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NORTH DAKOTA STATE AGENCY
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FIRST BIENNIAL REPORT

of the

North Dakota Water Conservation Commission

WATER COMMISSION
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From the date of its organization
March 23rd, 1937, to December 1st, 1938

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North Dakota Water Conservation Commission

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BUY "DAKOTA MAID" FLOUR

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LETTER OF TRANSMITTAL

December 15, 1938.

Honorable William Langer,
Governor of North Dakota
Bismarck, North Dakota.

Dear Governor:

We submit herewith the report of the State Water Conservation Commission covering activities from the date of its organization on March 23, 1937, up to the present time.

Respectfully submitted,

STATE WATER CONSERVATION COMMISSION.
HENRY HOLT, Vice Chairman,
KENNETH W. SIMONS,
FRANK P. WHITNEY,
GERALD C. OLSON,
J. ARTHUR ENGEN,
EINAR H. DAHL.

D. J. BEAKEY, Secretary,
E. J. THOMAS, Chief Engineer.

Excerpt from the report of the War Department Engineers to the Chief of Engineers, U. S. Army, Washington, D. C., April 22nd, 1937, following a public hearing held at Devils Lake October 26th, 1936:

"If the present period of deficient rainfall in this area is to continue indefinitely, it is apparent that agriculture must be greatly restricted as a means of livelihood. Since the affected region is primarily dependent upon agriculture it would follow that irrigation must be adopted to supplement the natural rainfall or that the population dependent upon it be greatly reduced. Likewise, the difficulties experienced by many municipalities in obtaining an adequate water supply for domestic and commercial use and for sanitation during the same period indicate that a definite solution of this problem is demanded."

ACKNOWLEDGMENTS

In presenting this report the commission wishes to call attention to and make public acknowledgment of the services rendered to it by the following agencies and individuals:

Hon. A. M. Christianson, justice of the state supreme court and chairman of the North Dakota Rural Rehabilitation corporation, who has financed much of the commission's work through a grant to the RRC and whose advice and knowledge has proved invaluable.

Mr. J. P. Cain, chairman of the Planning Board, and other members of the RRC and Planning Board, who also gave valuable assistance.

Mr. Cal A. Ward, Mr. Walter Maddock and other officials of the Farm Security Administration for their cooperation, assistance and advice.

Mr. S. H. McCrory, W. W. McLaughlin and M. R. Lewis, all of the Bureau of Agricultural Engineering in the U. S. Department of Agriculture.

Mr. George S. Knapp, state engineer of Kansas and technical adviser to the commission, who did much to put the work in this state upon a sound basis.

To Herbert C. Hanson, Director of the Experiment Station, H. F. McColly, Professor of Agricultural Engineering, and others at the state agricultural college for their advice and counsel.

Thos. H. Moodie, WPA administrator.

John C. Page, U. S. Chief of the Bureau of Reclamation.

Oscar W. Hagen, Representative from McKenzie County.

M. D. Hollis, Severt W. Thompson, Gus Lamb, C. F. Kelsch and M. O. Ryan for their services rendered to the Missouri River diversion program.

ORGANIZATION AND PERSONNEL

The North Dakota Water Conservation Commission was created by the 25th session of legislative assembly, House Bill No. 125, at which $112,500 was appropriated for a two-year period.

Pursuant to legislative direction the board was organized by Gov. William Langer with the appointment of the following citizens as members of the commission:

To six-year terms—

Mr. Henry Holt, Grand Forks, N. D.
Mr. Kenneth W. Simons, Bismarck, N. D.

To four-year terms—

Mr. Frank P. Whitney, Dickinson, N. D.
Mr. Gerald Olson, Mooreton, N. D.

To two-year terms—

Mr. D. J. Beakey, Williston, N. D.
Mr. J. Arthur Engen, Finley, N. D.

Under the law, the governor is designated as chairman of the commission. At its first organization meeting, however, Mr. Henry Holt was elected vice-chairman, to preside in the absence of the chairman. The

work of the commission was apportioned among committees, which were appointed at that time.

Later, at the request of the commission, Mr. D. J. Beakey was elected as secretary. He thereupon resigned as a member of the commission and Mr. Einar Dahl, Watford City, was appointed to take his place. That is the membership of the commission as now organized.

General

In reporting on its work the commission wishes to point out to the legislature the fact that North Dakota never before had a governmental body of this kind and in formulating its policies and arranging its work the commission was, necessarily, guided by the experience of other states and by the advice of experts employed by the federal government.

At the beginning the commission was assisted in perfecting its organization program by M. R. Lewis of Corvallis, Ore., an expert in the water conservation field, whose services were loaned to the commission by the Bureau of Agricultural Engineering of the Department of Agriculture. His services to the commission were invaluable. His entire time for three months was given over to assisting the commission without charge to the state of North Dakota.

Problems

The commission found—and were so advised by federal experts—that North Dakota has three distinct types of water problems, all of them pressing for solution. They may be listed in the following order:

1. Water for human and industrial needs and sewage dilution.
2. Water for livestock and other farm animals.
3. Water for irrigation to insure crop yields in those areas of North Dakota which have been hardest hit by drouth.

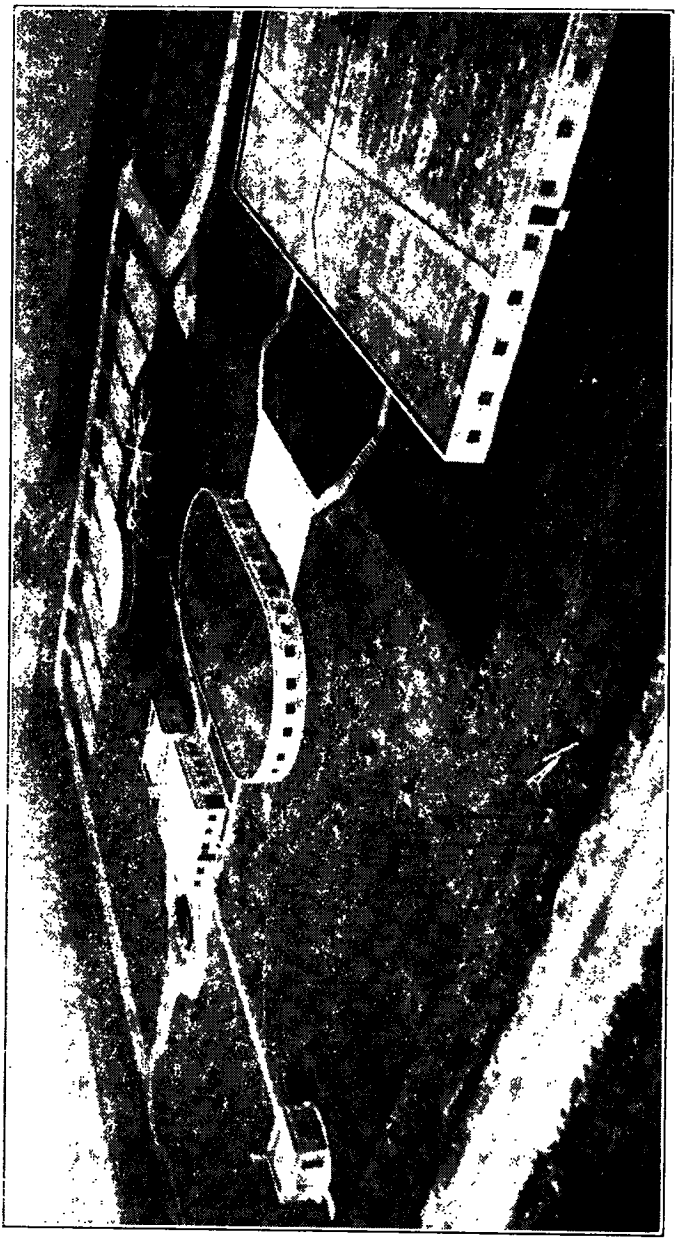
The commission has directed its work toward solving of these problems. It is apparent, however, that each of them will require long years of intelligent effort and considerable expense.

TRI-STATE WATERS COMMISSION

The 25th legislative assembly created, in addition to the North Dakota Water Conservation Commission, the Tri-State Waters Commission, which was designed to consider, in conjunction with Minnesota and South Dakota, proposed water developments in the Red River Valley. To this commission Governor Langer, who is also a member, appointed Mr. Henry Holt of Grand Forks, N. D., and Mr. Leo Gauthier of Walhalla, N. D. Since no appropriation was made for this commission, however, and since its work necessarily must be coordinated with that of the North Dakota Water Conservation Commission, the expense of this commission was paid from the appropriation to the North Dakota Water Conservation Commission.

A separate financial report for this commission appears as an appendix at the end of this report.

The condition in the Red River Valley is typical of those areas where the need for a better and more assured water supply is imperative.



FARGO SEWAGE TREATMENT PLANT—Construction of these plants have cost the cities and industries of Eastern North Dakota since 1935 the sum of over $1,600,000 for treatment of sewage and water. Measures against stream pollution can be successful only if sufficient flow is maintained in the streams to dilute the concentration of waste products.

Red River Plan

Since 1935, cities and industries in the Red River Valley have spent $1,600,000 for water and sewage treatment facilities. Despite this heavy expenditure, however, the condition still is critical. Because it lacks the water to properly dilute the effluent from its sewage disposal plant, the Armour Packing Plant at West Fargo has faced lawsuits asking damages in the sum estimated at $500,000 (accurate figures not obtainable due to present unsettled lawsuit) and we are informed that the various cities along the river, including Fargo and Grand Forks, together with certain other industries in those areas, will shortly face suits for additional large amounts.

Under the terms of the Tri-State Waters Commission agreement, approved by the 25th legislative assembly it had been hoped that the condition in the Red River Valley could be alleviated by the development of the so-called Red River plan. This would have conserved the waters in the Red River watershed and made them available at seasons of low flow.

In approving this tri-state agreement, however, the Minnesota legislature specifically exempted the Otter Tail River basin from the terms of the tri-state agreement. Since the Otter Tail river basin normally supplies 70 per cent of the water flow in the Red River, this commission has come to the conclusion that the Red River development plan will not meet the needs of the cities and towns along that stream. It cannot be depended upon to supply water for human and industrial needs, to say nothing of the need for stock water and small irrigation systems along the stream.

