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MINOT EXTENSION PROJECT

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HEARING

BEFORE THE

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SUBCOMMITTEE ON

WATER AND POWER RESOURCES

OF THE

COMMITTEE ON

INTERIOR AND INSULAR AFFAIRS

UNITED STATES SENATE

NINETY-FIRST CONGRESS

SECOND SESSION

ON

S. 2808

THE MINOT EXTENSION OF THE GARRISON DIVERSION UNIT OF THE
MISSOURI RIVER BASIN PROJECT IN NORTH DAKOTA

JUNE 30, 1970



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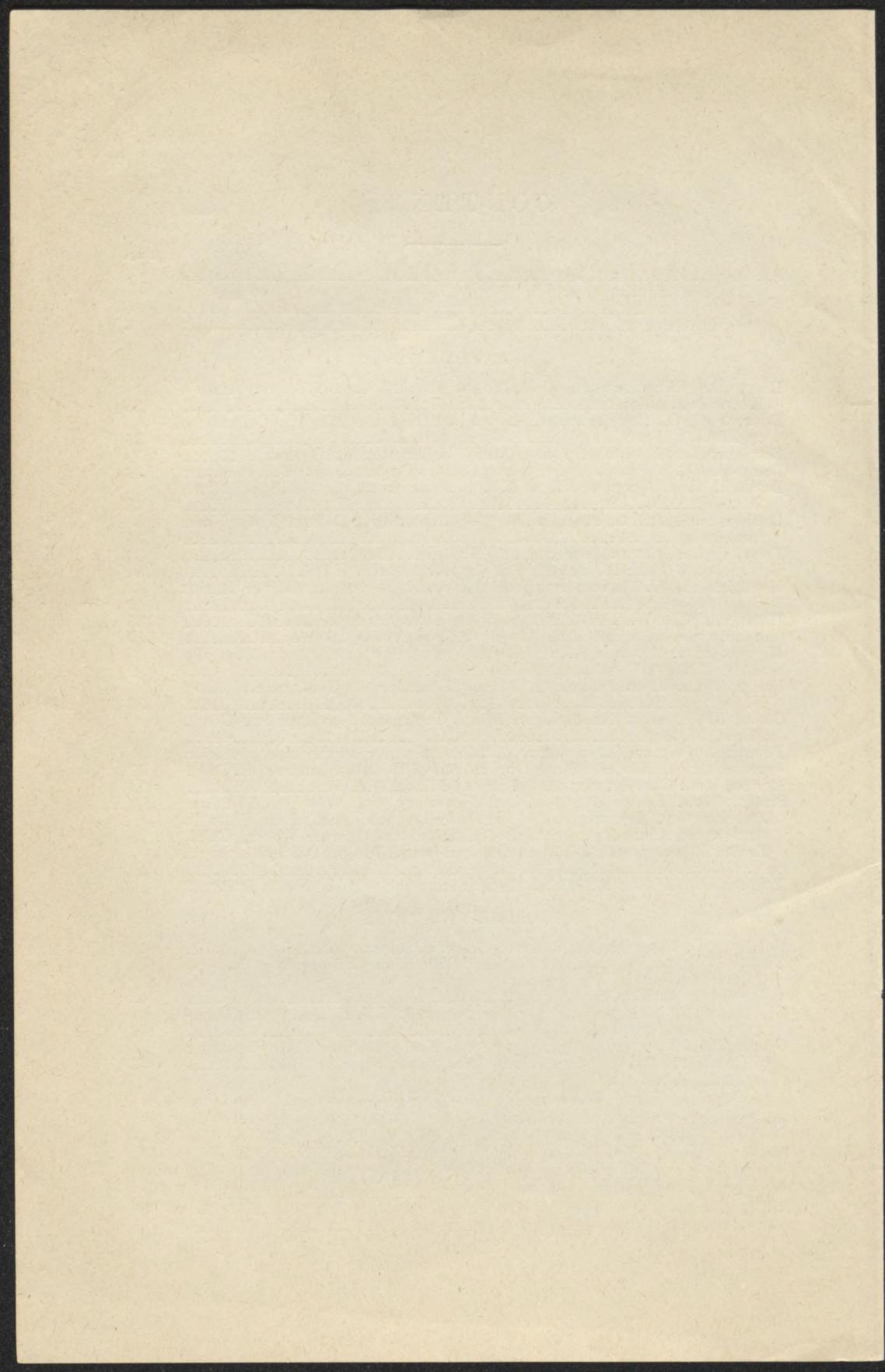
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THE MINOT EXTENSION OF THE GARRISON DIVERSION UNIT OF THE MISSOURI RIVER BASIN PROJECT IN NORTH DAKOTA

TUESDAY, JUNE 30, 1970

U.S. SENATE,
SUBCOMMITTEE ON WATER AND POWER RESOURCES OF
THE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS,
Washington, D.C.

The subcommittee met at 10:05 a.m., pursuant to notice, in room 3110, New Senate Office Building, Senator Quentin N. Burdick presiding.

Present: Senators Burdick and Jordan of Idaho.

Also present: Jerry T. Verkler, staff director; Stewart French, chief counsel; and Charles Cook, minority counsel.

Senator BURDICK. The purpose of this hearing before the Water and Power Resources Subcommittee this morning is to take testimony on S. 2808—introduced by the Senators from North Dakota—a bill to authorize the Secretary of the Interior to construct, operate, and maintain the Minot extension of the Garrison diversion unit of the Missouri River Basin project in North Dakota.

The Garrison diversion unit was authorized in 1965. The authorized plan includes the diversion of water from the Missouri River for municipalities in the vicinity.

The Minot extension would provide the facilities to deliver water from the Velva Canal of the Garrison unit to the city of Minot. S. 2808 also provides for facilities to assist the city in obtaining an interim water supply from ground water until the Garrison unit is in operation.

The text of S. 2808 and the reports of the Department of the Interior and the Bureau of the Budget will be included in the record at this point.

(The documents referred to follow:)

[S. 2808, 91st Cong., Second Sess.]

A BILL To authorize the Secretary of the Interior to construct, operate, and maintain the Minot extension of the Garrison diversion unit of the Missouri River Basin project in North Dakota, and for other purposes

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of the Interior is authorized to construct, operate and maintain the Minot extension of the Garrison diversion unit in North Dakota under the Federal reclamation laws (Act of June 17, 1902; 32 Stat. 388, and Acts amendatory thereof and supplementary thereto) for the principal purposes of conveying, regulating, and furnishing water made available through facilities of the Garrison diversion unit for use by the city of Minot and other communities for municipal and industrial pur-

poses; conserving and developing fish and wildlife resources; and enhancing outdoor recreation opportunities.

SEC. 2. The Secretary is authorized to construct appropriate portions of the Minot extension to assist in the interim delivery of water from ground water sources prior to the availability of water through the facilities of the Garrison diversion unit.

SEC. 3. (a) Costs of the project, or any unit or stage thereof, allocated to municipal water supply, shall be repayable, with interest, by the municipal water users over a period of not more than fifty years from the date that water is first delivered for that purpose, pursuant to contracts with municipal corporations or other organizations, as defined in subsection 2 (g) of the Reclamation Project Act of 1939 (53 Stat. 1187). Such contracts shall be precedent to the commencement of construction of the project. Contracts may be entered into with water users' organizations pursuant to the provisions of this Act without regard to the last sentence of subsection 9(c) of the Reclamation Project Act of 1939 (53 Stat. 1187).

(b) Expenditures for the Minot extension may be made without regard to the soil survey and land classification requirements of the Interior Department Appropriation Act of 1954 (67 Stat. 266).

(c) The interest rate used for computing interest during construction and interest on the unpaid balance of the reimbursable costs of the Minot extension shall be determined by the Secretary of the Treasury, as of the beginning of the fiscal year in which construction on the extension is commenced, on the basis of the computed average interest rate payable by the Treasury upon its outstanding marketable public obligations which are neither due nor callable for redemption for fifteen years from date of issue.

(d) The Secretary is authorized to transfer to a qualified contracting entity or entities the care, operation, and maintenance of the project works, and, if such transfer is made, to credit annually against the contractor's repayment obligation that portion of the year's joint operation and maintenance costs which, if the United States had continued to operate the project, would have been allocated to fish and wildlife and recreation purposes. Prior to assuming care, operation, and maintenance of the project works the contracting entity or entities shall be obligated to operate them in accordance with criteria established by the Secretary of the Interior with respect to fish and wildlife and recreation.

SEC. 4. The conservation and development of fish and wildlife resources and the enhancement of recreation opportunities in connection with the Minot extension shall be in accordance with the provisions of the Federal Water Projects Recreation Act (79 Stat. 213).

SEC. 5. There is authorized to be appropriated for the construction of the Minot extension the sum of \$12,900,000 (January 1969 prices), plus or minus such amounts, if any, as may be justified by reason of ordinary fluctuations in construction costs as indicated by engineering cost indexes applicable to the type of construction involved. There are also authorized to be appropriated such additional sums as may be required for the operation and maintenance of the extension.

U.S. DEPARTMENT OF THE INTERIOR,
OFFICE OF THE SECRETARY,
Washington, D.C., June 26, 1970.

Hon. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This responds to your request for the views of the Department on S. 2808, a bill "To authorize the Secretary of the Interior to construct, operate, and maintain the Minot extension of the Garrison diversion unit of the Missouri River Basin project in North Dakota, and for other purposes."

We recommend that the bill be enacted with the amendments suggested herein. The Garrison diversion unit was authorized as part of the Missouri River Basin project by the Act of August 5, 1965 (79 Stat. 433). Municipal and industrial water service is included as one of the purposes of the unit. Costs of the unit were allocated to the total municipal and industrial water function, with plans for use to be developed during construction of the unit. Future water service to the city of Minot was contemplated in the authorized plan of development.

The principal objectives of the proposed Minot extension of the authorized Garrison diversion unit are: (1) to provide a supplemental supply from ground water from the nearby Sunde aquifer to meet immediate needs, and (2) to provide a dependable supply of good quality imported Missouri River water for the long-range municipal and industrial requirements of the city of Minot in north-central North Dakota. The proposed development would also serve outdoor recreation and fish and wildlife enhancement functions.

The Secretary's feasibility report on the Minot extension was transmitted to the Congress on June 5, 1970, and ordered printed as House Document 347, 91st Congress.

The proposed Minot extension facilities would be constructed in two phases. The first phase of the development would consist of facilities to convey the ground-water supply, which would be developed by the city of Minot, from the aquifer to the city's treatment plant. The principal features of the first phase would consist of the Sunde Pumping Plant near the aquifer, the Sunde Pipeline leading from the pumping plant 3.7 miles to the Minot Pipeline, and a 3.6-mile segment of the Minot Pipeline leading to the city's water treatment plant. In conjunction therewith, the city would develop the Sunde aquifer by constructing wells, installing well pumps, and constructing a collection system.

The second-phase development would provide for diversion of Missouri River water through the Garrison diversion unit facilities to meet the city's long-term municipal and industrial water needs and also for fish and wildlife enhancement and recreational opportunities.

The principal features of the second phase include Livingston Dam and Reservoir, located about 2 miles from the city of Minot, having 9,970 acre-feet of conservation storage; Livingston Pipeline, 9.4 miles in length from the Velva Canal to Livingston Reservoir; two pumping stations to lift the water from the canal through the pipeline to the reservoir; the remaining 1.1-mile segment of the Minot Pipeline required to convey water from the reservoir to the city's water treatment plant; and facilities adequate for optimum recreation use of the reservoir.

Water supply and demand studies indicate that the Minot aquifer and Souris River streamflow—the city's existing sources of supply, together with the Sunde aquifer—cannot be relied upon to meet Minot's continuing water requirements. City growth and increased consumption are expected to result in peak and yearly demands in excess of the supply available from these sources by the late 1970's. It is estimated that about 6 years after completion of the first-phase ground-water conveyance system, water would be needed from the second-phase system.

Hydrologic studies indicate that the facilities proposed for the Minot extension in conjunction with those authorized for construction of the Garrison unit could supply the projected municipal and industrial needs of the city of Minot through the year 2020 without shortages.

The total estimated project cost of the Minot extension, based on January 1969 price levels, is \$17,410,000. The total includes the estimated construction cost of \$2,080,000 for the first-phase development and the estimated construction cost of \$10,830,000 plus the assigned costs of the Garrison diversion unit of \$4,500,000 for the second phase. The total estimated project cost is allocated tentatively to municipal and industrial water (\$14,780,000) and to recreation and fish and wildlife enhancement (\$2,630,000). The operation, maintenance, and replacement costs are estimated at \$159,000 and are allocated tentatively to municipal and industrial water (\$68,000) and to recreation and fish and wildlife (\$91,000).

The estimated annual costs of the Minot extension, which include the annual equivalent of the net project investment (total investment less preauthorization investigation costs) and the annual operation, maintenance, and replacement costs, and reflect phase development, have been computed to be \$847,000.

The annual benefits to be derived from the municipal and industrial water supply function have been evaluated at \$1,500,000. Benefits expected to be derived from the recreation and fish and wildlife functions would not begin until completion of the second phase. Therefore, these benefits are discounted and have been evaluated at \$104,000 for outdoor recreation and \$31,000 for fish and wildlife enhancement.

The ratio of the total evaluated annual benefits (\$1,640,000) to the estimated annual costs (\$847,000) for a 100-year period of analysis at 4% percent interest is 1.9 to 1.

The project and assigned costs (\$14,780,000) and interest during construction at the current rate of 3.342 percent (\$811,000) allocated to the municipal and

industrial water supply function and totaling about \$15,600,000 would be reimbursable by the city of Minot with interest within 50 years as required by reclamation law and policy.

The reimbursable component for the first-phase development would be \$2,080,000 project costs and \$51,000 interest during construction. Similarly, the reimbursable component for the second-phase development would be \$12,700,000 project and assigned costs and \$760,000 interest during construction, except that the payment on principal for \$5,500,000, which represents 30 percent of the total investment (\$18,350,000), would be deferred and associated interest payments foregone for a period of 10 years from the first year water is used from the second-phase facilities, as provided by the Water Supply Act of 1958 (72 Stat. 297).

The remaining costs of \$7,960,000 for municipal and industrial water supply for the second phase would be repayable and bear interest initially from the first year that water is used from the constructed works. In addition, the estimated annual operation, maintenance, and replacement costs of \$14,600 initially for the first phase and \$58,600 initially and \$68,500 ultimately—with the second phase—would be reimbursable by the city of Minot.

Of the \$2,630,000 of construction costs allocated to recreation and fish and wildlife enhancement, \$588,000, which represents one half of the separable costs, plus \$19,000 interest during construction and all separable operation, maintenance, and replacement costs (\$26,000 initially and \$86,000 ultimately) would be a non-Federal cost. As required by section 2(a) of the Federal Water Project Recreation Act (79 Stat. 213), the Garrison Conservancy District has indicated by letter dated July 18, 1969, its intent to agree to administer the land and water areas of the Minot extension for recreation and fish and wildlife enhancement and to bear one-half of the separable costs allocated to those two functions and all of the cost of operation, maintenance, and replacement incurred therefor.

The remaining \$2,050,000 of project costs and \$5,100 operation, maintenance and replacement costs allocated to recreation and fish and wildlife enhancement would be nonreimbursable Federal costs as provided by law.

The plan of development for the Minot extension has engineering feasibility and is justified economically. Early authorization is supported strongly by the state and local interests. The city of Minot has expressed its willingness to repay the reimbursable costs allocated to municipal and industrial water supply. Of the estimated total project costs of \$17,410,000, about \$15,370,000, or 88 percent, would be reimbursable with interest.

