake Mason is a part.

Relative to the water rights on South Willow Creek because of its intermittent supply of water which is erratic from the standpoint of average flow over a period of years, a decree was entered in the District Court of the Fifteenth Judicial District of the State of Montana, in and for the County of Musselshell, in an action wherein Margaret A. Berrigan was Plaintiff and John H. Ramsey, George McCleary, Vincent McCleary, Adolph Hammergren, Victor Anderson, and Theodore Lemler, were Defendants, which said decree is dated May 29th, 1919, and filed in the office of the Clerk of said Court on June 7th, 1919 at 4 p. m. Case No. 780. Said decree determines the priority of the water rights marked with the notation (a) only. This decree is not an adjudication of Willow Creek, but is a decree wherein the rights of the parties to the action are involved and no others. The decree in substance reads as follows: That Margaret A. Berrigan is entitled to 200 miners inches of water of Willow Creek, and the said right is hereby declared to be first in time and prior to the rights of any of the **defendants and other persons mentioned in this decree.** That Frank Liess, successor of Victor Anderson is entitled to 72.6 miners inches; That Adolph Hammergren is entitled to 107.7 miners inches; That Theodore Lemler is entitled to 155.2 miners inches; That J. E. Landon is entitled to 140 miners inches; That John H. Ramsey is entitled to 107.9 miners inches; That George McCleary and Vincent McCleary are entitled to 721.9 miners inches. Said parties are entitled to the water in the order named.

The reason this proposed project is included in this report is because it is felt that although the proposal did not materialize there is a definite need for irrigation development of some kind in this area to help stabilize the livestock industry. From the standpoint of irrigable land area it is the opinion of the writer that such a project would be entirely feasible, and that the possibility of storage reservoirs and artesian wells to supply the necessary water for this area at a cost that would be practicable to the water users, still needs further study and exploration.