Missouri River Diversion

In view of Minnesota's restriction on the tri-state agreement, therefore, your commission has concluded that the only way to meet the need of Eastern North Dakota for water is by diversion of the Missouri River into the headwaters of streams serving the Central and Eastern parts of North Dakota. Since this is a large and expensive project, it is obvious that it can be done only by the federal government. Much of the commission's work has been directed toward interesting the government in this project and convincing the government of its practicability and desirability.

Hearings Before Army Engineers

Representing the government in these negotiations have been the army engineers, who have jurisdiction over all navigable streams.

At the beginning the army engineers rejected the proposal as not economically sound.

At the insistence of this commission, however, the matter was reopened and further studies were made. In some of these studies the army engineers and others have joined. As a result there is a prospect that many of the objections to the diversion proposal will have been overcome in the near future.

At the suggestion of Mr. W. W. McLaughlin of the Bureau of Agricultural Engineering, this commission employed Mr. George S. Knapp of

Topeka, Kan., state engineer of Kansas and an engineer of national reputation, as a consultant for six months.

Under Mr. Knapp's direction, engineers and economists for the commission examined both the engineering and economic phases of the Missouri River diversion proposal.

Diversion Proposal Revised

This study entirely revised the diversion proposal as heretofore envisioned. In the judgment of this commission it not only reduced the costs but increased the benefits by providing for the creation in Central North Dakota of a large reservoir which would itself be a source of benefit as well as a regulator for the flows to be diverted into the James and Sheyenne rivers and Devils Lake.

Change in Plan

The so-called North Dakota Commission plan, now before army engineers, eliminated the proposed high dam in the Missouri river heretofore suggested and substitutes for it a lowering of the tunnel by 13 feet and the construction of a pile dike on the opposite side of the river which would direct the flow to an intake at the minimum level of record flow in the Missouri river. This would necessitate a somewhat longer diversion tunnel but would greatly reduce the over-all cost. It also meets the objection as to lack of footings for a high dam or a sheet piling cut-off wall under the river at the site proposed.

A major difference between the Commission plan and that of the army engineers is that the commission would provide for a flow of water through the diversion system throughout the entire year, whereas the army engineers' plan would provide for such flow during only seven months of the year.

The disagreement as to the practicability of carrying water in artificial channels under ice has caused certain studies to be made by the commission. These now are going forward.

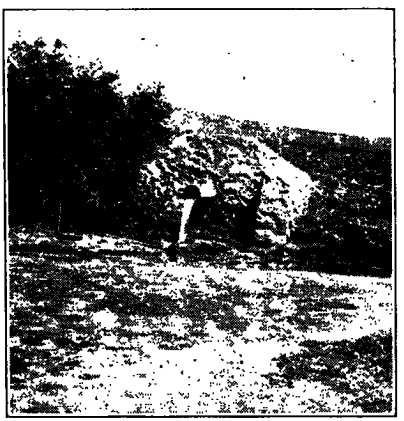
Costs and Benefits

The costs of diversion, as estimated by the commission and by the army engineers have been summarized as follows:

Costs	Commission Estimate	1937 Estimate Army Engineers
Diversion Work and Tunnel	$32,025,600	$45,819,984
Main Canal	1,500,000	3,511,402
Devils Lake Lateral	500,000	1,802,363
James River Lateral	50,000	213,440
Stump Lake Lateral	1,269,596	1,269,596
Sheyenne Reservoir	2,900,000	.....
Irrigation	884,000	1,489,514
Total Construction	$39,127,196	$54,106,299

The benefits of diversion as listed by the commission and by the army engineers have been summarized as follows:

Benefits	Commission Report	Army Engineer's Present Report
1. Total municipal water supply	$14,211,830	
2. Total sewage dilution	1,508,071	
3. Total industrial use	8,500,000	
4. Total plumbing repair	1,700,000	
5. All benefits served by main water plan*		2,290,780*
6. All benefits James river below Pipestem Cr.**		405,100**
7. Water supply, Devils Lake, New Rockford and smaller communities		1,603,500
8. Sewage dilution, Jamestown, New Rockford, Devils Lake and smaller communities		167,693
9. Irrigation—53,000 acres	2,401,000	
10. Irrigation—20,000 acres		800,000
11. Power	1,375,140	3,101,514
12. Recreation and tourist	2,805,000	911,250
13. Livestock Industry	11,317,625	784,800
Biological Survey Purposes		
14. 80,000 acre-feet	1,408,070	
15. 15,000 acre-feet		190,317
16. Ground water	300,000	300,000
17. Fire hazard	8,515,240	.....
18. Insect life	.....	.....
Total	$54,041,976	$10,554,954



SEWAGE OUTFALL — Picture shows discharging of raw sewage into the Red River with resulting sludge banks. This is an objectionable condition which requires not only treatment of sewage but additional stream flow to dilute it.

Much of the disagreement as to the benefits is due to the contention of army engineers that the needs of cities, industries and farmers in the Red River Valley can be met through the so-called Red River plan.

Health Department Studies

There also has been disagreement as to the amounts of water needed by the cities in question. Joint studies are now being made of this question by the Sanitary Engineering Division of the North Dakota Public Health Department with the cooperation of the Minnesota State Board of Health and the United States Public Health service. These studies have to do with the capacity of water to dilute sewage when running under ice. Preliminary data indicate that this study will support the commission's position. If this proves to be the case they cannot easily be ignored since the data obtained will be used by the United States Public Health Service in estimating the needs for water under similar conditions elsewhere throughout the United States. It is the first study of its kind ever made, so far as this commission has been able to learn.

Diversion by Pumping

Studies made by this commission have caused it to espouse no particular method of diverting water from the Missouri river and no special place for the diversion.

Preliminary studies have been made with a view to examining the cost of diversion by pumping from the Missouri river to the crest of the coteau on the east side of the river, permitting the water to run downhill into the central and eastern parts of the state from that point.

The commission advocates no particular route or method of diverting water from the Missouri river. Preliminary studies have been made with a view to determining the feasibility of pumping over the divide separating the Missouri river and Souris river watersheds.

Three sources of electric power are proposed for this pumping, namely, low cost power from Fort Peck, from a dam on the Missouri river at the location of the pumping and a steam plant using lignite coal.

Lignite coal is one of North Dakota's most extensive natural resources. According to the United States Geological Survey, this state has 516,000,000,000 tons of lignite available for commercial mining. Much of the coal is located in the vicinity of the proposed pumping.

This plan envisions cheap electric power for primary pumping and the recovery of more than two-thirds of the amount of power by reason of the flow of water from the peak of the coteau into the eastern part of the state. This is due to the difference in elevation of 1920 feet at Garrison, N. D., and 902 feet at Fargo, a difference of 1018 feet.

Alternate Proposal

There also has been suggested to this commission a proposal to divert water from the Missouri at the Fort Peck dam, carrying a large stream across Northeastern Montana and Northwestern North Dakota into the Des Lacs and/or Souris (Mouse) rivers. Diversion into Devils Lake and

into the headwaters of the James and Sheyenne rivers then would be made through the Wintering river and the Antelope and Buffalo valleys. This proposal has been given considerable support in Montana and offers the most extensive prospects.

Water Supply Insufficient

The need for a more adequate water supply in Central and Eastern North Dakota is evident to every resident of those areas. Farm wells have gone dry and farmers are forced to haul water for their families and stock. The ground water level has continued to recede. Wells which formerly were satisfactory no longer yield water. Streams have been polluted, so that fish and other aquatic life no longer can be sustained.

DEAD FISH—This picture was taken at Coldwater Lake in South Central North Dakota. It is a common sight along the lakes and streams of North Dakota to see dead fish along the banks. It is felt that the ultimate cause is lowered water table and diminished flow which brings on the harmful effects of alkali, stagnant water and poor oxidation besides a heavy winter kill from freezing. The following lakes in Eastern North Dakota were once a fishermen's haven but now have few fish: Wood Lake, Red Willow Lake, Stump Lake and Spiritwood Lake.

Fish still live in water above dams in certain parts of the Sheyenne river but the yearly run upstream through the Red River has been halted completely because of stream pollution at Grand Forks.

At Fargo, Lisbon and Valley City, underground sources of potable water apparently have been exhausted and they are wholly dependent upon the water in streams to sustain life. The situation elsewhere in the state is slowly becoming more desperate.

Devils Lake Hit Hardest

At Devils Lake, no satisfactory source of water is available except through diversion from the Missouri River. Water now available in quantity at that point is not fit for human consumption and residents of the city must either buy water or carry it from surface wells. One result of this condition has been to give Devils Lake a higher incidence of water-borne diseases than any other community in North Dakota. It is proposed to restore Devils Lake to the 1900 elevation of 1423 feet. This will provide water for the City of Devils Lake and for recreation and wild life.

A meeting for the promotion of Missouri River Diversion was held at Devils Lake on December 1, 1938. About 800 people from all parts of the State were in attendance. The need for Missouri River water in Central and Eastern North Dakota was discussed. It was brought to the attention of those present that a hearing would be held at Bismarck on December 15th and 16th by a Board of Review of the army engineers, and as many as possible were urged to be present at the hearing and to offer testimony in behalf of the project. About 400 people attended the Bismarck meeting. Included in the delegations were representatives from Minnesota and South Dakota. Benefits presented at previous hearings and at this hearing totaled $68,000,000.

The meeting at Devils Lake and the hearing at Bismarck showed a renewed and widespread interest in the project, not only in the State of North Dakota, but also in Minnesota and South Dakota. The testimony presented to the army engineers was apparently well received and it appears evident that the project has been advanced closer to the construction stage. It will be the purpose of the State Water Conservation Commission to continue its efforts in behalf of this project.

Other Water Needs in Eastern North Dakota

Elsewhere in Eastern North Dakota, the need for water in communities which cannot be supplied by increasing the flow in the Red River is acute.

Applications for assistance in improving water supplies have been received from communities on the Goose, Pembina and other streams. All have had the assistance of the commission.

The State Water Conservation Commission and the North Dakota delegation in congress are asking that items be included in the Flood Control Bill for the current year, providing for investigations and surveys by the army engineers on the Park, Forest, Goose and Wild Rice rivers in Eastern North Dakota.