We recommend that the figure "\$12,150,000" in section 5, on page 4, line 6, be amended to read "\$12,900,000". On line 10 of that page the following sentence should be added: "There are also authorized to be appropriated such additional sums as may be required for the operation and maintenance of the extension."

Enclosed is a statement concerning the estimated employment and expenditures required by 5 U.S.C. 2953 (1966), formerly Public Law 84-801 (5 U.S.C. 642).

Also enclosed is a statement of the effects of the bill on the environment as required by section 102(2)(C) of the National Environmental Policy Act of 1969 (P.L. 91-190).

The Bureau of the Budget has advised that there is no objection to the presentation of this report from the standpoint of the program of the President.

Sincerely yours,

CARL L. KLEIN,
Assistant Secretary of the Interior.

MINOT EXTENSION, GARRISON DIVERSION UNIT, NORTH DAKOTA, GARRISON DIVISION, MISSOURI RIVER BASIN PROJECT—ESTIMATED ADDITIONAL MAN-YEARS OF CIVILIAN EMPLOYMENT AND EXPENDITURES FOR THE 1ST 5 YEARS OF PROPOSED NEW OR EXPANDED PROGRAMS

	1st year	2d year	3d year	4th year	5th year
Estimated additional man-years of civilian employment:					
Executive direction:					
Executive.....	0	1	0	0	0
Clerical.....	0	0	0	0	0
Total, executive direction.....	0	1	0	0	0
Administrative services and support:					
Accountant.....	1	1	0	0	1
Property management.....	1	1	0	0	1
Records maintenance.....	1	1	0	0	1
Clerical.....	1	2	0	0	1
Total administrative services and support.....	4	5	0	0	4
Substantive (program):					
Engineering technicians and aids.....	8	15	0	0	8
Engineers.....	3	6	0	0	4
Others.....	1	2	0	0	1
Total substantive.....	12	23	0	0	13
Total, estimated additional man-years of civilian employment.....	16	29	0	0	17
Estimated additional expenditures:					
Personal services.....	150,000	280,000	0	0	160,000
All other.....	320,000	1,320,000	0	0	40,000
Total estimated additional expenditures.....	470,000	1,600,000	0	0	200,000

STATEMENT ON ENVIRONMENTAL IMPACT

The following statement on environmental impact is submitted in accordance with section 102(2)(C) of the National Environmental Policy Act of 1969.

The relationship of the proposed Minot Extension to the quality of the human environment was examined as required by Section 102(2)(C) of the National Environmental Policy Act of 1969 (Public Law 91-190). The investigation and formulation of the plan for this proposed water resource development was completed prior to the enactment of the Act. However, before recommending authorization of the proposal to the President and the Congress, copies of the Secretary's proposed report on the Extension were transmitted on September 22, 1969, to the State of North Dakota and other States of the Missouri River Basin, to the Secretary of the Army, and to the interested Federal agencies for review as required by the Flood Control Act of 1944 (58 Stat. 887), the Fish and Wildlife Coordination Act (48 Stat. 401 as amended), and procedures approved by the President on May 15, 1962 (S. Doc. 97, 87th Congress). No adverse comments relating to the impact of the proposed development on the environment were received.

These coordination procedures are similar to those set forth in Public Law 91-190 for improvement and coordination of Federal plans. In addition, the procedures for formulating and evaluating Federal water resource projects result in multiple objective considerations which relate to the environment. A statement on impact of the Minot Extension on the quality of the human environment reflecting the views and recommendations of those Federal and State agencies which participated directly in formulating the recommended plan of development or indirectly through the review process is presented in the Secretary's feasibility report. Our findings in that respect may be stated as follows:

(1) *Impact on environment.*—The proposed development would significantly enhance the well-being of people. The principal environmental impact would result from furnishing a supplemental supply from ground water to meet the immediate needs and a dependable supply of good quality imported Missouri River water for the long-range municipal and industrial requirements of the city of Minot, including the Minot Air Force Base. The second-phase development would provide new opportunities for water-oriented outdoor recreation and create a reservoir fishery on Livingston Creek which is an ephemeral stream. Both

the water supply and establishment of new recreation and fish and wildlife resources would contribute to the economic viability of the area.

(2) *Adverse environmental effects.*—The principal facilities to be constructed include Livingston Dam and Reservoir, three small pumping plants and a total of 178 miles of concrete pipelines for water conveyance. The reservoir would inundate some 1,200 acres of predominantly rangeland. No persons would be dislocated. The minor adverse effects, if any, of creating the reservoir would be more than offset by creation of a significant water-oriented outdoor recreation and fishery resource. The pipelines would be placed underground. Except for temporary dislocations during construction, there would be no known adverse impact on the human environment from the construction or operation of these facilities.

(3) *Alternatives to proposed action.*—One possible alternative, no development at all, would have extensive adverse impact on the Minot community in terms of deficient water supply. Any other alternative would involve construction of similar but larger facilities. For instance, a pipeline might be built directly to the Missouri River. Therefore, any possible adverse effects would be magnified by such other alternatives.

(4) *Relationship of short-term uses versus long-term needs.*—The objective of the proposed development is to provide both a satisfactory short-term and long-term water supply to the city of Minot, thus a common relationship exists between the short-term uses of the environment and the need to maintain and enhance its long-term productivity to satisfy human needs.

(5) *Irreversible commitment of resources.*—Commitment of the water resources for domestic purposes constitutes its highest use and is irreversible except to the extent that it may no longer be needed, may be provided by more economic or desirable alternatives, or may be required to meet more critical human needs.

EXECUTIVE OFFICE OF THE PRESIDENT,
BUREAU OF THE BUDGET,
Washington, D.C., June 30, 1970.

HON. HENRY M. JACKSON,
Chairman, Committee on Interior and Insular Affairs,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: This is in response to your letter of April 13, 1970, requesting the views of the Bureau of the Budget on S. 2808, a bill to authorize the Secretary of the Interior to construct, operate, and maintain the Minot extension of the Garrison diversion unit of the Missouri River Basin project in North Dakota, and for other purposes.

The purpose of the bill is stated in its title.

The Department of the Interior is transmitting a separate report to your committee in which it recommends enactment of the bill and suggests certain perfecting amendments.

The Bureau of the Budget concurs in the views of the Department of the Interior. Accordingly we would have no objection to enactment of this legislation if amended as recommended in the report of the Department of the Interior.

Sincerely,

WILFRED H. ROMMEL,
Assistant Director for Legislative Reference.

Senator BURDICK. I have a statement here by the Honorable Milton R. Young, U.S. Senator from the State of North Dakota.

I would like to include it in the record at this point.

(The document referred to follows:)

STATEMENT OF HON. MILTON R. YOUNG, A U.S. SENATOR FROM THE STATE OF NORTH DAKOTA

Mr. Chairman, we are all most grateful to you for arranging this hearing on S. 2080 to provide both an interim and a permanent water supply for the City of Minot, North Dakota.

Minot is one of North Dakota's major and fastest growing cities. It is located on the Souris River in the north central part of the state. This community is faced with what might be termed a feast or famine situation. It has suffered

disastrous floods both this year and last year. In fact, the flood in 1969 was the worst in its history.

The Senate Public Works Committee is presently considering a flood control project for Minot. This project, I am confident, will be authorized during this session of Congress as a part of the Omnibus Rivers and Harbors Bill. Floods of this magnitude notwithstanding, this city has long suffered from a shortage of water for municipal purposes.

Minot's principal source of water has been from the Souris River. They have also obtained a part of their water supply from underground aquifers. However, even these two sources combined are insufficient. This city has long faced a shortage of water and, in fact, several times in recent years has had to invoke water rationing.

Approximately twenty miles north of the City of Minot the United States Air Force has located a huge strategic Air Command Air Base which is also the headquarters for a Minuteman Missile Wing. The Air Base has a population of 18,000.

When this base was established the Department of Defense requested the City of Minot to provide water for the base. It was determined at that time that this would be a cheaper method of obtaining a source of water supply than establishing a separate system for the base itself. Water rationing in the City of Minot has also resulted in a similar plan of water conservation at the Minot Air Force Base.

In addition to irrigation, one of the major features of the Garrison Diversion Project is the providing of municipal and industrial water supply to a number of North Dakota cities. Minot is one of the principal cities which will benefit from this feature of the project. Minot city officials and citizens of the Minot community have over the years been among the most loyal supporters and strongest advocates of the Garrison Diversion Irrigation Project.

While the long-range solution to Minot's water supply problem is to obtain its water from the Garrison Diversion Irrigation Project, unfortunately, water will not be available from this source under the most optimistic estimates until 1975. Unfortunately, progress on the construction of this project has not been as rapid as we all would have liked as a result of the slow-down in construction of Federal projects such as this caused by our very difficult problems with the Federal budget.

Because of its urgent need for an adequate water supply, the City of Minot has studied almost every possible alternative. Most recently, in cooperation with the North Dakota State Water Commission and the United States Geological Survey, the city located an underground aquifer known as the Sunde Aquifer. This aquifer contains sufficient water to meet the city's needs for at least the next ten years. It is located about five miles southeast of the city.

The bill before you today would authorize the construction of an interim water supply for Minot, as well as their permanent water supply system directly from Garrison Dam.

The interim water supply involves the construction of a pipeline from the Sunde Aquifer to the City of Minot. The city itself would drill the wells, construct the gathering system and provide for electric power for pumping. The Bureau of Reclamation would construct the pipeline to the city. This system, as I have indicated, would provide for the city's water needs for the next ten years.

During this time the permanent water supply system would be constructed. This system involves a pipeline from the Velva Canal of the Garrison Diversion Irrigation Project, along with a reservoir immediately northeast of the City of Minot. After the permanent water supply system is in operation, the interim system would be available either as a supplemental water system or as a standby system to be used in case of an emergency.

It should be emphasized, Mr. Chairman, that the cost to the Federal government of constructing this water supply system is wholly reimbursable over a 50-year period under the provisions of the basic Reclamation Act. The Bureau of Reclamation estimates that the total Federal cost of constructing the interim water supply system is \$2,080,000 and the cost of the permanent water supply system is \$10,830,000. The project has a very favorable benefit-cost ratio of 1.9 to 1.

The Bureau of Reclamation will testify concerning the technical aspects of this project, and I know that the witnesses from North Dakota will provide you with ample testimony concerning the need for this project.

Mr. Chairman, this project is wholly justified and is economically feasible. Minot simply must obtain a more adequate source of municipal water if it is to continue to grow and attract industry. I would like to urge just as strongly as possible favorable action by your Committee.

Thank you.

**STATEMENT OF HON. QUENTIN N. BURDICK, A U.S. SENATOR FROM
THE STATE OF NORTH DAKOTA**

Senator BURDICK. Are there any congressional people in the room?
I see there are not.

I have supported the development of the Garrison diversion unit of the Missouri River Basin project for many years. When we achieved the reauthorization of the unit in 1965, one of the provisions of the authorized plan was for the diversion of Missouri River Basin water through the unit's facilities, for municipal and industrial use in the project area.

The city of Minot was interested at that time in the possibility of securing a dependable water supply from the unit, and the city actively supported the authorization.

Studies of the various alternatives were not yet complete, however and the facilities for the delivery of water to the city could not be included in the authorization.

The city of Minot has had the benefit of a number of studies, and it is clear that the only dependable source of a long-term water supply is the Missouri River.

The Bureau of Reclamation has completed its studies of the Minot extension of the Garrison unit which will provide the pumping and conveyance works necessary to deliver the water to the city and has found the plan to have engineering, economic, and financial feasibility.

We are now seeking congressional authorization of the construction, operation, and maintenance of these works.

The city of Minot is located in a rural area of one of the most agriculturally oriented States in the Nation. This large agricultural area depends on Minot as its business, transportation, trade, and commercial center.

In other words the welfare of Minot is vital to the well-being and economic stability of many smaller communities and rural residents of north central North Dakota.

Minot is also the trade center and economic foundation for the Minot Air Force Base, a vital part of the defense facilities of our Nation with 19,000 servicemen and dependents. The airbase is the home of the Strategic Air Command's 810th Strategic Aerospace Division with operational responsibility for intercontinental bombers and a Minuteman missile complex.

As the largest customer of Minot, the Air Force base must rely on the city for water and for the operation of the water supply facilities.

The city presently obtains its water from the Souris River and from wells. The Souris River is overappropriated. The present supply is not dependable and no opportunity exists for further development.

Ground water supplies also are limited and require expensive chemical treatment. The aquifer is being overdrawn and has declined more than 20 feet in 4 years at some points. The city has had to resort to

water rationing to avoid emergency situations in chronic periods of shortage.

Nearly one-half of the 250,000 acres to be irrigated in the authorized initial stage of the Garrison diversion unit are located within the trade area of Minot. If these lands are to realize their full potential for economic improvement Minot must be able to expand with the new irrigation development to provide a wide range of crop and livestock marketing facilities and processing services.

Minot, however, is not growing as rapidly as other major cities in North Dakota. One of the principal causes is the lack of an assured, ample, and long-range supply of good quality water for municipal and industrial purposes. Minot and the surrounding area also undergoes severe employment fluctuations.

It has the highest rate of unemployment and frequently has the highest unemployment claims payment in the State. An assured water supply for municipal and industrial uses would be vital in encouraging industry which in turn would stabilize the employment market.

The two-phase plan that has been formulated to meet Minot's water needs is particularly well suited for the situation. The immediate need is critical.

Fortunately, a ground water aquifer has been located near the city which can be tapped under the first part of a two-phase plan at a cost of a little over \$2 million.

The first-phase development will solve the immediate problem until a long-term water supply can be provided through facilities of the Garrison diversion unit.

A portion of the conveyance system of the first phase will remain in service as part of the second-phase development and the well field will serve as a permanent standby water source for emergency use.

The cost of the total plan is \$17.4 million (including \$4.5 million assigned costs from Garrison diversion unit).

Part of the cost is assigned to recreation and fish and wildlife values, but 88 percent of the total cost of the extension will be repaid with interest by the Minot water users. The benefits of the plan exceed the costs by a ratio of 1.9 to 1.

I wish to emphasize the urgent need for this legislation and to commend the well thought out plan which has been formulated with the help of State and city officials. I urge the favorable consideration of the Minot extension legislation by this committee.

Senator Jordan, do you have any comments?

Senator JORDAN. No; no comment, Mr. Chairman, at this time.

(I have received the following statement from Congressman Kleppe, which will be included in the record at this point.)

STATEMENT OF THOMAS S. KLEPPE, A U.S. REPRESENTATIVE IN CONGRESS FROM
THE STATE OF NORTH DAKOTA

Mr. Chairman, I appreciate the opportunity to submit a statement on behalf of legislation before your Subcommittee this morning, to authorize the Minot Extension of the Garrison Diversion Project.

As the sponsor of identical legislation in the House, H.R. 16987, and as the Representative to Congress of the Second District of North Dakota, which includes the City of Minot, I have a very real interest in this project.

The Garrison Diversion Unit, authorized in 1965 and now under construction, will provide a water supply to a number of cities in the area for municipal and industrial use. The largest city, Minot, is faced with the most critical water supply problem.

The legislation before you today, and my bill in the House, H.R. 16987, is designed to meet the immediate and long-range requirements of Minot for a dependable supply of municipal and industrial water.

The Bureau of Reclamation has recommended development of the Minot Extension. Their report as submitted to Congress proposed development in two phases. The first phase would provide the City with a supplemental groundwater supply to meet its present critical demands. The second phase would provide for diversion of water from Garrison Diversion Unit facilities to serve Minot's long-term municipal and industrial water needs and also provide for fish and wildlife enhancement and recreation opportunities.

The Bureau of Reclamation has indicated a capability of spending \$400,000 on design and initial construction of the interim supply plan.

In closing, I respectfully urge favorable consideration of this legislation, with the hope that the Minot extension can be authorized with a view towards a possible start on construction in early fiscal 1971.