On Oct. 12, 1938, a hearing was held by army engineers at Cavalier with regard to water developments needed in that area. The North Dakota Water Conservation Commission cooperated in arranging for this hearing.

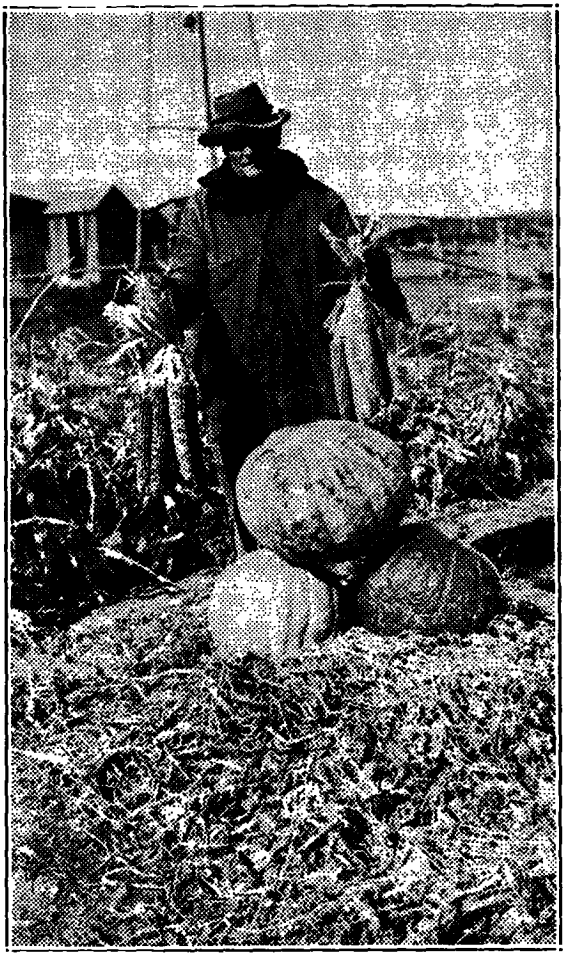
IRRIGATION ON SHEYENNE RIVER—Henry W. Kiefer of Warwich, North Dakota, was aided in diverting this 700 gallons per minute spring onto his 50-acre hay meadow. Kiefer said yields with irrigation were 4 tons Brome hay per acre. He also irrigates a one-acre garden with another spring.

Attention is called to the irrigation section of this report and to the conditions which handicap irrigation in Eastern and Central North Dakota, even though many farmers have requested help in putting water on their land to increase the crop yields.

IRRIGATION DEVELOPMENTS

Because it offered the best opportunity for immediate action of a constructive nature, the initial activities of this commission were directed toward the development of irrigation projects in those parts of the state where the need existed, where there was a desire for it and where suitable water and land conditions could be found together.

All requests for the construction of dams were rejected, as were requests for assistance in drilling and repairing stock water wells. Acute as the need for these developments is, the commission felt that its appropriation was too small to justify it in expending money for these purposes.



THINGS GROW BIG IF YOU GIVE THEM WATER—In this picture Henry Rix, pioneer settler in the Missouri River valley near Mandan, exhibits some corn, pumpkins and squash raised on irrigated land.

The law creating this commission directed that they give every possible assistance to farmers who desired to irrigate and who would "farm the land themselves."

Pursuant to this direction it established, in the spring of 1937, a system for assisting in the development of irrigation projects of this type.

Pursuant to the law, the commission subsidized the engineering costs of such projects up to 75 per cent. It also supplied farmers with pumps,

pipe, and in a few instances power units—as well as irrigation agricultural advice, in an effort to get them started.

61 Farmers Aided

Approximately 26 farmers were thus enabled to begin irrigation in 1937 in time to assist them, at least partially, in raising crops. In Northwestern North Dakota, where there was a marked deficiency in rainfall in 1937, these irrigation projects were almost uniformly successful. Elsewhere in the state the experience varied.

ONION FIELD—Adolph Sprenger of Elgin, North Dakota, obtained 400 bushels of onions per acre from this patch with four irrigations. The full cost of applying water did not exceed $2.00 per acre.

Farmers were uniformly required to contribute their labor to level their land and otherwise assist in the development, and the cost of materials was borne by the commission from the legislative appropriation.

The same system was followed in 1938 when 35 additional projects were installed for individual farmers. In mid-summer of 1938, however, the subsidy for engineering costs was reduced from 75 per cent to 50 per cent. This was made necessary because of the difficulty of financing these projects.

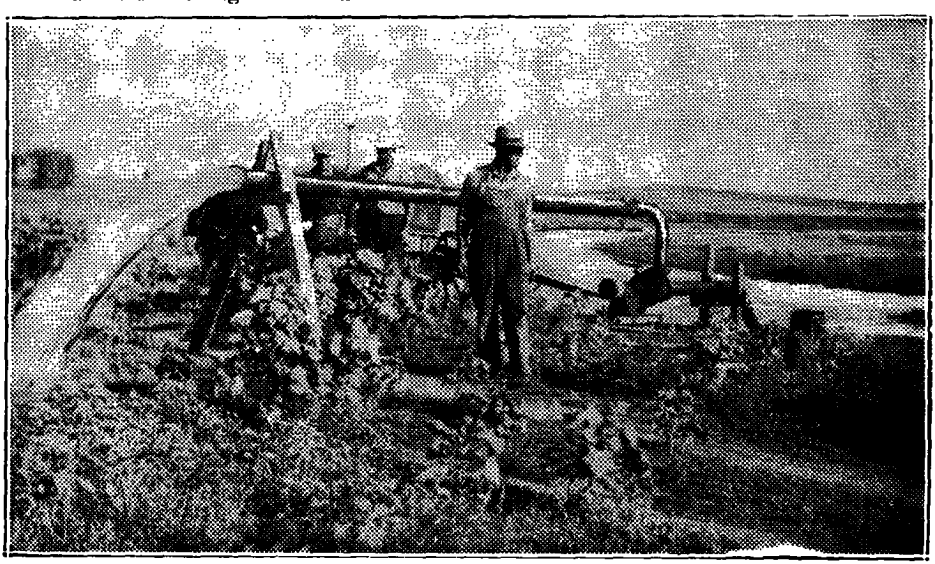
As was expected, three of these individual projects have definitely failed. Others have definitely succeeded. With others additional experience is necessary. This is in line with the experience elsewhere, including those areas where irrigation is an acknowledged success.

The reason for success by one farmer and failure by another lies more in the difference between men than in the difference between conditions. Irrigation farming requires constant attention and hard work. It is not easy. Some men trained in other types of agriculture are not able to adjust themselves to it.

Recommend Continued Assistance

The North Dakota Water Conservation Commission recommends that this type of irrigation assistance be continued and that provision for it be made by the 26th legislative assembly. In only a few cases have farmers who attempted irrigation been on the relief list since the project was installed.

In some areas irrigated crops which gave great promise were destroyed by grasshoppers. Irrigation is not and never was represented as insurance against such disaster.



IRRIGATION REQUIRES A LOT OF WATER, as witness this pump in action on the Ed Nuss farm near Elgin, Grant county. The pipe was turned up so the water would show in the photograph. In actual practice it is lifted no higher than necessary because lifting water costs money.

Even in areas where the grasshopper infestation was most severe, however, some crops were raised by irrigation farmers who watered their land after the grasshoppers had migrated to other districts. This was particularly true of feed crops which need not come to maturity to be useful.

Assistance to Individual Farmers

The following figures show the commission's assistance to individual farmers in the irrigation field:

	1937	1938
No. applications	195	25
No. accepted	59	52
*No. under consideration	57	24
No. rejected	79	5
Cost of projects	$22,359.01	$80,137.25
Acres irrigated	725	1295
**Amount collected from irrigators by Commission	$ 18.26	$68,844.89

*Most of the projects under consideration in 1937 were acted on in 1938.

**In all cases farmers have been required to give the commission the best obtainable security for its investment. Where possible mortgages on the land were taken. In others notes, secured by a mortgage on the machinery installed, have been accepted. In two cases the equipment furnished by the commission has been reclaimed. One farmer lost his land by foreclosure of the Federal Land Bank. Another refused to work on the project for which he had asked.

Some farmers were unable to get water on their land early enough in 1937 to make their yields representative. For the information of the legislature, however, some sample yields in 1937 on irrigated and adjoining dry land were:

Yield Data From Individual Projects—1937

Name	Address	Crops Grown	Acres	Irrigated Yield or Value Per Acre	Dry Land Yield or Value Per Acre
Ed Nuss	Elgin, N. D.	Corn	11	6 ton	
		Garden	1	$150.00	
		Corn	50		2 ton
Millhouse & Erickson	Cartwright, N. D.	Corn (silage)	80	7½ ton	
		Millet	12	3 ton	
		Garden	1	$50.00	
		Grain for pasture	200		50c
Anna Rix	Mandan, N. D.	Corn	8	45 bu. plus 5 ton fodder	
		Potatoes	3	200 bu.	
		Oats	1	70 bu.	
		Hay	12	2 ton	
		Corn	50		10 bu.
Knut Oss	Mandan, N. D.	Chinese Elm trees	8	$450.00	
		Potatoes	2	200 bu.	
		Sweet corn	2	$120.00	
		Garden crops	2	$150.00	
		Cane	4	3½ ton	
		Grain	10		$3.00
W. T. Krebsbach	Reeder, N. D.	Wheat	45	10 bu.	
		Potatoes	5	80 bu.	
		Grain	30		0
H. J. Houser	Sanish, N. D.	Potatoes	10	200 bu.	
		Watermelons	4	2000 melons	
		Cantaloupe	3	5500	
		Sweet corn	4	$150.00	
		Garden crops	14	$150.00	
		Grain	20		$4.00
R. H. Leroy	Bismarck, N. D.	Potatoes	10	150 bu.	
		Potatoes	10		50 bu.
Osmund Hamre	Watford City, N. D.	Potatoes	5	220 bu.	
		Corn	2	5 ton fodder	
		Other garden	5	$300.00	
		Grain	10		0

Representative yields in 1938 on irrigated and adjoining dry land were:

Yield Data From Individual Projects—1938

Name	Address	Crops Grown	Acres	Irrigated Yield or Value Per Acre	Dry Land Yield or Value Per Acre
Bob Maxwell	Turtle Lake, N. D.	Cucumbers	3	$150.00	
		Other garden	2	$125.00	
		Corn	50		1½ ton
		Garden	10		0
Roy McColl	Cartwright, N. D.	Wheat	60	22 bu.	
		Wheat	100		8 bu.
M. D. Graham	Burlington, N. D.	Hay	200	1½ ton	
		Hay	100		0
Emma L. Sampson	Fayette, N. D.	Corn	8	30 bu.	
				2 ton	
		Hay	5	1½ ton	
		Garden	2	$100.00	
		Corn	20		1 ton
John Mercer	Buford, N. D.	Corn	1	45 bu., 2½ ton	
		Potatoes	6	250 bu.	
		Garden	1	$200.00	
		Potatoes	50		50 bu.
		Corn	10		1 ton
Adolph Sprenger	Elgin, N. D.	Corn	4	60 bu.	
				2 ton	
		Potatoes	3	150 bu.	
		Onions	1	400 bu.	
		Oats	2½	50 bu.	
		Garden	2½	$100.00	
		Corn	10		1 ton
Mary O'Neil	Beulah, N. D.	Alfalfa	5	2½ ton	
		Garden	5	$100.00	
		Hay	40		1 ton
David W. Miller	Dore, N. D.	Sugar Beets	8	15 ton	
		Sugar Beets	2		5 ton
Joseph Seibold	Watford City, N. D.	Corn	7	5 ton	
		Millet	6	3 ton	
		Garden	3	$100.00	
		Corn	10		1 ton

Experience shows that additional training will be necessary to bring the operation of these projects up to what may eventually be expected.

Cooperation With Agricultural College

At the beginning of its operations the North Dakota Water Conservation Commission entered into an arrangement with the North Dakota Agricultural College extension division for the employment of an extension irrigationist, whose duties are to advise farmers during the growing season and teach a course in irrigation during the winter months.

IRRIGATION—Fall flooding the Prison Irrigation Farm to build up soil moisture for the 1939 crop.

It also arranged with the North Dakota Agricultural College for the assistance of technical experts in directing the work on irrigation test plots at the North Dakota State Prison irrigation farm, located on the river bottoms immediately south of Bismarck. Application of water to these plots has been under the direction of the extension irrigationist.

Comparative Yields

The cost of irrigation, as compared with dry land farming, was $1.50 per acre for pumping the water, plus such additional labor as was necessary.

Sugar beets at the penitentiary plots were planted late in 1937 and showed a yield of 10.9 tons per acre and a sugar content of 13.7 per cent.

In 1938 the yield was 12.2 per acre and the sugar content 17.0 per cent. The 1938 yield was still somewhat below the best yields (average is 12.5) on the Lower Yellowstone project, with which comparisons are being made. The average sugar content on the Lower Yellowstone in 1938, however was only 15.3 per cent.

LARGE IRRIGATION PROJECTS

In addition to its sponsorship of small, privately-owned irrigation projects and the test plots at the state prison irrigation farm, the commission has interested itself in the development of large-scale irrigation projects wherever feasible.

Buford-Trenton Project

In the fall of 1937 the commission entered into a cooperative arrangement with the Federal Bureau of Reclamation for a joint investigation of irrigation possibilities on the Buford-Trenton flats in Williams County. Tentative plans called for the investment of $10,000 in this investigation, $5,000 to be paid by each agency. The total cost to the commission, however, was only $1,800.

This investigation, made by engineers of the Reclamation Service, showed the 13,400 acre project to be entirely feasible and representatives of that bureau are cooperating with the commission in an effort to obtain a federal appropriation for the construction of the Buford-Trenton irrigation system. It is estimated to cost $817,780. Efforts are being made to obtain an appropriation for this work at the coming session of the Congress of the United States.

Other Large Scale Projects

Other investigations have been made on many other flats along the Missouri River. In each such case the soil has been surveyed by experts of the commission and the state agricultural college and the potential benefits to be derived from irrigation have been estimated. These studies indicate that there are approximately 300,000 acres of irrigable land on the Missouri river bottoms in North Dakota alone.

Similar studies have been made in the basins of other streams in Western North Dakota. One result has been to disclose that certain sections are highly mineralized and that the soil is not suitable for irrigation, since it would be damaged by the application of water.

It also has been ascertained that, at certain seasons of low flow, the water in some streams has such a high concentration of harmful salts that its use for irrigation would damage the land.

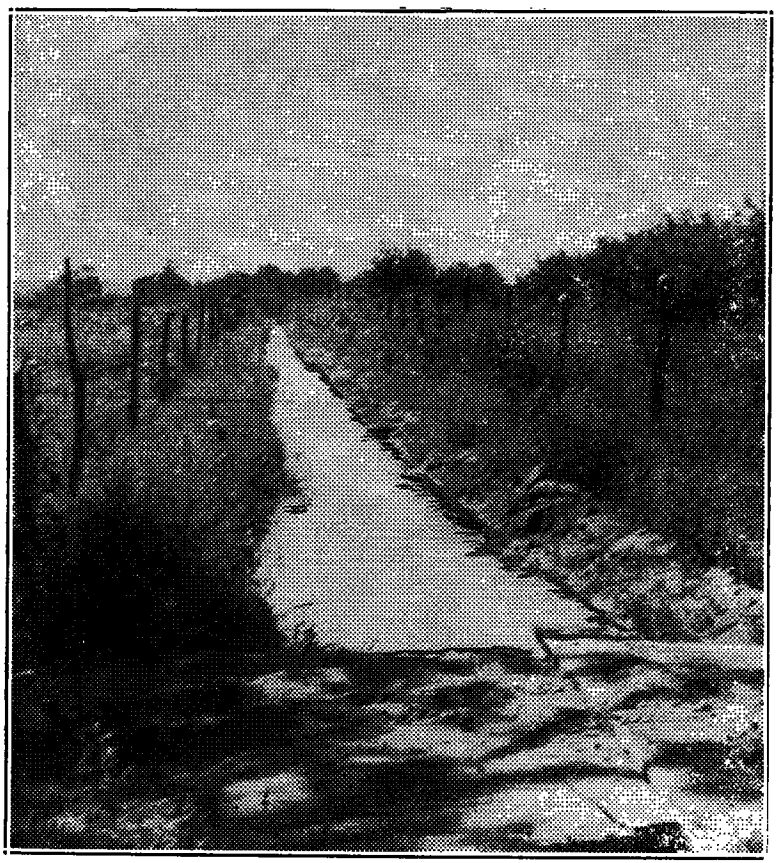
EXPERIMENTAL DEVELOPMENTS

Three experimental developments have been undertaken by the commission with a view to obtaining information on irrigation possibilities under certain conditions.

Community Gardens

Largest and most pretentious of these is the development on the Cedar river in Sioux and Grant counties, an area where drouth, grasshoppers and other pests have caused a long succession of crop failures.

The aim of the commission is to take this small watershed and develop its possibilities to the fullest as rapidly as possible in order that it may become a demonstration area for this type of development.



DOWN DITCHES LIKE THIS goes the water which has changed some land in Western North Dakota from a desert to fertile fields.

The commission has furnished plans for and the Works Progress Administration is constructing six low dams, to impound water in this stream. From the ponds thus created water will be pumped to adjacent land. The land is being farmed by groups of individual farmers, each of whom has been assigned two acres. On the two projects to which water was applied in the mid-summer of 1938, the results were generally satis-

factory. One project was cleaned out later, however, by grasshoppers. On the other the yield of corn reached to 40 bushels per acre. Potatoes produced 150 bushels per acre and sorghum produced 20 bushels grain and 2 tons feed.

The commission proposes to go ahead with this development as rapidly as possible, providing the work can be financed and additional WPA help can be obtained. These projects were the first on which farmers were assigned to work by the WPA in 1938 and the last from which farmers were withdrawn.

Well Irrigation

Another experimental project is that on the A. L. Maxwell farm near Turtle Lake, McLean County, where irrigation is being attempted by pumping from a well. Geologists have determined that this area is underlaid by water-bearing strata at an average of 20 feet in depth. The results obtained here in 1938 were only partially satisfactory.

There are several areas in the state where this type of irrigation may prove successful. In these districts considerable supplies of water lie relatively near the surface. One such district extends through the central part of the state southward from Towner County through McHenry, Sheridan, Kidder, Emmons and McIntosh counties.

Near Oakes, in Dickey County, preliminary investigations show 5,000 acres can be irrigated by this method.

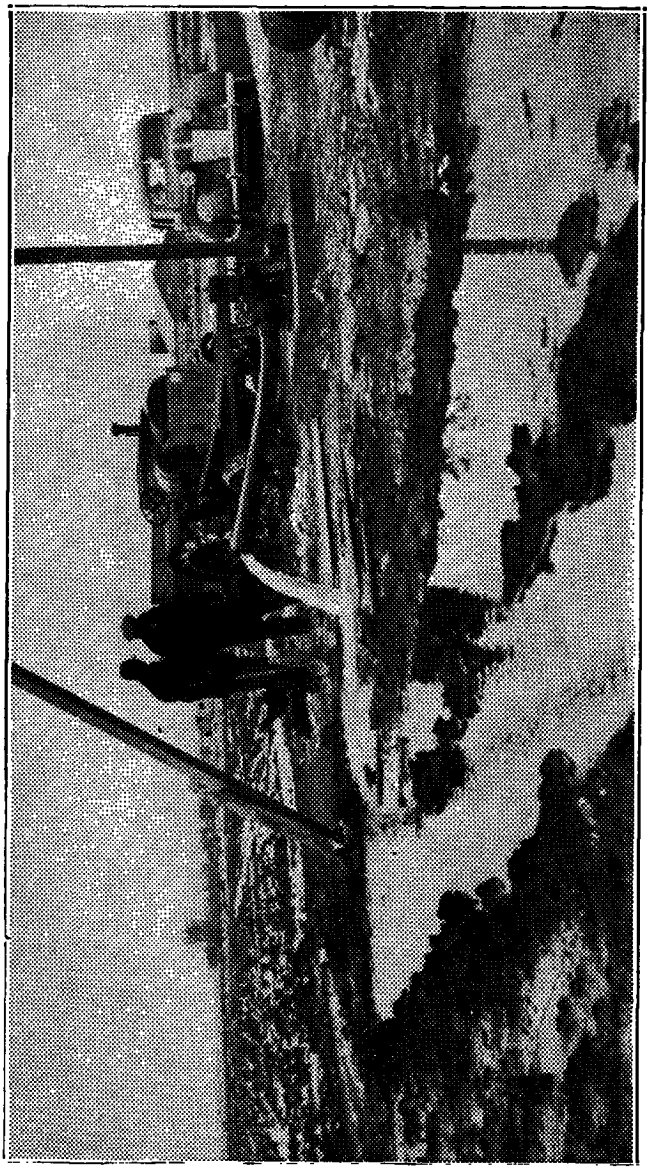
It must be remembered, however, that in many states where irrigation from wells was successful in the beginning it has since failed because of diminution of the water supply.