Senator BURDICK. Then we will call our first witness, the Honorable James R. Smith, Assistant Secretary for Water and Power Development of the Department of the Interior.

STATEMENT OF HON. JAMES R. SMITH, ASSISTANT SECRETARY FOR WATER AND POWER DEVELOPMENT, DEPARTMENT OF INTERIOR, ACCOMPANIED BY ELLIS L. ARMSTRONG, COMMISSIONER OF RECLAMATION, AND WARREN WEBER, CHIEF, PROJECT DEVELOPMENT DIVISION, MISSOURI-SOURIS PROJECT OFFICE, BISMARCK, N. DAK.

Mr. SMITH. Mr. Chairman and members of the subcommittee, it is a particular honor too for me to be here this morning to testify on behalf of the Minot extension project.

I am accompanied by Commissioner Ellis Armstrong of the Bureau of Reclamation, and the Commissioner is required to be in another hearing at 10:45 and if the committee would be kind enough to excuse him by that time, we would appreciate it.

I am also accompanied by Warren Weber, Chief of the Project Development Division, Missouri-Souris Projects Office, Bismarck, N. Dak.

I would like to call the attention of the committee to our new young image in presenting Miss Arlene Dragon, and I think she adds a lot to the appearances of these gentlemen.

Senator BURDICK. I quite agree with you.

Mr. SMITH. It is my purpose and privilege to testify on behalf of the proposed Minot extension of the Garrison diversion unit, Missouri River Basin project, and in support of the legislation to authorize its construction.

The Secretary's feasibility report on the unit was submitted to the Congress on June 5, 1970, and ordered printed as House Document 347, 91st Congress.

The views of the Department of the Interior on the bill S. 2808 were presented in our letter of June 26, 1970. We recommend that section 5 of the bill be amended to authorize the appropriation of construction funds in a sum consistent with our current estimated cost and to authorize the appropriations of such other sums as may be required for the operation and maintenance of the works.

The Garrison diversion unit was authorized as part of the Missouri River Basin project by the act of August 5, 1965. Municipal and in-

dustrial water service was included as one of the purposes of the unit with plans to be developed during construction. Future water service to the city of Minot was contemplated in the authorized plan of development.

Historically, the city of Minot has been plagued by inadequate water supplies from wells and the Souris River. Its population has grown 50 percent since 1950 and is expected to double by the year 2000. The Minot Air Force Base, a strategic national defense installation about 12 miles north of the city, and John Moses Hospital, an Air Force hospital within the city, are major water customers. Most of the principal industries, which involves processing dairy products, meat-packing, and the manufacture of concrete products, receive their water supply from the city's system. The expected increase in population and water use, declining ground level water, and seasonal flow of the Souris River have caused the city to seek a more adequate supply for its municipal, industrial, and contractual water needs.

The feasibility investigation of the Minot extension of the Garrison diversion unit was authorized by Public Law 90-254.

The principal objectives of the proposed Minot extension are (1) to provide a supplemental supply from ground water from the nearby Sunde aquifer to meet immediate needs, and

(2) to provide a dependable supply of good quality imported Missouri River Water for the long-range municipal and industrial requirements of the city of Minot in north-central North Dakota. The proposed development would also serve outdoor recreation and fish and wildlife enhancement functions.

Initially, our feasibility investigation concerned only the proposal to convey imported Missouri River water from the Velva Canal, which is shown on the map in red on the right, an authorized but unconstructed feature of the Garrison diversion unit, to the city of Minot's water treatment plant.

At that time water was expected to be available from the Velva Canal in 1972. Due to a reduced level of funding for construction, this delivery date can no longer be met. As now scheduled, water will not be available from the Garrison diversion unit until at least 1975.

However, the city of Minot has an immediate water supply shortage. The city currently relies on the Souris River and the Minot ground water aquifer for its supply. In both instances the quality is marginal, requiring expensive treatment, and the quantities are limited. Almost every summer since 1960 peak demands have exceeded the supply, causing excessive drawdown of the aquifer and forcing the city to restrict water use by imposing water rationing. Minot could not always fulfill its contractual obligation to deliver up to 2.5 million gallons per day to the Minot Air Force Base. The base has cooperated in rationing water use at the military facility during critical periods. The average per capita use for Minot is 80 gallons per day, which is about half the national average.

Ground water studies undertaken by the city of Minot in cooperation with the North Dakota State Water Commission after the completion of our investigations disclosed that the recently identified Sunde aquifer near the city has the potential to supplement the city's existing supply to meet its immediate needs. That aquifer is shown at the very bottom of the map in the cross-hatched area.

In view of these findings the city and the commission proposed that the city develop a ground water supply from the aquifer by the construction of wells, pumps, and a collection system. Our plan of development for the Minot extension would then be modified to include a ground water conveyance system and this segment would be constructed as soon as possible as the first phase of the proposed development.

This modified plan of development would more adequately serve the city's immediate needs and would permit the deferment of construction of the remaining second-phase facilities required to utilize the long-term water supply that will be available from the Garrison diversion unit.

Water supply and demand studies indicate that the Minot aquifer and Souris River streamflow, the city's existing sources of supply, together with the proposed development of the Sindre aquifer, will not be adequate to meet Minot's projected long-term water needs. City growth and increased water consumption are expected to result in peak and yearly demands in excess of the supply available from these sources by the late 1970's. It is estimated that about 6 years after completion of the first-phase ground water conveyance system water would be needed from the second-phase system.

Hydrologic studies indicate that the facilities proposed for the Minot extension in conjunction with these authorized for construction of the Garrison unit could supply the projected municipal and industrial needs of the city of Minot through the year 2020 without shortages. The first phase would develop an average of some 4,150 acre-feet of ground water annually to supplement the supply from the city's existing sources. The second phase would supply about 9,800 acre-feet per year initially and the deliveries are projected to increase to 21,000 acre-feet by the year 2020. When the second phase goes into operation, most of the ground water supply facilities will be reserved for emergency use.

The display map shows the general plan for the Minot extension and the location of its features relative to the Velva Canal, the city of Minot, and the Minot Air Force Base which is approximately 12 miles north of town.

The proposed Minot extension facilities would be constructed in two phases. The first phase of the development would consist of facilities to convey the ground water supply which would be developed by the city of Minot, from the aquifer to the city's treatment plant. The principal features of the first phase would consist of the Sindre pumping plant located near the aquifer, the Sindre pipeline leading from the pumping plant 3.7 miles to the Minot pipeline, and a 3.6-mile segment of the Minot pipeline leading to the city's water-treatment plant. In conjunction herewith, the city would develop the Sindre aquifer by constructing walls, installing well pumps, and constructing a collection system.

The second-phase development would provide for diversion of Missouri River water through the Garrison diversion unit facilities to meet the city's long-term municipal and industrial water needs and also for fish and wildlife enhancement and recreational opportunities at Livingston Reservoir.

The principal feature of the second phase would be Livingston Dam and Reservoir, located about 2 miles from the city of Minot. The

reservoir would have 9,970 acre-feet of conservation storage capacity and 1,200 acres of surface area. The Livingston pipeline would be 9.4 miles in length from the Velva Canal to Livingston Reservoir and have a capacity of 78 cubic feet per second. Two pumping stations would lift the water from the canal through the pipeline to the reservoir. The 1.1-mile segment of the Minot pipeline would convey water from the reservoir to the portion of the pipeline previously constructed under the first phase. Acquisition of land and construction of facilities adequate for optimum recreation use of the reservoir area are incorporated in the plan of development and would include picnicking and camping units, access roads and parking areas, boat ramps, swimming areas, and sanitary facilities.

The total estimated project cost of the Minot extension based on January 1969 price levels is \$17,410,000. The total includes the estimated construction costs of \$2,080,000 for the first-phase development and \$10,830,000 construction costs, plus assigned costs of the Garrison diversion unit of \$4,500,000 for the second phase. Of the total, \$14,780,000 is tentatively allocated to municipal and industrial water and \$2,630,000 to recreation and fish and wildlife enhancement.

The ultimate operation, maintenance, and replacement costs are estimated at \$159,000 of which \$68,000 are allocated tentatively to municipal and industrial water and \$91,000 to recreation and fish and wildlife.

The estimated annual costs of the Minot extension have been computed to be \$847,000.

The annual benefits to derive from the municipal and industrial water supply function have been evaluated at \$1,500,000. Benefits expected to be derived from the recreation and fish and wildlife functions would not begin until completion of the second phase. Therefore, these benefits are discounted and have been evaluated at \$104,000 for outdoor recreation and \$31,000 for fish and wildlife enhancement.

The ratio of the total evaluated annual benefits to the estimated annual costs for a 100-year period of analysis at $4\frac{7}{8}$ percent interest is 1.9 to 1.

The project and assigned costs plus interest during construction allocated to the municipal and industrial water supply function and totaling about \$15,600,000 would be reimbursable by the city of Minot with interest within 50 years after the first delivery of water from each phase of the proposed development.

The reimbursable component for the first phase would be \$2,080,000 project costs and \$51,000 interest during construction. Similarly, the reimbursable component for the second-phase development would be \$12,700,000 project and assigned costs and \$760,000 interest during construction.

The payment of interest on \$5,500,000 of second-phase costs, which represents 30 percent of the total investment, would be forgone for a period of 10 years from the first year water is used from the second-phase facilities, as provided by the Water Supply Act of 1958. The remaining costs of \$7,960,000 for municipal and industry water supply for the second phase would be repayable and bear interest initially from the first year that water is used from the constructed works.

In addition the estimated annual operation, maintenance and replacement costs of \$14,600 initially for the first phase and \$58,600

initially and \$68,500 ultimately—with the second phase—would be reimbursable by the city of Minot.

Of the \$2,630,000 of construction costs allocated to recreation and fish and wildlife enhancement, \$588,000 which represents one-half of the separable costs, plus \$19,000 interest during construction and all separable operations, maintenance, and replacement costs, estimated to be \$26,000 initially and \$86,000 ultimately, would be non-Federal costs, and as required by section 2(a) of the Federal Water Project Recreation Act, the Garrison Conservancy District has indicated by letter dated July 18, 1969, its intent to agree to administer the land and water areas of the Minot extension for recreation and fish and wildlife enhancement and to bear one-half of the separable costs allocated to those two functions and all of the cost of operation, maintenance, and replacement incurred therefor.

Of the estimated total project costs of \$17,410,000 about \$15,370,000 of, or 88 percent, would be reimbursable with interest. The remaining \$2,050,000 of project costs and \$5,100 operation, maintenance, and replacement costs allocated to recreation and fish and wildlife enhancement would be nonreimbursable Federal costs as provided by law.

The city of Minot does not have the resources to undertake the municipal financing and construction of the major facilities required to meet its immediate and long-term water supply needs. The city has the financing capability to construct the wells and collection system, which are estimated to cost about \$175,000 but needs the long-term repayment arrangements afforded by Federal construction for the remaining facilities required.

Minot has the highest water rate for any city of comparable size in North Dakota which essentially precludes financing any substantial capital improvements for water supply through revenue bonds.

The city has a high total indebtedness, \$10.5 million compared to its total assessed valuation of \$49.6 million. Its ability to sell general obligation bonds for future capital improvement could be seriously limited by any substantial added indebtedness at this time. Serious flooding from the Souris River in 1969, which occurred again this spring, did substantial damage to municipal facilities and private property and resulted in a reduction of \$1 million in assessed valuation.

The Minot extension would have a favorable impact on the human environment of the area by furnishing adequate water supplies and providing other resources for the well-being of people. No significant adverse effects on the human environment have been identified.

In conclusion, I would like to emphasize that the two-phase plan for Minot extension results in the most practical and economical method of meeting the immediate and long-range water needs of Minot, including the Minot Air Force Base. In addition, a new fishery resource would be provided and much needed outdoor recreation opportunities enhanced.

The need for the proposed development is well known, the plan has engineering feasibility, the economic justification for the proposal has been demonstrated and the local beneficiaries stand ready to assume their repayment responsibilities as prescribed by law. Early authorization is supported strongly by the State and local interests. Therefore, I urge that prompt and favorable consideration be given to the

Minot extension of the Garrison diversion unit so that construction of the first phase can commence without delay.

That concludes my prepared statement, Mr. Chairman, and if there are any questions, I am sure that among the three of us here, with some more backup that we have with us, we will do our level best to answer those questions.

I might conclude by also saying that I have followed this project closely since long before I came to Washington as a member of this administration, and have a very personal interest in the project, and knowing something about it, I am very hopeful this committee will approve this needed development that it will be authorized for construction by the Congress.

Thank you very much, Senator Burdick.

Senator BURDICK. We thank you, and thank you for your strong support of the project.

With respect to the bill itself, you recommended that the figure \$12,150,000 appearing in section 5, page 4, line 6, be increased to \$12,900,000.

Mr. ARMSTRONG. Yes; that represents the present estimated cost.

Senator BURDICK. You also recommended that we add the following on line 10 of that page: "There are also authorized to be appropriated such additional sums as may be required for the operation and maintenance of the extension."

Are there any other amendments besides those two?

Mr. ARMSTRONG. That is all.

These two will provide a satisfactory bill as far as we are concerned.

Senator BURDICK. Now, Mr. Smith, on page 4 of your statement in the middle of the page, you say that it is estimated that about 6 years after the completion of the first phase, water will be needed for the second-phase system.

In other words, the aquifer can handle this problem for about 6 years.

Mr. SMITH. Yes, sir.

Senator BURDICK. And that takes care of the needs of the Air Force base also.

Mr. SMITH. As I understand it, the first phase will take care of both the city of Minot and the Minot Air Force Base.

Senator BURDICK. This question may be a little difficult, but will the construction keep apace of the Garrison project itself so that the water will be available at that period?

Mr. Smith, I am speaking of the second stage.

Mr. SMITH. As you and I well know, this is the prerogative of the Appropriations Committee. While we are hopeful construction on the Garrison diversion unit can proceed apace and that our fiscal situation will allow us to move rapidly, it would be foolish for me to predict whether that date can be maintained.

We are hopeful of that at this moment, and see no reason that it could not be maintained.

Senator BURDICK. In other words, it is a reasonable assumption to make it at this time?

Mr. SMITH. Yes, sir.

Senator BURDICK. I want to assure you that I will do my best to make that assumption come true.

There has been one question raised by my colleagues, if this is a project that is absolutely necessary for the Air Force base at Minot. It is one of our key defense points in the Nation. We have missiles installed there. We have SAC bomber installations and, of course, we know that some of the airbases are not permanent institutions, that the Defense Department could change them, close them, could expand them. But suppose that the base should be closed—this is a wild assumption, but suppose it would be closed. Does your testimony and the evidence you have in your files and from your present personal knowledge indicate that, irrespective of the Minot base, that the city of Minot will need this water supply?

Mr. SMITH. Our evidence indicates that even in that unfortunate eventuality, this project will still be needed.

Senator BURDICK. And as long as the base is there?

Mr. SMITH. It is vitally needed.

Senator BURDICK. Senator Jordan?

Senator JORDAN. Thank you.

Mr. Secretary, I understand the proposed project will be constructed in two phases, the first phase being one of pumping from an aquifer and this will take care of the immediate needs for 5 or 6 years before water can be brought in from the Garrison Reservoir. Is that correct?

Mr. SMITH. Yes, sir.

Senator JORDAN. What assurance do you have that the aquifer you propose to pump from would have adequate supplies to warrant that kind of investment?

Mr. SMITH. That was one of the first questions to which we addressed ourselves as this project was in its formulative state, and through the good offices of Milo Hoisveen and the North Dakota Water Commission working in conjunction with the Bureau of Reclamation, that the aquifer has been proved.

I might add, facetiously, the first time we asked to see that the aquifer was proved up, a good part of the city of Minot was under water, and there was not any way to tell whether the aquifer was there or not, but subsequent to that the adequacy of the aquifer for the proposed use has been investigated and verified to the satisfaction of the Bureau of Reclamation.

Senator JORDAN. Will it take a number of wells and a collecting system to satisfy the demand?

Mr. SMITH. Yes, sir.

Mr. WEBER. The city has a proposal to install five wells, and the well pumps and collection system to convey the ground water to the Sundre pumping plant.

Mr. ARMSTRONG. Senator, the city is doing that at its own cost. We estimate that the city will spend about \$175,000 in putting in the wells and the collection system.

Senator JORDAN. What is the average lift of these wells?

Mr. SMITH. May I ask Mr. Hoisveen to answer that?

Mr. HOISVEEN. With the artesian effect present, I imagine the lift itself would be approximately from 50 to 75 feet with the drawdown that would occur.

The average thickness, and I will touch upon that in my testimony, is 125 feet, sir.

Senator JORDAN. You stated, Mr. Secretary, that Minot has the highest water rate of any city of comparable size in North Dakota.

Now you are proposing to spend more money for an intermediate water supply.

What will happen to this capital expenditure for the intermediate supply when water is available by pumping from Garrison?

Mr. SMITH. Commissioner Armstrong can answer that.

Mr. ARMSTRONG. The cost of water from the first phase is estimated to be \$24.50, and then—

Senator JORDAN. \$24.50?

Mr. ARMSTRONG. Excuse me. This per acre-foot.

Then when the second phase is completed and placed in operation the estimated cost for providing the water supply will increase to about \$40 per acre-foot. While this may be somewhat high for North Dakota it ties pretty well with the average cost for municipal and industrial water for our various reclamation projects across the West.

For instance, we made a study of the cost for municipal and industrial water supply for many of our projects last year and for those providing service comparable to that proposed for the Minot extension the median cost was about \$30 per acre-foot, and 10 years or so hence no doubt the \$40 per acre-foot, which is the estimated cost for this project, will possibly be about average.

Senator JORDAN. Will the pumping equipment and the facilities that are necessary for the intermediate period be useful after the second phase is implemented?

Mr. ARMSTRONG. Yes. The intent is to use them as a standby source. The water from the Missouri River through the Velva Canal is higher quality water, having about half the amount of dissolved solids as is in the ground water.

Senator JORDAN. It is your testimony and your opinion that even after the expenditure of these funds in phase 1 and phase 2, the water supply will be within tolerable limits.

Mr. ARMSTRONG. Yes; costwise.

This is in a reasonable price range for this type of water service.

Senator JORDAN. That is all.

Senator BURDICK. To carry on the questioning one more step, the installation for the intermediate supply, a good portion of that is part of the second stage, isn't it?

Mr. ARMSTRONG. Yes.

The cost there is a little better than \$2 million of which \$660,000 is the cost of the Sundre pump plant and Sundre pipeline up to the Minot pipeline, you see. So there is only \$660,000 of the cost that would be in the standby facilities.

Senator BURDICK. Then just using a horseback figure, about 70 percent of the intermediate water supply will be part of the permanent system?

Mr. ARMSTRONG. Yes.

Senator BURDICK. And the remaining you said would continue to be a standby for emergency or other reasons?

Mr. ARMSTRONG. That is true.

Senator BURDICK. When I mentioned the Air Force base, I was merely relaying a question that was asked me. It is hardly reasonable to assume that Minuteman missiles will soon be taken out of the ground in our present defense posture.

I think it is reasonable to assume we will have the airbase there for many years to come.

Mr. ARMSTRONG. Yes. I might state that, by the year 2020, the amount of water presently used by the airbase will only be about 10 percent of the total projected water requirements, so if that demand was not there, you see, the city of Minot would still have need for the water supply.

Senator BURDICK. But at the moment, there is a very vital demand right now.

Mr. ARMSTRONG. Yes. They have a contract for 21½ million gallons a day, which is almost 50 percent of the total water use in the city. However, because of the water shortages, as Secretary Smith pointed out, they have not been able to supply all of the demands that have been there.

Senator BURDICK. I suppose my colleague from Idaho is wondering why we have the water shortage when we are plagued with severe floods, but we get it at the wrong time, and wrong place.

We have two problems: a water supply problem and a flood control problem.

Senator JORDAN. I have had a little experience on the Souris River.

Mr. SMITH. May Commissioner Armstrong be excused?

Senator BURDICK. Yes. That is all, thank you.

Mr. SMITH. Thank you very much, Mr. Chairman.

Senator BURDICK. Our next witness will be Mr. Chester Reiten, mayor of the city of Minot.

STATEMENT OF HON. CHESTER REITEN, MAYOR, THE CITY OF MINOT, N. DAK.

Mayor REITEN. Mr. Chairman, on behalf of the people of Minot, N. Dak., I want to express our appreciation to you for conducting these meetings before this subcommittee, and also to you personally from the people of Minot for introducing this bill and taking such a vital interest in our problems in Minot.

My name is Chester Reiten, I am mayor of the city of Minot, and I am going to give a short summary of my written statement.

Senator BURDICK. At this point, your entire statement will be placed in the record and made part of it.

(The statement referred to follows:)

STATEMENT OF HON. CHESTER REITEN, MAYOR, CITY OF MINOT, N. DAK.

Mr. Chairman and members of the committee, my name is Chester Reiten, Mayor of the City of Minot.

In the sparsely settled agrarian state of North Dakota people are still regarded as assets and the city government of Minot, along with dozens of citizens groups, devote a good deal of time and effort to try to keep our community competitive in bidding for more settlers.

In this struggle to provide jobs and quality living in order to hold people who are here and to attract more, Minot has been handicapped through most of its history and severely handicapped for the past 20 years because of a very short supply of water.

During 13 of the past 20 years, Minot has had to ration water for periods ranging from a few weeks to most of the summer months.

Although we Minoters in 1968 raised \$800,000 for a five year campaign to attract new industry, we have had to avoid bidding for water consuming firms and switch the tense from the present to "our bright future" with those concerns who make inquiries on that point. (Industry we have lost because of our water deficiency is discussed in another statement.)

Water consumption averages for Minot and its sister community, the Minot Air Force Base, are just about one half of the national average. This below normal use is traceable to rationing, water conserving citizens and to our complete lack of heavy water-using industries.

Maintaining pride in community appearance has suffered because lawns and gardens must be sacrificed to hot weather when water supplies are low.

Fire protection is weakened in the heavy water consumption periods at both Minot and the Minot Air Force Base because of the drawdown on storage reserves. At Minot, summer consumption peaks at about 11 million gallons a day while storage reserve capacity is 13 million gallons. In other words, reserve storage is adequate for the currently inadequate supply but not for realistic demands.

Our sanitation and health problems are complicated by low water supplies, a situation which another statement covers in more detail. The Souris River channel through the city often dries up in July and August, on occasion trapping fish which die and rot. There is still some upstream untreated sewage that gets into the river, further amplifying the summertime health menace at Minot.

Our algae problem is so serious in the low flowing Souris River in the summer that our water treatment plant cannot handle the river water and our wells are drawn down to make up the difference, further mining our underground supply. Further, the algae and silt concentrations in the low river clog our recharge system which seeks to utilize river water to help hold underground water tables.

While Minot has spent upwards of \$6 million in water treatment and delivery works in the past 20 years, the system will not hit its peak efficiency until greater supplies of water are available.

Battles over Souris River water rights have been furious. Right now a federal agency which operates a reservoir upstream from Minot is challenging in court a state prior right under which Minot has been obtaining a limited amount of water from the river in dry years.

Logical annexations of immediate suburban areas to the city have been slowed by the city's questionable ability to provide continuing adequate supplies of water.

In short, the city's great need for water has become a part of many municipal problems.

When the adequacy of twin aquifers southeast of the city was established last year, the Mayor's Committee on Minot's Water Problems gave serious attention to recommending the city itself try to arrange financing of the \$2 million plus project. This course was relegated to an alternate position for two reasons: 1) The desire of the city not to take any step that would suggest a departure from getting a permanent supply from the Garrison Diversion project or to reduce the urgency for the permanent water and 2) The fact that nearly three-fourths of the cost of the interim plan would be for facilities that will also be used for the permanent supply, making the link-up a natural one.

I think it is fair to say that Minot worked hardest at the problem of keeping its people and attracting new ones during the 1960s among the city's four major cities. But its population gain was the smallest of the four. The greatest single cause for our poor showing was our lack of an adequate water supply.

We cannot afford any further delay in correcting that deficiency.

Mayor REITEN. As you know, Mr. Chairman, North Dakota is a rural State. According to the Census Bureau we are the most rural State in the Nation, with 85 percent of our income coming from agriculture, and yet our farms are being reduced in number because of advanced technology, and in order to keep the people on the land, in our city, the city raised \$800,000 to bring in industry.

This is a very high figure for a town of only 32,000. Yet we find that industry asks, "What is your water supply in the city?"

In the last 20 years, 13 years we have to have rationing in our city. Five times we have asked the Governor of the State to intercede with the Bureau of Sport Fisheries to allow the dam to release more water for our city.

Because of this, water consumption, as has been mentioned, in Minot is one-half the national average. Besides hurting us in attracting industry, this lack of water has influence on our community's appearance.

Because of the lack of water, fire protection is reduced, our consumption at peak periods is 11 million gallons a day, and our reserve is only 13 million.

As has been mentioned, this has an effect on the airbase, which also has to have water rationing. As has been mentioned in other reports, it has an effect on the health of the city.

Yet the people have known now for some time that the aquifer can produce the water for the city.

Yet the city has not gone ahead on its own for an important reason. We did not want to interfere with a permanent supply of bringing water to Minot from the Velva Canal.

So we would want the consideration to this bill, which ties the city into the permanent supply, and yet at the same time allows us to have this interim supply.

Also, the fact that three-fourths of the interim supply cost will be part of the permanent supply cost. Mr. Chairman, we are not asking for money. We will repay then most of this money.

The people of Minot need this water supply and, as you know, it was in 1927 that the first discussions was made about the diverting of water from the Missouri River to help Minot, and this is 1970.

Thank you very much for your support of this bill.

Senator BURDICK. Thank you, Mr. Reiten.

It is an excellent statement. I know you have spent a lot of time on this very perplexing problem. I know you have had your hands full, not only with the water supply problem but with the flood problems, and you have given a very good presentation here this morning.

Thank you.

Mayor REITEN. Thank you.

Senator BURDICK. Our next witness will be Vernon Fahy, city manager, Minot, N. Dak.

We are glad to welcome you, sir.

STATEMENT OF VERNON FAHY, CITY MANAGER, MINOT, N. DAK.

Mr. FAHY. Thank you, sir, and I appreciate the courtesy you and your colleagues have extended to the delegates from North Dakota and for the support of this vital project.

I have a rather lengthy statement which I will not read at this time. The statement that has been made by the mayor, by the Bureau people, and, of course, by yourself, has pretty well summarized the situation in Minot.

Senator BURDICK. At this time, your full statement will be made part of the record.

(The statement referred to follows:)

STATEMENT OF VERNON FAHY, CITY MANAGER, MINOT, N. DAK.

Mr. Chairman and members of the committee, my name is Vernon Fahy and I am the City Manager of the City of Minot, North Dakota.

This statement is intended to urge your favorable action on Senate Bill 2808, a bill to authorize the Secretary of the Interior to construct, operate and maintain the Minot Extension of the Garrison Diversion Unit of the Missouri River Basin Project in North Dakota.

This community has had water supply problems for the past 30 years as a result of declining ground water levels and increases in population and its citizens have looked with envious eyes upon the great Missouri River lying about 42 miles

to the south. Our citizens have been strong supporters of the Garrison Diversion Project since its inception because it holds the only promise for a permanent solution to our water problem. Upon completion this project will bring Missouri River water within 12 miles of the City of Minot in the Velva Canal which is one of the main carriers of irrigation supplies. The project anticipated the water supply needs of the City of Minot and assigned about one-third of the total project costs for municipal and industrial water to this city.

In order to meet the minimum demands of our citizens for water, it has been necessary to impose very strict rationing programs upon our people. In addition, we have developed an artificial recharge system which is somewhat unique in that it provides for pumping of water from the river during periods of high flows into a basin which ultimately allows the water to pass into the underground storage which provides the supply for our well system. The City has participated in several ground water studies in attempts to locate additional supplies of water to satisfy the needs of our citizens pending the completion of the Velva Canal. These points are made to indicate that our people are patiently tolerating restrictions and expense while awaiting the development of the permanent supply of water.

Minot Air Force Base, with its population of approximately 16,000 people, is a valuable part of our community and receives its water supply from our system. This base rations, regulates and conserves water during times of short supply and it, too, will benefit greatly from this project. As a matter of fact, the officials of Minot Air Force Base have requested that arrangements be made for the city to supply an additional 1 million gallons per day of water to meet the needs of the base. The governing body of the city has indicated that it will do everything possible to meet this request. Of great concern to the air base and to this community is the matter of fire fighting capabilities during the summer months. In spite of the rationing program there are many times when the total amount of water in storage is below the level determined to be necessary for fire fighting reserve. This threat to lives and properties must be eliminated at the earliest possible time.

In addition to the regulation of water and the development of the artificial recharge system, the City of Minot participated with county, state and federal entities in an extensive survey of this area to determine if a new ground water aquifer could be located to satisfy our interim requirements. This survey indicated that there was a potential source of ground water in an area lying approximately 6 miles southeast of the city. The State Water Commission and the city jointly financed an extensive study of this area which proved that an aquifer does exist and that it would be capable of meeting Minot's needs until Missouri River water becomes available. Dr. Wayne Pettyjohn, Professor of Geology at Ohio State University and the former employee of the U.S.G.S. worked with the State Water Commission in evaluating this aquifer and he verifies its capability to produce our interim needs. Officials of the Bureau of Reclamation have reviewed this ground water survey and their March 1970 report indicates that sufficient quantities are available to meet this city's needs until the late 1970s. The testing program of the North Dakota State Water Commission shows that the new aquifer, called the Sundre-Buried Channel aquifer, will have a sustained capability of at least 6 m.g.d. indefinitely, assuming natural recharge.

The Bureau of Reclamation report covering the Minot Extension of the Garrison Diversion Unit recommends, and the city supports, a plan which would provide water from the Sundre aquifer to the Minot pipeline as the first phase of the project with the second phase being constructed from the Minot pipeline to the Velva Canal when necessary. It was generally agreed by all parties involved in this study of Minot's water needs that this plan was the most economical means for meeting the urgent demands of the city until the second phase could be constructed. This general plan is discussed in detail in the Bureau of Reclamation's report. Basic elements are roughly outlined on attached Exhibit "A".

The governing body and the citizens of Minot are fully prepared to pay the total costs of this project, including the interim supply which will require the expenditure of approximately \$600,000 more than would be required to construct the Minot Extension.

We respectfully request that the conveyance facilities be constructed from the Sundre aquifer by the Bureau of Reclamation under a repayment contract which will allow the city to take advantage of the favorable interest rate inherent in this method of financing. This city has one of the highest water rates in the state and the treatment costs for our water exceed those of most other areas in

this section of the United States. The continuing capital improvement programs necessary to keep our present system current and the repayment of the total indebtedness of approximately \$3 million for outstanding sewer and water revenue bonds provide very little likelihood that the City could increase water rates to retire this construction cost under conventional financing methods. Financing by the federal government would allow the city to avail itself of the long-term repayment provisions of the Water Supply Act of 1958 and would provide substantial advantages to us in meeting our total capital improvement costs in the future.