The third experimental project was located on the Fred Keck farm near Washburn, N. D. It was devised to determine the costs of pumping water with lignite coal to a point 128 feet above the river, all other irrigating projects having been limited to a lift of about 25 feet from the level of the water. This experimental project has not yet been placed in operation.

THE IRRIGATION RECORD

Summary of Acres Irrigated in 1937 and 1938

The original files from which this information has been taken are those of the Extension Irrigationist and on request may be inspected by any interested party. He also has available the list of individual and group irrigators, acres irrigated by each and the crop yields obtained by irrigation. Below the status of irrigation development is listed:



FROM THE BOWELS OF THE EARTH COMES WATER FOR CROPS—This picture was taken on the R. L. Maxwell farm in central McLean county. A 5 acre garden was watered from a well sunk into the gravel beds west of Turtle Lake. State experts will keep close watch of the effect of irrigation pumping on the water table. Regarded as an experiment by the North Dakota water commission but one which may point the way for farmers not living near streams.

Acres irrigated due to State Water Conservation Commission assistance (1937)	725
Acres irrigated due to State Water Conservation Commission assistance (1938)	1,295
Detail surveys and plans completed (under construction) (1938)	8,861
Detail surveys made, plans incomplete (1938)	6,938
Acres on which reconnaissance surveys were made (approved for further development) (1938)	308,700
Acres irrigated by private individuals (some of which was due to information or assistance of the Commission) (1938)	596
Acres irrigated with aid of other organizations such as Rehabilitation Corporation, Farm Security Administration, State Engineer, North Dakota Agricultural College and Bureau of Reclamation (1938)	22,157
Total acres irrigated in North Dakota during 1938	24,048

This list is subject to only slight change when or if additional information is submitted.

The above information was obtained by the Extension Irrigationist who visited and worked with all developed projects during the summers of 1937 and 1938.

Yields on Penitentiary Demonstration Irrigation Farm

Crop Grown	Variety		Yield Per A. 1937	Yield Per A. 1938
Beets	(Detroit Dark Red)		14.4 Tons	13.9 Tons
Parsnips	(Hollow Crown)		6.8 Tons	11.4 Tons
Carrots	(Chantenay)		9.0 Tons	14.2 Tons
Turnips			16.5 Tons	.....
Rutabagas	(Purple Top)		14.2 Tons	14.5 Tons
Potatoes	(Triumph)		3.1 Tons	.....
Potatoes	(Warba)		.....	2.0 Tons
Potatoes	(Cobblers)		2.5 Tons	2.5 Tons
Beans	(Great Northern)		20 Bu.	.....
Beans	(Webber Wax)		.....	11 Bu.
Beans	(Stringless Green Pod)		.....	93 Bu.
Corn	(White Flint)	Fodder	4.0 Tons	.....
Corn		Grain	53 Bu.	.....
Corn	(Golden Bantam)	Fodder	3.0 Tons	2.0 Tons
Corn		Grain	45 Bu.	60 Bu.
Corn	(Sunshine)	Fodder	.....	2.0 Tons
Corn		Grain	.....	58 Bu.
Corn	(Golden Gem)	Fodder	.....	2.0 Tons
Corn		Grain	.....	49 Bu.
Corn	(Stowell Evergreen)	Fodder	.....	4.0 Tons
Corn		Grain	.....	92 Bu.
Corn	(Rainbow Flint)	Fodder	4.0 Tons	.....
Corn		Grain	81 Bu.	.....
Squash	(Buttercup)		6.0 Tons	6.2 Tons
Sugar Beets			10.9 Tons	12.2 Tons
Onions	(White Globe)		.....	700 Bu.
Onions	(Yellow Globe)		.....	100 Bu.
Peas	(Lincoln)		.....	116 Bu.
Cabbage	(Copenhagen)		.....	8.7 Tons
Cabbage	(Danish Ballhead)		.....	12.5 Tons
Tomatoes	(Allred)		.....	500 Bu.
Tomatoes	(Bison)		.....	476 Bu.

Plot size was one-fifth acre.

Tests are being made on these plots of the practicability of raising fruits and berries which, if successful, will raise the level of living in those areas where irrigation is practicable. These tests have not yet progressed far enough to compile figures on yield. Varieties now being tested are:

Fruit or Berries	Variety
Apples	Dolgo
	Florence
Plums	Redwing
	Waneta
	Opata
Currants	Red Lake
Gooseberries	Pixwell
Raspberries	Chief Latham
Strawberries	Progressive

At the Burlington Irrigation Project, sponsored by the North Dakota Rehabilitation Corporation and the Farm Security Administration, however, yields were recorded this year as follows:

Yields of Crops on Burlington Project (1938)

Crops	Variety	Irrigated Yield Per Acre	Non-Irrigated Yield Per Acre
Potatoes	Triumph	200-325 Bu.	35-80 Bu.
Potatoes	Russets	150-200 Bu.	0-50 Bu.
Potatoes	Brown Beauties	90-210 Bu.	0-50 Bu.
Cabbage	Danish Ballhead	11 Tons	0- 1 Ton
Cabbage	Golden Acre	7½ Tons	0- 1 Ton
Cabbage	Late Flat Dutch	10 Tons	.....
Onions	Yellow Globe	500-800 Bu.	250-300 Bu.
Onions	White Globe	440 Bu.	.....
Carrots	Chantenay	400-800 Bu.	200-300 Bu.
Carrots	Imperator	350 Bu.	.....
Carrots	Imperator	1600 Doz. Bunches	.....
Tomatoes	Bison	600 Bu.	200 Bu.
Tomatoes	Red River	800 Bu.	.....
Tomatoes	Allred	1100 Bu.	.....
Tomatoes	Pritchard	950 Bu.	.....
Tomatoes	Burbank	850 Bu.	.....
Tomatoes	Early Jumbo	1200 Bu.	.....
Cucumbers	Arlington-Chicato	250-600 Bu.	.....
Cantaloupe	Sugar Rock	6 Tons	1 Ton
Cantaloupe	Hales Best	8 Tons	1 Ton
Watermelons	Northern Sweets	10 Tons	2 Tons
Sweet Corn	Golden Sunshine	1200 Doz. Ears	800 Doz. Ears
Rutabagas	Purple Top	10 Tons	1-2 Tons
Field Corn	Falconer	4 Tons	2 Tons
Hay	Wild & Mixtures	1½ Tons	0-½ Ton

Value of Irrigation to Livestock Industry

To place a definite value of irrigation to the future livestock industry of North Dakota, we shall make a comparison with the Lower Yellowstone Irrigation Project in Eastern Montana and Western North Dakota. Following is the acres irrigated and the livestock wintered on the feed grown in 1937 as compared to anticipated development for North Dakota:

Acres Irrigated and Livestock Fed in Lower Yellowstone

Acres irrigated	13,849
Number livestock fed (horses and cattle)	8,701
Number livestock fed (sheep and hogs)	170,093
Total livestock fed	178,794

Acres planned for Irrigation in North Dakota and probable value to Livestock Industry

Acres to be irrigated	348,547

Number livestock which could be winter fed (as compared with Yellowstone Project)

Horses and cattle	218,983
Sheep and hogs	4,280,843
Total livestock which could be winter fed	4,499,826
Total livestock which could be winter fed per acre	12.9

Bonds Not Generally Salable

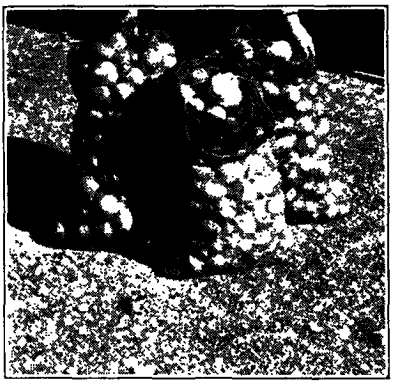
Since no limitations were placed by the 1937 general assembly upon the expenditure by the commission of the appropriation granted to it, the commission determined to use as much of this amount as possible for operating expenses and to finance projects by the sale of bonds, as contemplated in the law creating the commission.

Experience soon showed, however, that these bonds were not salable on the ordinary markets and the commission looked about for another source of finance.

RRC Purchased Bonds

This was found in the North Dakota Rural Rehabilitation Corporation to which the federal government had allocated $300,000 for use in financing experimental irrigation projects in North Dakota. Because it did not desire to set up engineering and other services of its own, and because it did not possess certain powers given by law to the North Dakota Water Conservation Commission, the North Dakota Rural Rehabilitation Corporation agreed to purchase the bonds on such projects as seemed feasible both to it and to the Water Conservation Commission.

This has provided a source of finance for the Lewis and Clark project, the Sioux Mutual Aid project, the Grantier project, the Cedar River project and others listed elsewhere in this report.



ONIONS UNDER IRRIGATION —By pumping from Antelope Creek with a 4-inch pump and old car motor, Adolph Sprenger of Elgin, N. D., raised 200 sacks of onions per acre. (400 Bu.)

On these projects the Rural Rehabilitation Corporation already has advanced to this commission the sum of $167,023.85 and stands ready to finance additional work up to the limit necessary to complete the projects.

The financial support of the Rural Rehabilitation Corporation has enabled the Water Conservation Commission to do vastly more work than would have been possible without this assistance.

Recommend Further Bond Support

The experience of the commission in its futile efforts to sell irrigation bonds on the general market convinces this commission that further support must be given these securities if irrigation is to have the impetus in North Dakota to do for the state what experience already has shown it can and will do.