Mr. Chairman and members of this committee, I respectfully urge that you support the provisions of this bill so that the City of Minot can provide a safe, dependable supply of water which is so necessary to the growth and development of our city. One has only to realize that the per capita consumption of water in Minot is approximately one-half that of the average American city to understand the critical nature of our needs. Studies show that most American cities have a per capita consumption of approximately 200 gallons per person, whereas Minot's per capita consumption averages about 80 gallons per person per day. This same water consumption pattern is reflected in figures compiled by officials of Minot Air Force Base. From these statistics it must be recognized that the citizens of Minot and its air base community are exercising restraint in the use of the limited amounts of water available.

The Bureau of Reclamation report of the Minot Extension of the Garrison Diversion Unit, dated July 1969, contains a great deal of information concerning the history of Minot's needs and the benefits which will accrue to the city as a result of the construction of the conveyance system which would be authorized under the provisions of this bill. I respectfully request that you take favorable action on this legislation to provide facilities so essential to the growth and development of our community.

Thank you.

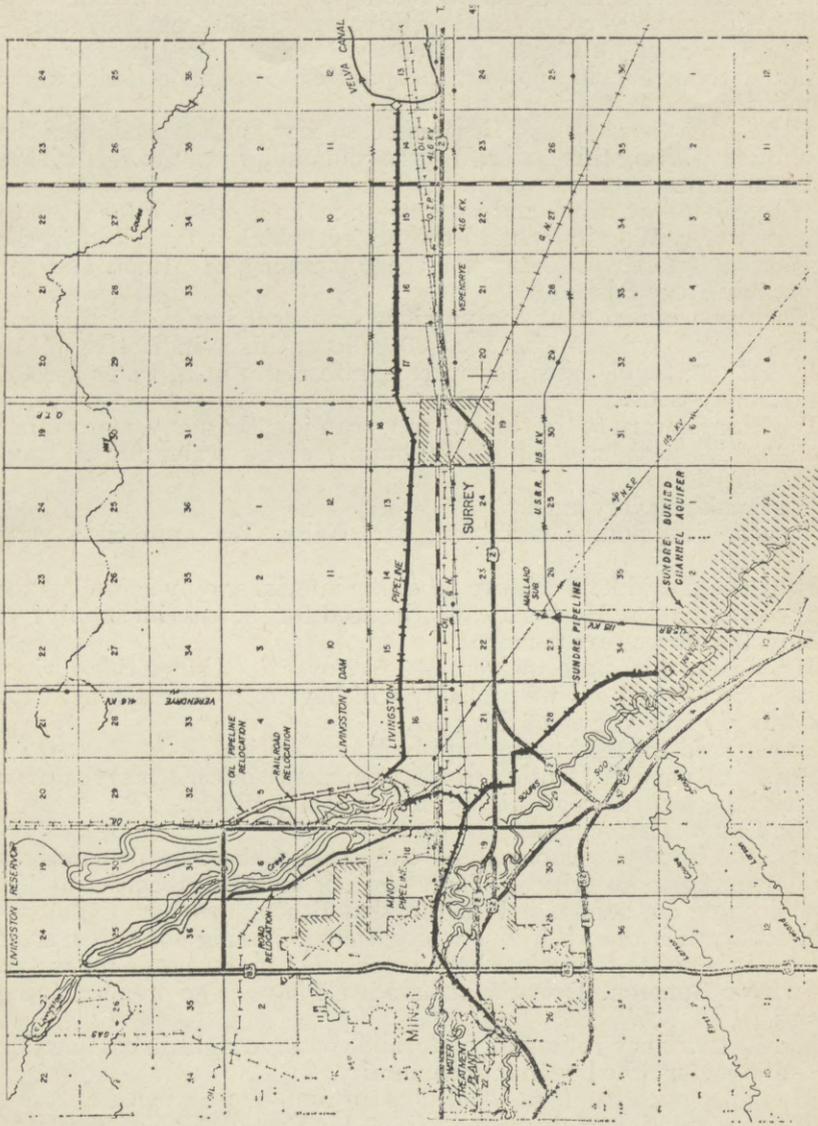


EXHIBIT A

Mr. FAHY. I would like to say this, though, that the people of Minot have found it to be a very rare occurrence in the past when they have not had to look forward to a summer without the necessity for rationing water.

Minot Air Force Base has become a very vital part of our community in almost every way, and we do contract with them for furnishing the water supply for the community. In recent months, they have indicated to us that they now are in a position to need additional water supplies.

There are no sources near the airbase, so they must depend upon the city for furnishing this water. We as a community want to furnish the water to them.

They are a part of us, and we want to make it possible for them to get the water. We vitally need the project which is described in the legislation before you today for the community of Minot, and for Minot Air Force Base.

When you realize that the previous statement has stated that our per capita per consumption is at 80 gallons, this is indicative of the fact that our people have had to recognize restraint in water use for many, many years.

We look forward to the time when we can join the many, many other communities who have a plentiful supply of the water for all community needs.

We thank you very much.

Senator BURDICK. Thank you, Mr. Fahy. We appreciate your testimony.

It has been said here that we need this interim supply as well as the long-term solution. How critical is the need for the interim supply?

How fast do we have to move?

Mr. FAHY. Although we were 3½ feet over flood stage this spring, if conditions work out we probably will have to recognize a need for rationing in late August of this year.

So the need for the interim supply is most critical.

Senator BURDICK. In other words, each month or each year that now passes, it becomes a progressively more critical problem.

Mr. FAHY. That is right.

The continual development of our areas makes the demands on water supply more critical. There are not storage capacities as has been brought out before, and the fact that although we have had flooding, although it does help our underground existing aquifer to some extent, it is not to the point that we can relax in our needs for water.

Senator BURDICK. Does the airbase itself have to go on a rationing basis?

Mr. FAHY. They ration, regulate, and conserve right in conjunction with those of us who live in the community.

Their program has been identified with ours, and when we issue a need for regulation of the water, Minot Air Force Base also regulates.

I believe this is more now in a statement that has been issued by the Air Force to the mayor of Minot, in which their per capita consumption is identical with ours.

Senator BURDICK. In other words, it is a fair statement to say that more water is actually needed in the city of Minot and the Air Force base right now.

Mr. FAHY. Absolutely.

Senator BURDICK. Thank you very much.

Our next witness will be Milo Hoisveen, water commissioner of North Dakota.

Welcome you to the committee this morning, Mr. Hoisveen.

STATEMENT OF MILO W. HOISVEEN, NORTH DAKOTA WATER COMMISSIONER

Mr. HOISVEEN. Mr. Chairman and committee members, as State engineer and chief engineer of the water commission, and as the U.S. representative on the International Souris River Board of Control, I am well aware of the controversy which exists over water permits on the Souris River.

The Honorable Senator Jordan was at one time the chairman of the International Joint Commission, and became quite familiar with the problems on the Souris River.

The Minot extension from the Velva Canal with the interim development from the aquifer appears to be the solution to the controversy mentioned. As well as adequately supplying the city of Minot.

The Sunde aquifer was located in cooperation with the city of Minot at a cost of \$75,000. By the way, I am highlighting my statement.

Senator BURDICK. Your full statement will be made a part of the record without objection.

(The statement referred to follows:)

STATEMENT OF MILO W. HOISVEEN, NORTH DAKOTA STATE WATER COMMISSIONER

Mr. Chairman and committee members, my name is Milo W. Hoisveen. I am State Engineer and Chief Engineer of the North Dakota State Water Commission. I also serve as the United States representative on the International Souris River Board of Control, which was created by the International Joint Commission to provide a board to regulate the flow of water between the Provinces of Saskatchewan, Manitoba, and the State of North Dakota. In accordance with the guidelines set forth by the International Joint Commission, the board has functioned very successfully. The International Joint Commission and the North Dakota State Water Commission authorized the city of Minot a water allocation of 6,700 acre-feet of water annually from the Souris River. The International Joint Commission's order is attached to this statement. The U.S. Bureau of Sport Fisheries and Wildlife has successfully avoided such deliveries to Minot on the basis of a Declaration of Intent.

The Honorable Henry A. Wallace, as Secretary of the U.S. Department of Agriculture, pursuant to Section 8270 of Compiled Laws of North Dakota for the year 1913 (repealed in 1943), notified the then State Engineer of North Dakota, by letter dated September 1, 1934, that the United States intended from and after that date to utilize certain unspecified unappropriated waters as of the date thereof, in the State of North Dakota in said notice described as follows: "The Mouse River, also known as the Souris River, and all its tributaries; the Des Lacs River, also known as the Des Lacs Lakes, and all their tributaries; the James River, including its tributaries; the Pipestem River, and all tributaries of both such rivers in North Dakota; and the Bois des Sioux, the Sheyenne River, the Forest River, and all other tributaries of the Red River in North Dakota, and all tributaries of the Missouri River in North Dakota." No public hearings were required, so locally affected people did not have an opportunity to present claims to water they had been using for years. Controversy over this permit has developed as the Minot Aquifer declined to a dangerously low level as the community grew and the demand for water increased. Minot, which previously obtained all of its water supply from wells, was compelled to go to the Souris River and mix its water from both sources.

The Garrison Diversion Unit, a multi-purpose reclamation project, estimates the delivery of water to the Souris Loop in 1976. Construction and land acquisition will probably delay availability of water from this source until 1980. Their need is immediate as water rationing has been in effect for several years.

Attached is a chart made up from our cooperative gaging station above Minot. This chart indicates that Minot, with an ever increasing population, would under severe drouth conditions, have a difficult time in meeting its water requirements even if the Bureau of Sport Fisheries and Wildlife were to turn over the entire upper water supply in Lake Darling, a man-made reservoir. It depicts that in the drouth of the "30's" there were periods from 180 to 210 days where no flow was recorded in the Souris River.

Thus, it appears as though the city of Minot, in order to avoid the continuing controversy with the Bureau of Sport Fisheries and Wildlife, will be required to obtain its water from some other source than the Souris River as soon as possible.

In 1968, the city and the State Water Commission entered into an agreement to make an intensified ground-water study of an aquifer that showed some promise when the U.S. Geological Survey and the State Water Commission made a joint ground-water study in cooperation with Ward County. We refer to it as the Sundre Aquifer.

The Sundre Aquifer is a glacio-fluvial deposit of sand and gravel confined to an ancient valley. This valley is filled by as much as 450 feet of gravel, sand, silt and/or clay and has no expression on the present day topography. The aquifer is about 1.5 miles wide and has been traced for a distance of more than 20 miles. Undoubtedly, it is much longer.

The investigation of the Sundre Aquifer, which cost approximately \$75,000, consisted of test drilling, installation of observation wells, chemical analyses of water samples, construction of a test well, an aquifer test and data analysis. The aquifer test consisted of pumping a 220-foot deep well for 15 days at a rate of 1,950 gallons per minute. During this period, water levels were measured in 50 observation wells located from 150 feet to 8.5 miles from the pumped well.

The top of the sand and gravel deposit making up the Sundre Aquifer is generally encountered at depths ranging from land surface to 250 feet, the shallowest places being in the Souris River Valley. The total thickness of sand and gravel ranges from nine to 275 feet with an average thickness of about 125 feet. Using this average thickness and an areal extent of 20 square miles, the Sundre Aquifer stores more than 350,000 acre-feet of water.

In comparing the Sundre Aquifer to the Minot Aquifer, from which Minot currently pumps a major portion of its water needs, it is found that the Sundre Aquifer is several times thicker and of much larger areal extent. A study of the Minot Aquifer was made by the United States Geological Survey, the city of Minot and the North Dakota State Water Commission in 1963-1964. This study included the construction and operation of an analog model of the aquifer. It was shown through the use of this analog that the Minot Aquifer could yield three million gallons per day on a sustained basis. From tests made on the Sundre Aquifer, it has been determined that it will yield six million gallons per day on a sustained basis. Yields to individual wells will be on the order of 2,000 gallons per minute. This should be adequate to meet Minot's water requirements to 1980.

The water in the Sundre Aquifer where it underlies the Souris River Valley contains concentrations of dissolved solids ranging from 700 ppm (parts per million) to 1000 ppm. The water from the present Minot well field has an average dissolved solids concentration of about 900 ppm.

I respectfully urge that this segment of the Minot Extension be authorized and funded at the earliest possible date, as this city is in dire need for water. I thank you for permitting me to appear before this Committee, as this is a most urgent project.

RUN-OFF OF SOURIS RIVER, MINOT, N. DAK.

[In acre-feet]

Year	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Total
1930.....	271	298	62	31	2,960	11,400	34,100	7,130	2,610	1,110	31	9	60,000
1931.....	15	28	28	17	28	139	324	247	42	31	25	18	940
1932.....	18	12	12	6	6	52	3,600	873	869	117	22	18	5,600
1933.....	25	36	37	31	117	11,900	23,700	3,290	20,000	2,410	184	60	61,800
1934.....	10	15	22	18	194	11,340	7,380	593	14	54	92	89	19,820
1935.....	0	0	0	0	0	508	561	4,000	18	1,060	264	0	6,410
1936.....	0	0	0	0	0	0	3,590	1,610	4,860	3,050	4,270	325	17,700
1937.....	0	0	0	0	0	0.2	76	850	13	0	0	0	930
1938.....	0	0	0	0	0	2,080	6,090	25	0	345	1,880	2,100	12,529
1939.....	1,840	51	223	6	0	10,090	22,440	162	361	21	1	0	35,200
1940.....	5,370	157	123	25	29	23	5,430	374	15	1,900	3,610	4	17,060
1941.....	3	0	0	0	0	2	8,480	201	1,130	99	29	74	10,020
1942.....	1,120	1,050	116	21	3	477	4,170	413	66	117	68	290	7,910
1943.....	26	25	0	0	0	9,210	104,400	60,840	30,720	16,410	5,400	876	227,900
1944.....	159	142	922	9,090	7,980	5,340	8,470	996	12,390	8,110	7,850	7,090	68,540
1945.....	6,940	7,100	5,200	5,260	4,440	5,870	1,830	1,150	825	208	52	0	38,880
1961.....													18,860

INTERNATIONAL JOINT COMMISSION

ORDER APPROVING APPLICATION OF THE CITY OF MINOT, NORTH DAKOTA, FOR PERMISSION TO DIVERT WATER FROM THE SOURIS RIVER FOR DOMESTIC AND OTHER MUNICIPAL PURPOSES

Whereas, the City of Minot on the Souris River in the County of Ward, State of North Dakota, filed an application dated 23 March 1951 with the International Joint Commission requesting permission to divert 6,700 acre feet of water annually from the Souris River for domestic and other municipal purposes, the maximum rate of diversion to be 9.25 cubic feet per second; and

Whereas, the Souris River rises in the Province of Saskatchewan, flows southeasterly across the international boundary into the State of North Dakota and, after making a large counter-clockwise loop in that State, flows in a general northerly direction and re-enters Canada in the Province of Manitoba. The flow varies widely and at times the river has been known to be dry or practically dry; and

Whereas, under date of 15 January 1940 the Governments of the United States and Canada submitted a Reference to the International Joint Commission requesting *inter alia* advice as to what apportionment should be made of the waters of the Souris River and its tributaries to the Province of Saskatchewan, the State of North Dakota, and the Province of Manitoba, and what interim measures should be adopted to secure the specific objectives; and

Whereas, on 2 October 1940 the Commission submitted an interim report to the Governments of the United States and Canada recommending *inter alia* as interim measures, pending permanent settlement of the questions presented in the Reference, that the Province of Saskatchewan be permitted to continue the use then being made of waters of the Souris River and, in addition, to impound 4,000 acre feet of water for the purpose of providing an adequate water supply for the Town of Weyburn and the mental hospital at Weyburn; that the State of North Dakota be permitted to continue the use it was then making of the waters of the Souris River and, in addition, to impound 200 acre feet of water to provide an adequate water supply for the Town of Crosby, North Dakota; and that a regulated flow of not less than 10 cubic feet per second (later increased to 20 cubic feet per second) be released from the State of North Dakota to the Province of Manitoba during the months of June, July, August, September and October of each year; and

Whereas, the Commission further recommended in its interim report of 2 October 1940 that in the event the State of North Dakota or the Province of Saskatchewan should desire, pending permanent settlement of the questions presented in the Reference, to construct any additional storage works, or otherwise make additional use of the waters of the Souris River Basin, "application shall be made to the International Joint Commission for authority to construct the desired storage works or otherwise to make use of additional waters"; and

Whereas, the recommendations in the Commission's interim report of 2 October 1940 were approved by the Governments of the United States and Canada on 23 March 1941 and 25 April 1941, respectively; and

Whereas, when the Reference of 15 January 1940 was submitted to the Commission and for several years thereafter records of the flow of the Souris River were inadequate for the purpose of apportioning the waters thereof, and it was therefore necessary that the Commission cause satisfactory streamflow records to be obtained; and

Whereas, on 9 October 1952 the Commission submitted a second interim report to the Governments of the United States and Canada under the Reference of 15 January 1940, with special reference to the said application of the City of Minot, North Dakota, and therein noted that:

"The proposed diversion is for domestic water supply, a use of the highest priority;

"The rate timing of the diversion will be such as to reduce the average annual diversion to an amount very much less than 6,700 acre feet;

"A high percentage of the water diverted will be returned to the river together with some of the water pumped from wells by the City of Minot, with the result that the net effect downstream will be moderate;

"The Commission's first interim report dated 2 October 1940 contemplated that applications of the type submitted by the City of Minot should be considered by the Commission and acted upon in the interim prior to formulation of the complete recommendations with respect to the questions in the Souris River Reference."

And the Commission therein concluded that the application should be approved, subject to appropriate conditions to safeguard established requirements and rights; and

Whereas, in its second interim report dated 9 October 1952 the Commission recommended that:

"(a) The Commission be authorized by the Governments of the United States and Canada to adopt an Order approving the Application of the City of Minot, North Dakota; provided that the diversion so permitted shall be taken into consideration by the Commission in its ultimate recommendations for apportionment of the waters of the Souris River.

"(b) The pending application of the City of Minot and any future applications for diversion of water from the Souris River, other than for water supply dugouts, small stockwatering pools, and small irrigation projects, which the State of North Dakota or the Province of Saskatchewan may specify, be considered outside of the one thousand (1,000) acre-foot limitation specified in the Commission's resolution of 26 May, 1945"; and

Whereas, the above recommendations were approved, in the identical form submitted, by the Government of the United States on 16 April 1954; and

Whereas, the Government of Canada, on 7 March 1955 approved the second interim report of the Commission dated 9 October 1952 and the recommendations contained therein, provided that Recommendation (a) be amended by adding at the end thereof the following clarifying clause: "and shall be deemed to have been made subsequent to the said apportionment."; and

Whereas, the Government of the United States on 6 April 1955 agreed to the amendment of the said Recommendation (a), as proposed by the Government of Canada; and

Whereas, by Resolution dated 6 April 1955 the Commission amended Recommendation (a) of the said Interim Report dated 9 October 1952 by adding the clarifying clause proposed by the Government of Canada.

NOW THEREFORE THIS COMMISSION DOETH ORDER AND DIRECT that the application of the City of Minot, North Dakota, for permission to divert water from the Souris River for domestic and other municipal purposes, at a rate not exceeding 9.25 cubic feet per second, and not exceeding 6,700 acre-feet per year, with return flows to the river to be substantially as contemplated in the Application, be and the same is hereby approved as an interim measure, subject to the following conditions:

(a) The diversion hereby permitted shall be taken into consideration by the Commission in its ultimate recommendations to the Governments of the United States and Canada for apportionment of the waters of the Souris River and, in order to safeguard established requirements and rights, shall be deemed to have been made subsequent to the said apportionment;

(b) The diversion hereby permitted shall be considered by the Commission outside of the one thousand (1,000) acre-foot limitation specified in the Commission's resolution of 26 May 1943;

(c) The City of Minot shall furnish to the Commission, through the International Souris River Board of Control, such data as the Commission

may require as to the amounts of water actually diverted from the Souris River, together with estimates of the return flow.
Signed at Toronto, Ontario, this 26th day of January, 1956.

Signed: A. G. L. McNaughton.
Len Jordan
George Spence.
Roger B. McWhorter.
J. Lucien Dansereau.
Eugene W. Weber.

Mr. HOISVEEN. The Sundre aquifer is a glacial deposit, confined to an ancient valley, and the valley is filled by as much as 450 feet of gravel and clay.

The aquifer is about $1\frac{1}{2}$ miles wide and it has been traced for over 20 miles in length and undoubtedly it is much longer.

The investigation of the Sundre aquifer consisted of drilling, taking chemical samples, and the construction of a test well, an aquifer test, and data analysis.

The aquifer test consisted of pumping a 220-foot deep well for 15 days at a rate of 1,950 gallons per minute. During this period, water levels were measured in 50 observation wells varying from 150 feet in distance up to $8\frac{1}{2}$ miles from the site of the well.

The top of the sand and gravel deposit making up the Sundre aquifer is generally encountered at depths ranging from the land surface to 250 feet, the shallowest place being the Souris River Valley itself.

The total thickness of the sand and gravel ranges from 9 to 275 feet, with the average thickness of 125 feet. Using this average thickness and the extent of 20 square miles, the Sundre aquifer stores more than 350,000 acre-feet of water.

This should be an adequate supply until water is available from the Velva Canal for the long-range needs of Minot.

In comparing the Sundre aquifer from the Minot aquifer from which Minot currently pumps the major portion of its water needs, it is found that the Sundre aquifer is several times thicker and much larger in the area of extent.

A study of the Minot aquifer was made by the U.S. Geological Survey, the city of Minot, and the North Dakota State Water Commission in 1963 and 1964. The study included the construction and the operation of an analog model. It was shown through the use of an analog that the Minot aquifer could yield 3 million gallons per day on a sustained basis.

From tests made on the Sundre aquifer, it has been determined that it will yield 6 million gallons per day on a sustained basis.

Yields of individual wells will be on the order of 2,000 gallons per minute. This should be adequate to meet the requirement of Minot to the year 1980.

The water in Sundre aquifer where it underlies the Souris Valley contains concentrations of dissolved solids ranging from 700 parts per million up to a thousand.

The water in the present Minot field has an average dissolved solid concentration of about 900 parts per million. So the water in the aquifer the Sundre aquifer is somewhat better in quality than that currently being used by the city of Minot.

I respectfully urge that this segment of the Minot extension be authorized and funded at the earliest possible date, as this city is in dire need of water.

I wish to thank you for permitting me to make this statement this morning.

Senator BURDICK. Mr. Hoisveen, you were in the hearing room this morning when Secretary Smith testified, were you not?

Mr. HOISVEEN. Yes, sir.

Senator BURDICK. He stated that it is estimated that about 6 years after completion of the first phase of ground water systems, water would be needed for the second phase system.

I presume that is just an estimate. What we are concerned with is whether or not the aquifer has the capacity to carry on for the city of Minot until the second phase is built.

Would it, under normal progression?

Mr. HOISVEEN. Yes, sir. We feel there is certainly an adequate supply, 6 million gallons per day. That is a conservative estimate, and the city of Minot hired a consultant to make an analysis of the data compiled by the State water commission and he indicated that he believed that as much as 10 million gallons per day could be obtained from the aquifer, and recharge, of course, would occur quite readily as a result of the areal extent of the area that feeds into the aquifer.

Senator BURDICK. We can't put an exact fix on the capacity of an aquifer, but whether it is 6 years, 7 years, or even 8 years, it is your opinion that the capacity is such that it will serve the needs until the second phase is built?

Mr. HOISVEEN. Yes, sir; I am confident it will.

Senator BURDICK. I think you described the extent to which the tests were made and based upon your knowledge as expert in this field, it is your opinion that the aquifer is going to be adequate to all the needs of Minot until the second phase is built?

Mr. HOISVEEN. That is correct, sir, and we have methods, too, that if necessary, water could be entrained into the aquifer if need be.

As first vice president of the National Water Resources Association, I would like to state that the association has gone on record and is in full support of the project herein mentioned, and another significant item I believe, is that the Bureau of the Budget has commended the city of Minot for its initiative in financing the part of the capital costs of the project.

I think that is quite a commendation, coming from the Bureau of the Budget, sir.

Senator BURDICK. I would say that you are right.

Thank you for your testimony.

Our next witness is Mr. Roy Holand, Garrison Conservancy District. We are glad to welcome you to the committee, Mr. Holand, and you may proceed.

STATEMENT OF ROY HOLAND ON BEHALF OF THE GARRISON CONSERVANCY DISTRICT

Mr. HOLAND. Mr. Chairman and members of the committee, my name is Roy Holand, of La Moure, N. Dak. I serve as the chairman of the 25-county Garrison Conservancy District, the political subdivision

in the State of North Dakota established by the State legislature in 1955 to be concerned with the development and operation of the Garrison diversion unit.

Mr. Vernon Cooper, manager of our district, is here with me and joins me in this statement.

In my statement, which incidentally I would like to file, I would like to summarize very briefly.

Senator BURDICK. The full statement will be made part of the record, without objection.

(The statement referred to follows:)

STATEMENT OF ROY A. HOLAND, LA MOURE, N. DAK., CHAIRMAN, AND VERNON S. COOPER, CARRINGTON, N. DAK., MANAGER, GARRISON DIVERSION CONSERVANCY DISTRICT

Mr. Chairman and members of the committee, my name is Roy A. Holand of LaMoure, North Dakota. I serve as the Chairman of the 25-county Garrison Diversion Conservancy District, the political subdivision in the State of North Dakota established by the State Legislature in 1955 to be concerned with the development and operation of the Garrison Diversion Unit. Mr. Vernon Cooper, Manager of our District is here with me and joins me in this statement.

First, I wish to express our most sincere appreciation to you for scheduling this hearing on S. 2808 which would provide for the authorization of the Minot Extension of the Garrison Diversion Unit. The Minot Extension is most important to the City of Minot and to the Garrison Diversion Unit, and we are indeed grateful for the opportunity to join in the presentation of the case in support of this bill.

The Garrison Diversion Unit, which was authorized in 1965 and is now under construction, will provide a plentiful supply of good water for a number of purposes that will enhance the economic growth and stability in a large area of North Dakota. An important project purpose is that of providing a water supply to a number of cities in the project area for municipal and industrial use. The City of Minot is the largest city of those listed in the project report as potential municipal water customers of the project and is, without question, the city in the area with the most critical water supply problem. The water supply that can be made available to the City of Minot through the Garrison Diversion Unit and the Minot Extension of that project can provide a permanent solution to this problem.

The Garrison Diversion Conservancy District is the overall entity in the State of North Dakota concerned with the Garrison Diversion Unit. The District represents all water users who will be dependent on a single source of water and supply system. The District reaches out to include both the direct and indirect project beneficiaries and provides a means whereby they share in the project costs. Our Conservancy District has contracted with the United States for the Garrison Diversion Unit and the operation of project facilities. At the present time we are levying a tax of 1 mill on all property within the District to meet our obligations under this contract. In addition to the Conservancy District's contract, other entities, including irrigation districts, park districts, and municipalities, have contracted or will contract with the United States and the Conservancy District for those portions of the project facilities that are necessary to serve those specific project purposes or areas. The operation of the project will be the responsibility of the Garrison Diversion Conservancy District and the various water user entities.

Although irrigation is the principal purpose of the Garrison Diversion Unit, others are very important. The Garrison Diversion Conservancy District recognizes this fact and, through various actions, it has consistently advocated and sought the development of the recreation, fish and wildlife, and municipal and industrial water features of the project, as well as those related to irrigation. We feel each project function is vital and should be provided so that the full measure of benefits will accrue to the State and Nation from the investment in the Garrison Diversion Unit.

The authorized project plan for the Garrison Diversion Unit provides for the canal side delivery of water to 14 municipalities and 4 industrial areas. In the case of Minot, which is one of these 14 municipalities, the water supply would be available at one of the project's main supply canals—the Velva Canal. The Minot

Extension, which would provide for the facilities for the delivery of water from the Velva Canal to the city's water plant, is not a part of the authorized Garrison Diversion Unit. However, the Minot Extension is dependent upon the Garrison Diversion Unit and a substantial portion of the municipal and industrial water benefits of the Garrison project are associated with Minot. About 30% of the costs of the Garrison Diversion Unit allocated to municipal and industrial water have been assigned to the Minot Extension.

The facilities for the Minot Extension are multiple-purpose in nature and will not only bring a municipal water supply to the city but will also provide certain recreation and fish and wildlife benefits. Because of the close relationship of the Garrison Diversion Unit and the Minot Extension, and the importance of these projects to each other, our Board of Directors did, on July 18, 1969, give its letter of intent to assume or arrange for the assumption of one-half of the separable capital costs of the Minot Extension associated with recreation and fish and wildlife enhancement and the operation and maintenance costs of these purposes, as is required by the Federal Water Recreation Act (79 Stat. 213). The total amount of these capital costs of the Minot Extension, for which the Conservancy District would be responsible, is \$607,000. Annual operation and maintenance costs associated with recreation and fish and wildlife are estimated to be \$86,000 at full development.

Because the Garrison Diversion Unit and the Minot Extension are so closely related, our District feels that it will be to the advantage of all parties concerned if the operation of the Minot Extension be integrated into the operations of the Garrison Diversion Unit to the greatest possible extent. We will direct our efforts to working out such an arrangement at an appropriate time.

The plan that has been developed for the Minot Extension, by the Bureau of Reclamation, incorporates provision for developing an interim water supply from a groundwater source that can take care of the city's requirement until the Velva Canal of the Garrison Diversion Unit is constructed and a water supply from the Garrison project is available. Our District fully endorses this concept and proposal.

Our District's Board has expressed its support for authorization of the Minot Extension of the Garrison Diversion Unit through resolutions on several occasions. A copy of the most recent resolution, which was adopted on April 9, 1970, is attached to my statement.

We most respectfully and sincerely request and urge your favorable consideration of S. 2808, which would authorize the Minot Extension of the Garrison Diversion Unit.

Thank you.

Mr. HOLLAND. I would wish to call to your attention particularly to the statements that we make on page 3 indicating that the facilities for the Minot extension are multiple in purpose.

It will not only bring a municipal water supply to the city but will also provide certain recreation benefits. Because of the close relationship of the Garrison division unit and the Minot extension, and the importance of these projects to each other, our board of directors did on July 18, 1969, give its letter of intent to assume or arrange for assumption of one-half of the separable costs of the Minot extension associated with the recreation and fish and wildlife enhancement and the operation and maintenance costs of these purposes, as is required by the Federal Water Recreation Act.

Senator BURDICK. Do you have a resolution and will you file it with the committee?

Mr. HOLLAND. Yes; it will be filed with the committee.

Senator BURDICK. It will be received as part of the record.

Mr. HOLLAND. Our district feels that it would be to the advantage of all parties concerned if the operation of the Minot extension would be integrated into the operations of the Garrison diversion unit to the fullest extent possible.

We will direct our efforts to working out such an arrangement at an appropriate time.

The plan that has been developed for the Minot Extension by the Bureau of Reclamation incorporates provision for developing an interim water supply which has been fully reviewed here by this committee.

Our district board has expressed its support for acquisition of the Minot extension and the Garrison diversion unit through various resolutions on several occasions.

Its most recent resolution which was adopted on April 9, 1970, is attached to my statement.