The attention of the general assembly is respectfully directed toward this matter.

The system devised for providing adequate security for these bonds is to have the commission enter into a contract with the irrigation district whereby the commission will build, and the irrigation district will buy upon completion, the works and structures installed.

BIG, FAT CABBAGE HEADS grew on the Charles Benzie truck-garden farm near Washburn. He had some hard luck but is more than satisfied with the results obtained.

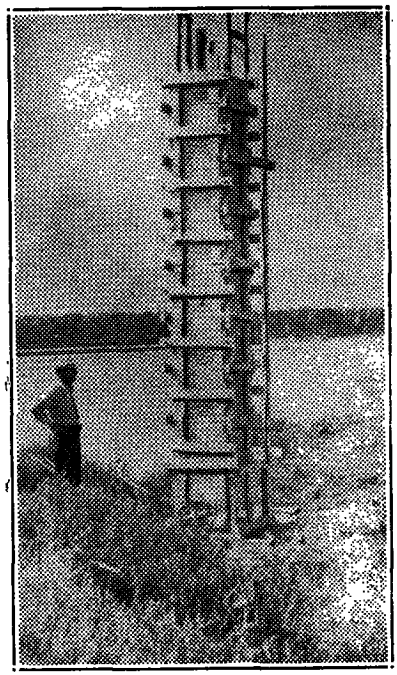
Payment is made by the irrigation district in bonds, which are accepted at par value by the commission. The commission then offers its bonds for sale in an equal amount to the North Dakota Rural Rehabilitation Corporation or to whatever individual or agency will buy them.

SIOUX MUTUAL AID PROJECT

When the commission was organized, one of the first applications for aid came from the Sioux Mutual Aid Corporation, which was attempting to operate an irrigation project near Cartwright, McKenzie County. Examination by the commission's engineers showed that the project had not been constructed in accordance with sound engineering practices and would have to be rebuilt.

Also, the commission found a complication in the fact that a mortgage on the rights of way for ditches had been given to the Federal Bank for Cooperatives to secure a loan made by the association.

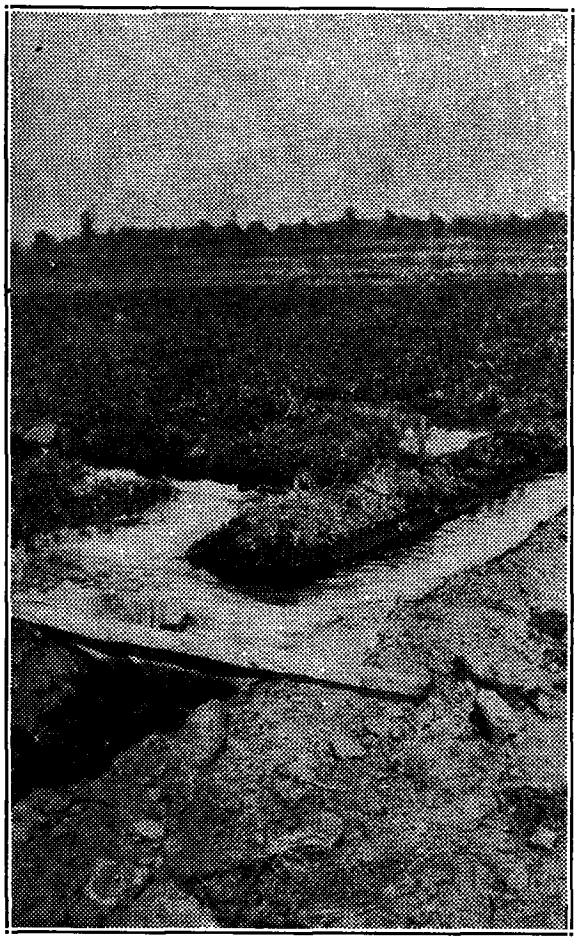
In the fall of 1938, legal and other technicalities having been adjusted, the commission is rebuilding this project. It contains 1,000 acres, all of which will be under irrigation beginning with the spring of 1939.



TRY ANYTHING ONCE—Farmers have ideas of their own, as witness this pump, made of wood. It was built and operated by a Mr. D. W. Casey, near Livona, Emmons county. The aim was to make a pump cheaply but the installation lacked efficiency.

At the beginning the commission adopted a plan whereby it could cooperate with mutual aid corporations composed of farmers. Later, however, it was determined that better financial procedure and greater security for the investment could be had under the North Dakota irrigation district law. As a result the commission has dealt only with irrigation districts in its development of large projects. A number of these have been organized in Western North Dakota and are ready to function as soon as funds to construct the projects can be provided.

In the case of the Sioux Mutual Aid Corporation, the commission required that an irrigation district be formed before it consented to finance the work of reconstructing the ditches and installing new pumping facilities.



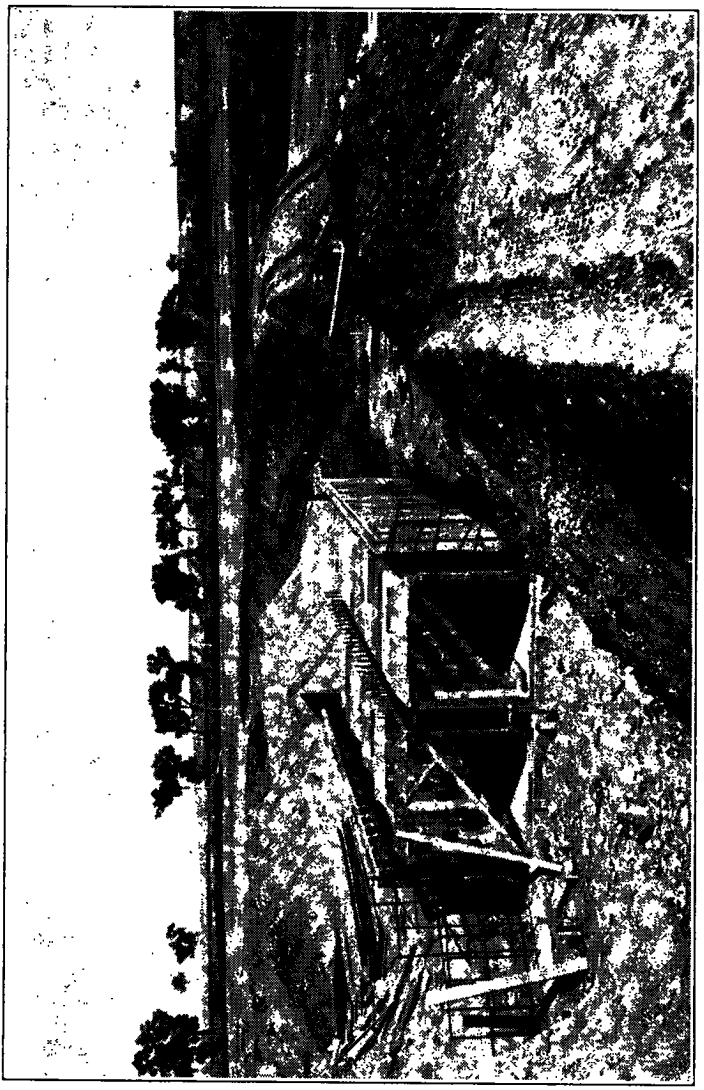
SIMPLE TOOLS DO THE TRICK—This picture shows a canvas dam being used to divert water from the ditch into the field to be irrigated.

Under the irrigation district law, such municipal corporations have taxing authority. The commission feels that this arrangement gives better support foı their bonds.

LEWIS AND CLARK PROJECT

Largest and most important of the projects undertaken by the commission has been the construction of works and structures in the Lewis and Clark irrigation district, lying just south of the Lewis and Clark bridge over the Missouri river, near Williston.

The area under development contains 7,700 acres of which 4,800 are regarded as irrigable.



CONSTRUCTION ON LEWIS & CLARK—A reinforced concrete road culvert on the main canal of the Lewis & Clark project. The main ditch seen on either side of the structure is 8 feet wide at the bottom, 26 feet wide at the top and 5 feet deep. There are five miles of this main canal and 22 miles of smaller canals. This network of ditches will furnish water to the 4,800 acres to be irrigated.

Construction has been done by the commission and the Works Progress Administration.

Since the project still is under construction final costs have not been determined.

The original estimates as to cost were:

WPA	$232,790
By State Water Conservation Commission and reimbursed by Rural Rehabilitation Corporation	115,660
Total	$348,450

Cost figures to Dec. 20, 1938, are:

By WPA	$183,440.00
By Commission and reimbursed by Rural Rehabilitation Corporation	68,889.72
Total	$252,329.72

Employed on this project have been WPA workers from the City of Williston and a large number of farmers. This project probably has provided more profitable employment for needy farmers than any other three projects in North Dakota. The number of men at work has varied from 200 to 450, depending upon the season.

Because WPA workers may not, legally, work on land not owned by the state or a public corporation, it was necessary for much of this land to be purchased by the North Dakota Rural Rehabilitation Corporation, of which mention is made elsewhere in this report.

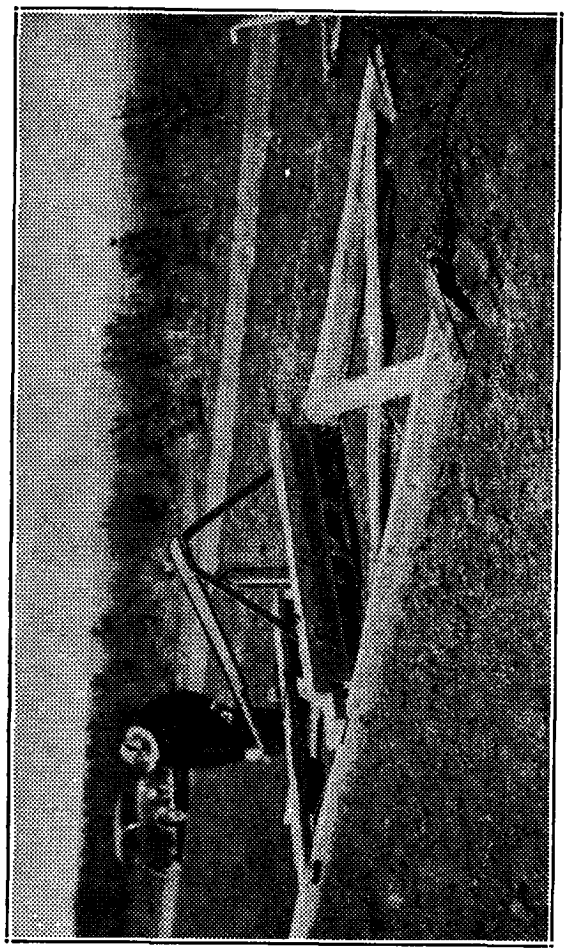
Much of the land to be developed was covered with brush. This was taken off the land by WPA labor in the winter of 1937-38. In the spring and summer of 1938 the land was grubbed and plowed with a breaking plow, all at the expense of the commission. The grubbing was done by WPA labor but the breaking was done under contract. WPA workers assisted in preparing the land, after breaking, wherever possible.