(The document referred to follows:)

RESOLUTION URGING THE EARLY AUTHORIZATION OF THE MINOT EXTENSION, GARRISON DIVERSION UNIT, INCLUDING THE PLAN FOR THE INTERIM SUPPLY ADOPTED BY THE BOARD OF DIRECTORS, GARRISON DIVERSION CONSERVANCY DISTRICT, APRIL 9, 1970

Whereas, the Board of Directors of the Garrison Diversion Conservancy District did, on July 17, 1969, by resolution duly adopted, urge the early authorization of the Minot Extension of the Garrison Diversion Unit, which Extension would provide the necessary facilities whereby a municipal water supply could be furnished to the City of Minot from the Velva Canal of the Garrison Diversion Unit; and

Whereas, as a supplement to the plan for the Minot Extension of the Garrison Diversion Unit, the Bureau of Reclamation has developed a plan whereby an interim supply of water from underground sources could be made available to the City of Minot that could temporarily supply the City's needs until the Velva Canal is constructed and placed in operation and a permanent supply would be available from the Garrison Diversion Unit; and

Whereas, a portion of the facilities that will be required to provide the City of Minot an interim water supply from this groundwater source are a part of those included in the plan for the Minot Extension of the Garrison Diversion Unit: Now, therefore, be it

Resolved by the Board of Directors of the Garrison Diversion Conservancy District, That this Board reaffirms its support for the early Congressional authorization of the Minot Extension of the Garrison Diversion Unit and construction of the facilities for this Extension, and further urges that such authorization include provision for the development of the interim supply from groundwater sources, as set forth in the report of the Bureau of Reclamation on such interim supply, to serve the City until a supply of water from the Garrison Diversion Unit will be available from the Velva Canal; and be it further,

Resolved, That a copy of this resolution be forwarded to Senators Milton R. Young and Quentin N. Burdick and Representatives Mark Andrews and Tom Kleppe.

ROY A. HOLAND,
Chairman, Garrison Diversion Conservancy District.

Attest:

VERNON S. COOPER,
Secretary, Garrison Diversion Conservancy District.

[SEAL]

Mr. HOLAND. In conclusion, I wish to state on behalf of the board of directors of the Garrison Conservancy District that we most respectfully request and urge your favorable consideration of S. 2808, which would authorize the Minot extension of the Garrison diversion unit.

Thank you.

Senator BURDICK. I want to thank you for your testimony and the cooperative spirit and action on the part of the conservancy district.

It is certainly appreciated by this committee.

Mr. HOLAND. Thank you.

Senator BURDICK. That completes the oral testimony. Now we have a series of statements to be made part of the record.

The next statement is a statement of our Governor, William L. Guy, of North Dakota. It will be made part of the record at this point.
(The statement referred to follows:)

STATEMENT OF HON. WILLIAM L. GUY, GOVERNOR OF THE STATE OF NORTH DAKOTA

Mr. Chairman and committee members, I thank you for the opportunity to appear before you. I testify to your committee as Governor of North Dakota and as Chairman of the North Dakota State Water Commission. I am appearing in behalf of the city of Minot, asking that your committee give favorable consideration to the proposal to furnish water for the city of Minot.

North Dakota is a rural state. Our state has been losing population during the past ten years. Minot showed only a slight gain in population in spite of the fact that the Minot Air Base is located near the city. I am convinced that this is due, in part, to a lack of a dependable and adequate water supply for the city of Minot.

Potable water is an absolute essential for any city. Its availability can control so much economic activity and residential living, that it cannot be ignored. To deny a city an adequate source of water is to deny it a major and necessary ingredient for city rejuvenation and growth.

Minot has been short of water for a number of years. It has been painfully aware that it is walking too close to the brink of disaster. Minot has been forced to ration water for some time now.

As Governor, I have been asked to intercede, on five different occasions, with the Bureau of Sport Fisheries and Wildlife to secure releases from their federally controlled water impoundment behind Lake Darling Dam to make a small quantity of water available to Minot. All of the water in Lake Darling is committed by a water right held by the Bureau of Sport Fisheries and Wildlife. They are extremely reticent in weakening that water right by sales to the city of Minot.

It is understandable why the Bureau of Sport Fisheries and Wildlife is as nervous about the limited water supply as is the city of Minot. In the four-year period between 1935 and 1938, over half of the months, or in 26 out of the 48 months, there was zero flow in the Souris River.

Minot has been augmenting its supply of Souris River water from an aquifer which has been overdrawn. The Souris River does not have sufficient water to renew this overdraw. This has caused Minot to suffer a serious drawdown in its groundwater supply.

The alternatives that have shown any promise at all to increase the water supply for Minot have not been satisfactory. Either they did not provide sufficient water, or the cost of sufficient water was too high, or the timetable for completion of a sufficient supply was too far in the future.

As Governor of North Dakota, I urged the State Water Commission to make additional ground-water studies in the Minot area. In a joint project with Minot, such studies were made and the results have been successful. A vast underground aquifer has been located. Conservative estimates state that this supply would be adequate to furnish water for Minot at least through 1980 under present projections of growth.

This appears to be the best alternative to satisfy the very urgent need for water to Minot. However, the development of a new source of dependable water supply for a city the size of Minot is very costly.

This drain on the city's finances comes at a time when Minot has not yet recovered from devastating, widespread flooding these past two springs. The massive flood damage has virtually exhausted Minot's financial resources and has made it necessary for that city to seek assistance to finance an additional source of water supply.

Therefore, I urge Congress to authorize an installation of the interim water supply for the city of Minot as soon as possible. If this is done, it would provide additional water so that Minot can remain an active community and can continue to grow in the manner in which we must expect our regional centers to grow if we are to be successful in absorbing our share of a rapidly increasing United States population.

Senator BURDICK. The statement by Russell Dushinske, North Dakota Water Users Association, will be made part of the record at this point.

(The statement referred to follows:)

STATEMENT OF RUSSELL L. DUSHINSKE, EXECUTIVE VICE PRESIDENT, NORTH
DAKOTA WATER USERS ASSOCIATION

Mr. Chairman and members of the committee, my name is Russell L. Dushinske. I am Executive Vice President of the North Dakota Water Users Association and also a member of the North Dakota Water Commission. The North Dakota Water Users Association is a voluntary, non-profit, non-taxing organization of over 2,300 citizens who are united to "actively foster, promote and support the orderly execution of any program or project for the development, management and beneficial use of land and water resources in North Dakota."

The Water Users Association was organized 12 years ago in a merger of the North Dakota Reclamation Association and the Missouri-Souris Projects Association. Both predecessor organizations had as their prime objective the diversion of water from the Missouri River to bring water supplies to farmlands, municipalities and industries, plus bringing assured water supplies to lakes and streams in a large area of the State.

Since the beginning of the organized effort over 40 years ago, municipalities have solidly supported the project, realizing that only through diversion of the Missouri would their needs be satisfied. Always in the forefront of the promotion was the City of Minot and its citizens who have long battled the problem of inadequate supplies.

Minot is one of the 14 cities which has requested water in the initial phase of the Garrison Diversion Unit. In fact, Minot is a major entity in the municipal and industrial phase of the project as approximately one-third of the total supplies and costs of the M. and I. water is allocated to Minot.

In a statement made October 7, 1959, before the Senate Select Committee on National Water Resources of the Eighty-Sixth Congress at Bismarck, North Dakota, the Honorable W. M. Harrington, then Mayor of the City of Minot, gave an extensive review of Minot's water problems. Mr. Harrington noted then that "for the past fifty years the City of Minot has endeavored to provide its citizens with an adequate supply of good drinking water."

Since that time, the problems has increased immeasurably. The plans of the Bureau of Reclamation and the State Water Commission for the interim supply and for the permanent solution through the Minot Extension of the Garrison Diversion Unit appears to be the only logical solution.

The North Dakota Water Users Association urges your favorable consideration of this project as a sound federal investment in the future of the City, the State and the Nation.

Thank you.

Senator BURDICK. Next, the statement by Oscar Berg, Mayor's Committee on Water Problems of the City of Minot. That will be made part of the record.

(The statement referred to follows:)

STATEMENT OF OSCAR N. BERG, CHAIRMAN OF THE MINOT MAYOR'S COMMITTEE ON
MINOT'S WATER PROBLEMS

Mr. Chairman and members of the committee, I am Oscar N. Berg from Minot, North Dakota. I represent the Mayor's Committee on Minot's Water Problems as its Chairman.

Mayor C. D. Johnson in May of 1968, named me as Chairman of a committee comprised of 26 leading citizens, representing a cross-section of business, professional people and labor, to evaluate Minot's municipal water problem, which had plagued the city for almost half-a-century.

Rationing during the summer months had become common-place because of an inadequate water supply. This retarded the growth and progress of the community and caused mental anguish on the part of our citizens.

One of the major problems confronting the committee was the high water rates that Minot water users were already paying. Secondly, was to discover a source of water within the capability of the Minot community to underwrite in additional charges.

Meetings were held with the Bureau of Reclamation; The U.S. Corps of Army Engineers; the U.S. Bureau of Sport Fisheries and Wildlife; the U.S. Geological Survey; the North Dakota State Water Commission and other agencies which could have a part in solving Minot's water supply dilemma. A special

committee of local financial leaders was appointed by the committee to evaluate the economics of the various proposals.

Our group, after considerable analysis and research, endorsed a plan for an interim supply from an underground aquifer. This to solve temporarily the problem until the Velva Canal extension of the Garrison Diversion irrigation project becomes a reality when Missouri River waters will be made available.

The need is urgent. Our community serves a tremendous trade area, both as a wholesale and retail center. In addition thereto, our medical facilities and professional services, together with the Minot State College, which has an enrollment exceeding 3,000 students, creates a challenging problem when water usage is restricted.

In addition to the above, the Minot water system supplies the Minot Air Force Base. This is one of the most important installations for defense purposes on the northern boundaries of our country.

The members of the Mayor's Committee hopes this committee will give favorable consideration to legislation and appropriations that will assist in solving our problem on an interim basis until we have Missouri River waters available from the Velva Canal. The committee membership believes that it will have business, cultural and environmental values that will be of benefit to the community. We make this plea to you, not requesting a grant or charity, because we commit our water users to repay all of the expenditures by the federal government in this enterprise on an amortized basis. Favorable action I know, will be deeply appreciated by all of Minot's citizens.

Thank you.

Senator BURDICK. Next, a statement by Jack C. Bone, on behalf of the Minot Mayor's Committee on Minot's Water Problems on construction of the Minot extension of the Garrison diversion unit in North Dakota.

(The statement referred to follows:)

STATEMENT OF JACK C. BONE, NEWSPAPERMAN AND MEMBER OF THE MINOT MAYOR'S COMMITTEE ON MINOT'S WATER PROBLEM

Mr. Chairman and members of the subcommittee, my name is Jack C. Bone. I am assistant to the editor of the Minot Daily News and have been covering water projects affecting the state of North Dakota for 24 years.

If there has been one plus factor in the disastrous flood of 1969 followed by the nearly disastrous flood of 1970, it was the brief reprieve it gave the City of Minot from a problem equally as disturbing.

Increased flows in the Souris River and a recharge of underground water supplies following the two years of flooding should bring a year's delay in the arrival of an acute water shortage. Any hope, however, that the stay of execution would extend beyond that date is daydreaming because high flows in the Souris River have been the exception rather than the rule.

Minot's long standing water problems have been linked with the river ever since the city first provided a municipal supply. From 1900 to 1916, the city relied entirely on the Souris River for its water supply. From 1916 to 1949, it relied entirely upon wells located in an aquifer below the city which depended to a large extent on the Souris River to recharge it.

From 1949 to the present time, the city has utilized water both directly from the river and from wells and since the mid-sixties has used river water when available to pump into a recharge area to keep its well field from being further "mined".

The "mining" process actually started soon after the city began taking its supply from wells. By 1936, the total decline in the 1915 water level was about 27 feet. By 1946, the total decline was 39 feet. In 1959, it was 52 feet. By 1963, it was more than 70 feet below the original level. Since then the recharge program, coupled with rigid rationing in periods of high use—beginning in 1950—have held the water level fairly constant. A gain of 5-10 feet came after the floods.

As early as the 1920s, Minoters were aware of the transitory nature of their water supply.

In 1927, Elwyn F. Chandler, dean of the College of Engineering at the University of North Dakota and hydraulic engineer for the U.S. Geological Survey, prepared a plan for diverting the water of the Missouri River into the Souris and eventually on to Devils Lake.

He chose the Souris as the first recipient of the Missouri River water because of its recurring low flows, endangering water supplies for Minot and other communities it served.

"That river has occasional large floods," he reported, "but its average flow is less than 400 cubic feet a second." He felt that limited flow handicapped the growth of communities and of agriculture.

Another Missouri River diversion plan prepared in 1933 for the Missouri River Diversion Association by the Burns and McDonnell Engineering Co. of Kansas City, Los Angeles and Cincinnati also took note of the water needs of Minot on the Souris River.

That report noted that Minot was dependent upon the underflow of the Souris River for its water supply and made a point of the fact that the quality of water from wells at Minot left much to be desired because of its "taste, odor and color."

Through large investments in treatment facilities Minot has raised greatly its water standards but it remains, as always, dependent upon the unpredictable Souris River for its water supply.

By the mid-50's Garrison Reservoir became a possible new source but a preliminary study of the costs to the city for a 42 mile pipeline and extensive pumping installations ruled that course out as beyond the city's ability to finance.

Meanwhile, the city has continued to count heavily on diversion of Missouri River water to resolve its shortage problem. Both the initial Missouri Souris project, with diversion from Fort Peck, and the project which replaced it, Garrison Diversion, recognize Minot's urgent need for water.

In fact, Minot was so deeply concerned about its water supply needs when the change in the project was made it prevailed upon Gov. Norman Brunsdale in 1952 to call a meeting of representatives of the Bureau of Reclamation, Army Corps of Engineers, State Water Commission, North Dakota Reclamation Association, the Missouri Souris Projects Association and the Greater North Dakota Association to make it clear beyond any doubt that the city wanted its right to municipal water preserved in the new project design.

It was, and Minot is charged with repayment of more than \$4 million of the Garrison Diversion costs (in addition to its own water supply costs) based on its water benefit.

However, the date for the delivery of that water has been moved back and back. Initially, Minot expected water by the early 1960s, then the mid-1960s as funding for reclamation projects declined, then the late 1960s. Later Bureau of Reclamation estimates placed the year of delivery as 1971, then 1972 and 1974. There is no present estimate but it is highly unlikely that Garrison Diversion water will be available before 1978, a date too late to gamble on. A dry year would put the city and the Minot Air Force Base in a desperate position.

Since 1959, the city has been working closely with the State Water Commission and subsequently with a former USGS hydrologist in locating and substantiating a good underground interim water supply. That supply has been found. Please work with us to develop it as a fully repayable interim project until Garrison Diversion water comes our way.

Senator BURDICK. A statement by Norman L. Peterson, director of the Division of Water Supply and Pollution Control of the North Dakota State Department of Health.

(The statement referred to follows:)

STATEMENT OF NORMAN L. PETERSON, DIRECTOR, DIVISION OF WATER SUPPLY AND POLLUTION CONTROL, NORTH DAKOTA STATE DEPARTMENT OF HEALTH, BISMARCK, N. DAK.

Mr. Chairman and members of the subcommittee, this statement is being filed by Norman L. Peterson, Director, Division of Water Supply and Pollution Control of the North Dakota State Department of Health, Bismarck, North Dakota.

The North Dakota State Department of Health has long recognized that the City of Minot has been experiencing a problem relative to the adequacy of its city water supply. This problem has become increasingly serious as the city population and demands for water increase.

It should be pointed out that any city's water supply is the keystone to the development of the city and is vital to the continued health and welfare of its residents. An inadequate or limited supply of water for the residents not only inhibits normal city growth but is correspondingly detrimental to the

health and welfare of its citizens. The State Department of Health is seriously concerned about this matter, especially as it relates to the health of the residents of the City of Minot.

This department is of the opinion that the Minot Extension of the Garrison Diversion Project will provide a permanent solution to the city's water problem and we urge that the city take all necessary steps to bring this project to reality. However, because it is recognized that the Diversion Project is necessarily a few years away from possible completion, the city will need to take steps to obtain an interim supply to meet the immediate water needs of the city. The State Health Department believes that the City of Minot should obtain an adequate supply of water at the earliest possible date and it respectfully requests this committee to develop a favorable recommendation for the authorization of the Minot Extension of the Garrison Diversion Unit which contains provisions for an interim water supply pending completion of the Velva Canal.

Senator BURDICK. A statement by Norman Brunsdale, a former Governor of the State of North Dakota will also be made part of the record at this point.

(The statement referred to follows:)

STATEMENT OF C. NORMAN BRUNSDALE, FORMER NORTH DAKOTA GOVERNOR AND
U.S. SENATOR

Mr. Chairman and members of the committee, I am C. Norman Brunsdale from Mayville, North Dakota. I served in the North Dakota Senate from 1927-1935 and again from 1940-1951. I was elected and served as Governor from 1951-1957. I served as a member of the U.S. Senate from November 1959 to August 1960. These years of public service provided me with a first hand experience and knowledge of the urgent needs of North Dakota municipalities for additional water supplies for both domestic and industrial uses.

In 1952 when the Missouri-Souris project proposed for eastern Montana and northwestern North Dakota had to be abandoned because of soil conditions, I as Governor called a meeting of federal, state agencies and North Dakota water oriented organizations, recognizing the urgency of inducing the Bureau of Reclamation to explore new areas for irrigation development. This was based upon my feeling that North Dakota had sacrificed over five hundred thousand acres of valuable ranch, farm and bottomlands in the Missouri River valley to provide water storage for the Garrison reservoir. North Dakota's compensation was to be irrigation of one million acres of farmland. In addition thereto, I personally recognized the need of Minot and many other municipalities, for additional water supplies if these communities were not only to survive, but to grow in population.

The Bureau of Reclamation succeeded in finding new land areas suitable for reclamation development. It was my thinking that the Garrison Diversion irrigation project, when authorized, provided for industrial and municipal water supplies for our urban communities, particularly Minot. It was with deep regret that I learned that this feature was not included in the legislation. Thus I think it essential that this Committee consider favorably the passage of this bill.

Minot was suffering from an inadequate water supply in 1952 and that is almost two decades ago. It has grown in population and this has created additional problems.

In addition thereto, the Minot Air Force Base, which is one of the most important strategic defensive installations on the northern perimeter of our country, derives its water supply from the Minot system.

I sincerely request and hope that you will give favorable consideration to this most important proposal. I think it is not only in the interest of the Minot community, but the State of North Dakota and our nation.

Thank you.

Senator BURDICK. A statement by David R. Laurent, manager of the Minot Chamber of Commerce, will be made part of the record.

(The statement referred to follows:)

STATEMENT OF DAVID R. LAURENT, MANAGER, MINOT CHAMBER OF COMMERCE,
MINOT, N. DAK.

Mr. Chairman and members of the committee, my name is David R. Laurent and I am Manager of the Minot Chamber of Commerce, Minot, North Dakota.

With the exception of the depression years of the 30's, Minot has enjoyed a steady growth in population since its founding in 1887. Recently, however, the 1970 census revealed that Minot has dropped from 3rd to the 4th largest community in the State of North Dakota with a population of 32,164. Not included in those statistics are five residential areas outside the corporate limits of the city with an estimated population of 2000. Annexation would be virtually impossible without an additional water supply. Many of our community leaders believe we are now experiencing an economic "stalemate" condition, a condition that could be improved with an additional water supply for the City of Minot.

The insufficient water available for industrial, commercial and human consumption, has seriously hampered the future economic development of our community—an economy based primarily on agriculture, livestock and mineral resources.

Minot as a retail and wholesale center for a trade territory of 150,000 people is in critical need of an adequate water supply to provide the major water users of our area:

(1) *Minot Air Force Base.*—The City of Minot provides water to the Minot Air Force Base located 15 miles north of Minot with a population of 16,216.

(2) *Minot State College.*—A four year liberal arts college with an enrollment of 2700 students. Minot State College is the major water user within the corporate limits of the city.

(3) *Medical Center.*—There are three major hospitals located in the city serving the Minot trade area and the Minot Air Force Base.

(4) *Industrial Development.*—Not only is Minot hampered in attracting new industry, but is already experiencing problems supplying local industry with their water needs. In the area of air conditioning alone, restrictions must be imposed on commercial businesses because of an insufficient water supply.

Equally important to the future growth of Minot are the social, cultural and the recreational factors which are dependent on an adequate water supply. The health and safety of our citizens and the environmental quality of our area are of prime concern to us.

Because of the congestion and confusion caused by a concentration of people in major cities throughout the country, steps are being taken nationally to accelerate a more rapid development of "rural America." Because of the availability of labor, land and a variety of other attractions, we have every reason to believe that our community will grow and prosper. It is unfortunate, however, that an inadequate water supply has temporarily hindered the progress of our community.

We are confident that you will give serious consideration to our request for an immediate authorization and appropriation for an interim water supply for our community as well as for the Minot extension of the Garrison Diversion Unit.

Senator BURDICK. Another statement by Harold C. Brunner, chairman of the Minot Urban Renewal Agency, together with a statement by Henry A. Hendrickson, chairman of the Souris-Red-Rainy River Basins Commission, will be made a part of the record also.

(The statements referred to follow:)

STATEMENT OF HAROLD C. BRUNNER, CHAIRMAN OF MINOT URBAN RENEWAL AGENCY

Mr. Chairman and members of the committee, my name is Harold C. Brunner. I live at Minot, North Dakota and at present am serving as Chairman of the Minot Urban Renewal Agency.

I want to submit in behalf of our group, a statement in support of the Minot Extension of the Garrison Diversion Unit because of the dire need for either an interim or permanent water supply for my community. We have experienced rationing of this most precious resource during thirteen summer seasons in the last twenty years. This has caused a deterioration in the physical beauty of our homes and much anguish on the part of our citizens.

I think it is imperative for any community with any hope for growth, both in population and culturally, to possess an adequate, if not abundant water supply. The adoption by this Committee of this proposal will contribute to the well-being of our community and its citizens for years to come on a permanent basis because of an adequate water supply that is within the capabilities of our water users to underwrite in repayment.

The Minot Urban Renewal Agency contemplates an expenditure of ten to twelve million dollars in partnership with the federal government during the forthcoming five years. An adequate water supply will enhance our joint investment and assure our City of retaining its status as an excellent wholesale and retail service center for an exceedingly large trade area.

It will also have cultural and environmental values that are most difficult to measure in monetary evaluations.

Thank you.

STATEMENT OF H. A. HENDRICKSON, CHAIRMAN OF THE SOURIS-RED-RAINY RIVER BASINS COMMISSION

I am Chairman of the Souris-Red-Rainy River Basins Commission.

The following represents a statement of my position on the recommended Minot Extension of the Garrison Unit. The statement does not represent an official project indorsement by the Basins Commission.

The search for water to supply the Citizenry and Industrial needs for the City of Minot has continued for the past 40 years.

The problem has been compounded in the past decade since the construction of the Minot Air Force Base which increased the population by some 1,500 persons, along with accompanying water needs consistent with the operation of the largest Air Force Base in America.

The strain on meager water supplies and the rapid depletion of existing acquifers has caused an annual program of City wide water rationing each succeeding year.

Municipal and Industrial water supply is an integral part of the Garrison Unit and the Velve Canal will serve such a purpose to the City of Minot.

Although our Framework Plan has not been fully formulated to date, our Appendix for Municipal and Industrial and Miscellaneous Water Requirements recognizes the need for improvement, generally consistent with the plans recommended for construction by the Bureau of Reclamation in its report now being considered by Congress for possible inclusion in authorizing legislation. Thus at this time I foresee no conflict between the improvements proposed by the Bureau of Reclamation and the Framework Plan we will ultimately recommend for the Souris-Red-Rainy Region.

In view of the critical water shortage in the City of Minot along with the fact that a substantial portion of this appropriation is re-imbursable, I urge early authorization of the proposed works and their most expeditious construction.

Senator BURDICK. And, finally, the statement of Mr. S. L. Olsen, executive director of the Minot Industrial Development Corp., will be made a part of the record at this point.

(The statement referred to follows:)

STATEMENT OF S. L. OLSEN, EXECUTIVE DIRECTOR, MINOT INDUSTRIAL DEVELOPMENT CORP., MINOT, N. DAK.

Mr. Chairman and members of the committee, my name is S. L. Olsen and I serve as the Executive Vice President of the Minot Chamber of Commerce and the Executive Director of the Minot Industrial Development Corporation in Minot, North Dakota.

The lack of an adequate water supply has historically plagued Minot's economic development. This has been especially true in the area of industrial development, both in the past and at the present time.

Minot has always recognized and appreciated its agricultural economy and we have recognized also the fact that it would be necessary for us to diversify our economy. The railroad industry in Minot, in the past, has supplemented our agricultural economy with employment in past years that peaked at 3000. We saw this number dwindle down to the present six to eight hundred people in the Minot division. Also, the advent of the Minot Air Force Base was a great impetus

to our agricultural economy. We have, in the past, recognized the fact that the railroad employment would dwindle and there is always the possibility of the loss of the Minot Air Force Base to our economy.

Recognizing these problems, we, in Minot, have tried to carry on a vigorous program of industrial development. However, we have learned from experience over the past years that our inadequate and unstable water supply has been a great deterrent to our inducing industry to locate in this area. The enthusiasm of the people of Minot to diversify their economy through industrial development has always been great, but was probably best exhibited by the recent Industrial Fund Drive that was held in our community in 1968. That Fund Drive raised a total of \$800,000 in pledged funds for a five year industrial development program.

I am certain that a great deal of the success of that Fund Drive can be attributed to the fact that Minot and North Dakota could look forward to the start of the Garrison Diversion Irrigation project and that sometime in the future, through this project, we would have an adequate municipal water supply.

We can cite the loss of specific industries to our community because of our inadequate water supply. The oil refineries located in North Dakota, the salt plant located in our state and more recently, several other industries have not considered us because of their knowledge of our historical lack of adequate water.

The 1970 preliminary census figures indicate once again, that our state has lost population. Minot, of the four larger communities in the state had the slowest rate of growth. We attribute this slow rate of growth to our inability to attract industry primarily because of inadequate water supply. We have, over the past years, been unable to retain the young people in our communities because of the lack of job opportunities that could be afforded these young people through industrial development.

We feel confident that we possess, in our community, all the necessary elements to attract industry, such as adequate financing, large quantities of inexpensive properly zoned industrial land, and excellent trainable labor force and numerous tax incentive programs. However, to reiterate, we lack one important element that is of immediate need—an adequate water supply.

We, therefore, respectfully request that this committee consider the authorization and the necessary appropriation for the approval of the Minot extension of the Garrison Diversion Unit of the Missouri River Basin Project in North Dakota. The approval of this project will eventually solve our water problems but we cannot overemphasize the importance of an interim water supply as a solution to our problem until the Minot extension of the Diversion project is completed.

We have all heard numerous commentaries on the need for the dispersal of the population in the United States from our metropolitan centers and we, in Minot, feel that our community can aid in the solution of this problem through an industrial development program. However, we need to find a solution to the one missing ingredient to make this program successful—that is, an adequate water supply.

Senator BURDICK. Are there any other witnesses in the hearing room today that would like to be heard?

Are there other statements that should be made part of the record at this time?

If not, the meeting is adjourned.

(Subsequent to the hearing the following letters were received:)

U.S. SENATE,
COMMITTEE ON THE JUDICIARY,
Washington, D.C., July 8, 1970.

HON. HENRY M. JACKSON,
Chairman, Interior and Insular Affairs Committee,
U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: I would deeply appreciate that the enclosed July 2, 1970, and July 18, 1969, letters from Vernon S. Cooper of the Garrison Diversion Conservancy District be included in the formal hearing record on S. 2808, the Minot Extension of the Garrison Diversion Unit.

With kind regards, I am,
Sincerely,

QUENTIN N. BURDICK.

GARRISON DIVERSION CONSERVANCY DISTRICT,
Carrington, N.D., July 2, 1970.

HON. QUENTIN N. BURDICK,
U.S. Senate,
Washington, D.C.

DEAR QUENTIN: During the course of the hearing before the Water and Power Resources Subcommittee of the Senate Interior and Insular Affairs Committee hearing on the Minot Extension of the Garrison Diversion Unit, I believe Roy Holand was asked to submit a copy of the Letter of Intent that the Garrison Diversion Conservancy District had given indicating an intent to assume one-half of the recreation and fish and wildlife capital costs of the project. A copy of this letter is enclosed.

Sincerely,

VERNON S. COOPER, *Manager.*

[Attachment]

GARRISON DIVERSION CONSERVANCY DISTRICT,
Carrington, N.D., July 18, 1969.

MR. HAROLD ALDRICH,
Regional Director, Region 6, U.S. Bureau of Reclamation,
Billings, Mont.

DEAR MR. ALDRICH: In connection with the authorization, construction, and development of the Minot Extension, Garrison Diversion Unit, North Dakota, of the Missouri River Basin Project, it is the intent of the Garrison Diversion Conservancy District to agree to administer, in accordance with the Federal Water Project Recreation Act (PL 89-72), the land and water areas of said Minot Extension of the Garrison Diversion Unit devoted to recreation and fish and wildlife enhancement. It is the further intent of the Garrison Diversion Conservancy District to assume, or arrange for the assumption of, one-half of the separable capital costs associated with the recreation and fish and wildlife enhancement of said project and for all the operation, maintenance, and replacement costs associated with these project purposes, provided that the Garrison Diversion Conservancy District retains the right to review and approve the facilities and development proposed for the recreation and fish and wildlife features of the project before such facilities are installed, and their installation will be determined by the demand and need for them.

This letter of intent has been approved by appropriate action of the Board of Directors of the Garrison Diversion Conservancy District at its regular meeting on July 17, 1969.

Yours very truly,

VERNON S. COOPER, *Manager.*

GREATER NORTH DAKOTA ASSOCIATION,
NORTH DAKOTA STATE CHAMBER OF COMMERCE,
Fargo, N. Dak., June 24, 1970.

HON. QUENTIN N. BURDICK,
U.S. Senate,
Washington, D.C.

DEAR QUENTIN: The feasibility study justifying the construction of the Garrison Diversion Irrigation Project includes the provision to provide an adequate water supply to the city of Minot. The project, as approved, calls for a pipeline from the Velva Canal to the city of Minot to provide water for municipal and industrial use.

Minot officials have advised us that they are asking for approval now of facilities to provide an interim water supply by pipeline from wells in the Souris aquifer located southeast of Minot. They advise us that they will be supported in this request by the Bureau of Reclamation, the Garrison Conservancy District, the North Dakota Water Users Association and other groups interested in water resource development in the state.

Recent census figures indicate that while Minot's population is up, the city is not growing as fast as some of our other regional service centers. This could, at least in part, be attributed to the difficulty that Minot has had in finding an adequate source of water.

Minot has made substantial strides in efforts to diversify the economy in that area of the state. They launched and successfully funded the first major indus-

trial development effort in North Dakota. The Greater North Dakota Association supports the city of Minot in its request for this interim water supply and respectfully asks that you do whatever might be possible to secure favorable consideration for their request.

Sincerely yours,

R. C. CROCKETT,
Executive Vice President.

(Whereupon, at 11:05 a.m. the subcommittee adjourned, subject to call of the Chair.)



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