As of December 1 there remained to be constructed the intake for water in the Missouri river, construction of a pumphouse and power line, the installation of pumps and certain other work. All of this will be done in time to begin irrigation in 1939.

Settlement on Lewis and Clark Project

Arrangements have been made with the Farm Security Administration for assistance in settling farmers on this land. Where they desire to do so, farmers already located in the area will be encouraged to remain and take up irrigation farming. Because irrigation farming calls for much smaller acreages than is normal in North Dakota farming operations, however, it is planned to locate 58 farmers on tracts of 80 acres or less as conditions warrant.

This settlement is expected to cost in the neighborhood of $300,000 for structures, implements, livestock and seed. All of this sum will be repayable to the Farm Security Administration over a period of years, under its rehabilitation loaning program.



BEFORE IRRIGATION CAN SUCCEED YOU MUST LEVEL THE LAND—
This is a controlled "float" or leveling device used at the Great Plains Forest Nursery near Mandan.

It is hoped to obtain additional Farm Security Administration cooperation in the development of similar projects in the future.

Detailed information as to costs and other factors on the Lewis and Clark and other projects sponsored by this commission will be furnished to members of the legislature or any interested citizen upon request to the commission's secretary.

PLAN OF REPAYMENT

Ability of settlers on the project to pay the operating costs of the irrigation project and their debts to the Farm Security Administration is based upon the experience had during the last 10 years on the Lower Yellowstone project in North Dakota and Montana and within a few miles of the site of this project.

The prospective yearly costs of farmers on the Lewis and Clark have been estimated as follows:

Income

Area	Crops	Return Per Acre	Total Return
30	Alfalfa	$14.83	$444.90
5	Potatoes	5.00	425.00
5	Beans	24.25	121.25
5	Oats	10.70	53.50
10	Corn	12.15	121.15
14	Sugar beets & tops	68.14	953.96
1	Garden	77.89	77.89
		Total Income	$2,187.65

Expenses

The prospective yearly income is based on the average yields and average prices received by farmers on the Lower Yellowstone during the last 9 to 11 years.

These are as follows:

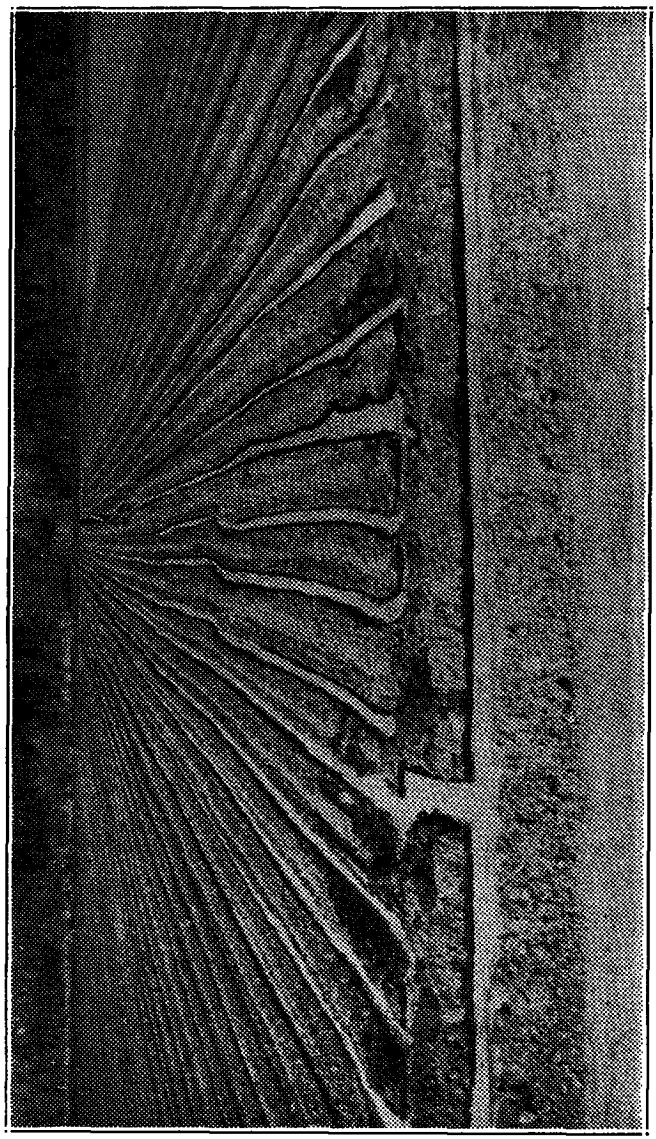
Irrigation expenses @ $4.00 per acre	$ 280.00
Hired help (man for 6 months @ $50.00)	300.00
Extra labor for beet field ($25.00 per acre)	350.00
Interest and amortization costs on $4,000 for buildings, equipment, stock, etc.	180.00
Interest and amortization costs on $2,800 for land cost	126.00
Total	$1,236.00

From these estimates the commission envisions the position of the operator of an 80-acre farm, of which 70 acres is irrigable, as follows:

Average yearly income	$2,187.65
Average yearly expenditures	1,236.00
Net Income	$ 951.65

From this income, of course, the settler must pay his household expenses and other personal expenses.

Attention of the General Assembly is called to the fact that this anticipated experience is far above that of the average North Dakota



HERE WE SEE WATER FLOWING ON THE FIELDS—Row irrigation at the Great Plains Forest Nursery near Mandan.

farmer, even in the so-called good years. Attention also is called to the fact that, no matter how severe the drouth, it insures the irrigation farmer of adequate supplies of food for his family and feed for his livestock.

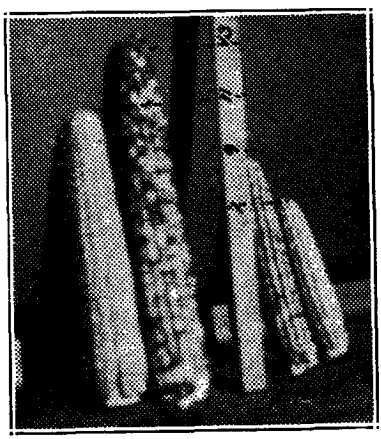
IT IS A NOTABLE FACT THAT, DURING THE LAST EIGHT YEARS, NO IRRIGATION FARMER ON THE LOWER YELLOWSTONE PROJECT HAS APPLIED FOR OR RECEIVED RELIEF AND TAX COLLECTIONS ARE NORMAL.

N. D. Relief Load

From March, 1933, to date, figures released by the Director of the National Emergency Council indicate that the Federal Government made available to North Dakota approximately $400,000,000 in loans, grants, and work relief. During this period property values decreased $90,000,000 or approximately 9%; tax delinquency increased from 16 to over 50%; population decreased about 8%, and Public Welfare officials anticipate that relief need this winter may reach an all time high in spite of the fact that normal precipitation prevailed throughout the state on an average during the past two growing seasons. No material improvement in this situation is in prospect.

PROPOSED PROJECTS

In the summer and fall of 1938, the commission made application to the Public Works Administration for assistance in constructing nine irrigation projects throughout Western North Dakota.



PLENTY OF WATER INSURES PROFITS—The corn at the left in this picture was grown on irrigated land. The corn at the right was grown on non-irrigated land only a few feet away Same land, same seed but a different product.

Data submitted to the PWA listed these as follows:

Summary of Irrigation Projects for Which Applications Have Been Submitted to the Public Works Administration by the North Dakota State Water Conservation Commission

Name of Project	State Project No.	Location	Acres
Lewis & Clark Irrigation	175	Along Missouri River 8 Mi. SW of Williston, N. D.	4800
Bismarck Irrigation	215	Along Missouri River, South from Bismarck	4300
Sioux Irrigation	36	Along Yellowstone River, South from Cartwright	840
Seneschal Irrigation	171	Along the Missouri River 27 Mi. NE of Watford City	1900
Painted Woods	160	Along the Missouri River, about 8 Mi. W. of Wilton	1970
Stout Irrigation	150	Along the Missouri River, about 16 Mi. S. of Menoken	2000
Kyes Irrigation	79	Along the Missouri River, about 17 Mi. SW of Hazelton	1400
Yellowstone Pumping	214	Along Yellowstone River 8 Mi. N. of Sidney, Mont.	2000+300 A. in Mont.
Grand River Bowman	216	Along Grand River and S. Line of Bowman Co.	5000

No action had been taken on these applications at the time of writing this report.

INDIVIDUAL IRRIGATION PROJECTS

Name	No. Acres	County	Address	Invested	Amount Repaid
A. W. Gussner	60	Burleigh	Bismarck	$ 203.74	$ .....
Anton Kostelecky	34	Stark	Dickinson	27.69	27.69
Knut Oss & W. A. Leach	44	Morton	Mandan	352.25	.....
R. L. Williamson	30	Williams	Buford	357.23	.....
V. M. Craven	30	Burleigh	Bismarck	220.35	50.00
Frank Lassey	20	McKenzie	Cartwright	209.04	.....
Fred Sinerius	40	Mercer	Beulah	738.93	.....
W. T. Krebsbach	60	Adams	Reeder	366.95	66.95
F. W. McGillic	57	Morton	Mandan	21.22	.....
Art Olafson	20	Mercer	Halliday	190.81	.....
R. B. Millhouse	93	McKenzie	Cartwright	790.01	.....
Harvey Moxley	20	Mercer	Beulah	301.89	50.00
T. E. McGregor	52	McKenzie	Arnegard	10.50	10.50
Henry J. Rix	40	Morton	Mandan	702.47	.....
Oscar Oberg	20	McLean	Washburn	12.94	12.94
R. H. LeRoy	40	Burleigh	Bismarck	439.40	.....
Arthur Maxwell	53	McLean	Turtle Lake	715.86	.....
H. J. Houser	40	Mountrail	Sanish	510.79	208.77
Arthur Hartosh	20	Williams	Ray	5.27	.....
Ralph McGirl	20	Grant	Elgin	18.83	.....
Ed Nuss	40	Grant	Elgin	244.90	.....
Louis Signalness	40	McKenzie	Cross	298.19	.....
Roy McColl	40	McKenzie	Cartwright	338.42	50.00
Anton Bolte	33	Hettinger	Regent	277.38	.....
Osmund Hamre	27	McKenzie	Watford City	111.91	37.30

INDIVIDUAL IRRIGATION PROJECTS
(Continued)

Name	No. Acres	County	Address	Invested	Amount Repaid
M. D. Graham	77	Ward	Burlington	11.47	11.47
Fred Keck	20	McLean	Washburn	211.81	.....
Martin E. Michelson	30	Grant	New Leipzig	15.36	15.36
Emma Sampson	30	Dunn	Fayette	235.21	.....
Emil Peterson	30	McKenzie	Charlson	242.98	.....
Fred Slag	20	Burleigh	Bismarck	31.56	.....
C. E. Stewart	80	Williams	Ray	485.28	186.55
A. M. Johnson	30	Morton	Almont	12.11	.....
Klenda Lynn	20	Emmons	Linton	12.56	.....
John Mercer	35	Williams	Buford	263.32	.....
Graner & O'Rourke	44	Morton	Huff	357.11	.....
Harry Semerad	21	Stark	Dickinson	11.45	11.45
Adolph Sprenger	30	Grant	Elgin	228.04	.....
Theo. Semerad	25	Stark	Dickinson	240.41	.....
Charles Clark	80	Emmons	Livona	311.81	.....
R. E. O'Neil	44	Mercer	Beulah	72.45	.....
Janie Scott	40	Dunn	Manning	7.76	7.76
Magnus Gudbranson	36	McKenzie	Charlson	463.24	.....
J. G. Houston	10	Williams	Buford	4.56	4.56
Halvor Rolfsrud	10	McKenzie	Keene	181.21	.....
T. S. Stuart	30	Divide	Crosby	288.18	.....
G. A. Richardson	22	Morton	Mandan	14.16	.14.16
Bruno Upmeyer	27	Williams	Williston	280.17	50.00
F. M. Shatswell	27	Williams	Buford	198.91	.....
Bank of North Dakota	20	Burleigh	Bismarck	19.40	18.75
State Penitentiary	160	Burleigh	Bismarck	99.05	.....
Harry Tatley	20	Burleigh	Bismarck	13.18	13.18
Richard C. Ike	33	Williams	Williston	466.55	.....
C. H. Parker	40	Ward	Minot	19.47	.....
Vern A. Soderquist	10	Divide	Columbus	331.51	40.00
George Gerbig	30	Slope	Ranger	295.81	76.95
Mary B. Materna	30	Dunn	Manning	165.45	.....
State Training School	100	Morton	Mandan	323.87	.....
D. W. Miller	10	McKenzie	Dore	398.09	.....
Lewis Dinehart	40	Dunn	Manning	229.82	.....
H. P. Lundin	20	McKenzie	Watford City	28.46	.....
Joseph Hackenberg	40	Williams	Williston	312.44	.....
Joseph Seibold	20	McKenzie	Watford City	21.42	5.78
Florence Thorkelson	44	Stark	Dickinson	712.55	.....
Clifford Hanson	20	Williams	Buford	8.44	.....
Gust Johnson	40	McKenzie	Watford City	315.87	.....
Leona Myrhow	20	Williams	Williston	12.48	.....
State Hospital	160	Stutsman	Jamestown	286.32	.....
W. T. Hall	20	McKenzie	Cartwright	217.36	.....
William Rehberg	20	McKenzie	Alexander	19.69	.....
John Wendike	40	McKenzie	Watford City	306.91	50.00
Paul Hoffman	40	Burleigh	Bismarck	17.80	.....
H. W. Long	40	Sioux	Solen	605.03	.....
F. M. Hendrixson	....	McKenzie	Arnegard	36.31	.....
J. F. Schiermeister	25	Emmons	Linton	24.42	.....
Feeble Minded School	60	Walsh	Grafton	232.05	.....
Thos. W. Lynch	40	LaMoure	LaMoure	16.38	.....
H. E. Wildfang	40	Burleigh	Sterling	18.10	.....
T. B. Meinhover	15	Burleigh	Bismarck	14.67	.....
Woodie Watson	40	McKenzie	Watford City	493.22	50.00
Einar H. Dahl	40	McKenzie	Watford City	11.89	.....
Pearl Van Allen	20	Williams	Williston	208.94	.....
Murray Moxley	40	Mercer	Beulah	14.06	.....
Harry Liedal	30	Wells	Hamberg	33.83	.....
Stephen Westdal	40	Williams	Williston	28.46	.....
Oscar A. Peterson	20	Sioux	Solen	242.98	.....
W. E. Berwman	20	Burleigh	Bismarck	33.13	11.61
			Total	$18,283.50	$ 1,081.73

In addition to payments made the Commission holds contracts for sale, mortgages and notes on Projects amounting to $12,234.22.

GROUP IRRIGATION PROJECTS

Name	No.	County	Address	Invested	Amount Repaid
Cartwright	840	McKenzie	Cartwright	736.11	.....
Kyes	1400	Emmons	Livona	365.20	.....
Grantier	240	McKenzie	Banks	1,912.45	1,910.95
Park Hill	100	Burleigh	Bismarck	131.87	.....
Stout	2000	Emmons	Hazelton	1,414.48	.....
Painted Woods	1970	McLean	Washburn	2,167.02	.....
Seneschal	1900	McKenzie	Banks	255.10	.....
Lewis & Clark	4800	McKenzie	Williston	68,889.72	64,170.47
Cedar River	20	Sioux	Watauga, S. D.	180.32	.....
Cedar River	20	Sioux	Watauga, S. D.	525.92	.....
Grant County	20	Grant	Carson	114.70	.....
Grant County	20	Grant	Carson	209.88	.....
Cedar River	20	Sioux	Watauga, S. D.	192.93	.....
Cedar River	20	Sioux	Watauga, S. D.	92.51	.....
Grant County	20	Grant	Carson	154.79	.....
Grant County	20	Grant	Carson	125.82	.....
Grant County	20	Grant	Carson	149.26	.....
Cedar River	20	Sioux	Watauga, S. D.	489.63	.....
Cedar River	20	Sioux	Watauga, S. D.	445.27	.....
Odessa Mutual Aid	20	Grant	Odessa	568.66	450.00
Grant County	20	Grant	Carson	176.23	.....
Grant County	20	Grant	Carson	121.85	.....
Cedar River	20	Sioux	Watauga, S. D.	238.19	.....
Cedar River	20	Sioux	Watauga, S. D.	59.79	.....
Nesson Valley	14000	Williams	Hofflund	.....	.....
Hoerauf	20	Grant	Elgin	512.40	450.00
Cedar River	20	Sioux	Watauga, S. D.	62.65	.....
Cedar River	20	Sioux	Watauga, S. D.	92.34	.....
Sioux	1030	McKenzie	Cartwright	1,879.13	1,879.13
Yellowstone	2100	McKenzie	Fairview, Mont.	63.97	.....
Bismarck	4300	Burleigh	Bismarck	118.03	.....
Grand River Bowman	5000	Bowman	Bowman	124.04	.....
Trenton-Buford	13,840	Williams	Buford	1,800.00	.....
				$86,017.41	$68,860.65

Note:—Surveys and investigations—preparation of preliminary plans and estimates of cost of the Trenton-Buford Project, comprising 13,800 acres, were made by the Bureau of Reclamation in cooperation with the State Water Conservation Commission on a 50-50 basis.

FINANCIAL STATEMENT
of
STATE WATER CONSERVATION COMMISSION
From March 23, 1937, to December 1, 1938

INCOME

Legislative Appropriation	$112,500.00	
Application Fees	1,275.20	
Repayments from Private Projects	1,081.73	
Repayments from Rural Rehabilitation Corp.	73,622.23	
TOTAL INCOME		$188,479.16

EXPENSE

Account	Chargeable to Administration	Chargeable to Projects	
Administrative Salaries	$ 17,898.60	$ 14.70	
Administrative Mileage & Expense	2,559.38	.....	
Administrative Office Equipment	2,813.83	.....	
Administrative Office Supplies	1,376.70	.....	
Engineering Salaries, Mileage & Expense	25,411.07	33,081.60	
Engineering Office Equipment	1,911.69	23.00	
Engineering Field Equipment	1,225.82	14.49	
Engineering Office Supplies	847.66	29.44	
Maps (Blue Prints, Etc.)	451.07	307.65	
Buford-Trenton Irrigation Project	1,800.00	.....	
Commissioners Per Diem	4,467.25	507.75	
Commissioners Mileage & Expense	4,051.71	393.69	
Tri-State Per Diem & Expense	2,034.56	.....	
Legal Service	1,544.55	994.62	
Printing	889.17	140.67	
Telephone & Telegraph	1,053.88	82.18	
Missouri River Diversion	2,529.19	.....	
Fieldmen (Salaries, Mileage & Exp.)	1,895.55	3,953.08	
Projects (Material & Supplies)	.....	62,408.86	
Preliminary Investigation and Research Charges	225.92	.....	
Workmen's Compensation	570.48	.....	
Construction Supplies	898.72	.....	
Membership in Natl. Associations	125.00	.....	
Total Expenses	$ 76,581.80	$101,951.73	$178,533.53
Balance in hands of State Treasurer December 1, 1938			$ 9,945.63
Balance due on Repayable Projects			27,247.77
Balance of Administrative Fund including Repayable Accounts Dec. 1, 1938			$ 37,193.40