

Y4  
.In 8/13  
F79

1040

92/14  
IN 8/13  
F79

# FOSS RESERVOIR, OKLA.

GOVERNMENT  
Storage

HEARING  
BEFORE THE  
SUBCOMMITTEE ON  
WATER AND POWER RESOURCES  
OF THE  
COMMITTEE ON  
INTERIOR AND INSULAR AFFAIRS  
UNITED STATES SENATE  
NINETIETH CONGRESS

FIRST SESSION  
ON

**S. 1946**

A BILL TO AMEND THE REPAYMENT CONTRACT WITH  
THE FOSS RESERVOIR MASTER CONSERVANCY DISTRICT,  
AND FOR OTHER PURPOSES

AUGUST 10, 1967

KANSAS STATE UNIVERSITY LIBRARIES



Printed for the use of the Committee on Interior and Insular Affairs

U.S. GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1967

82-905



AY  
In 8/13  
7 29

COMMITTEE ON INTERIOR AND INSULAR AFFAIRS

HENRY M. JACKSON, Washington, *Chairman*

CLINTON P. ANDERSON, New Mexico  
ALAN BIBLE, Nevada  
FRANK CHURCH, Idaho  
ERNEST GRUENING, Alaska  
FRANK E. MOSS, Utah  
QUENTIN N. BURDICK, North Dakota  
CARL HAYDEN, Arizona  
GEORGE McGOVERN, South Dakota  
GAYLORD NELSON, Wisconsin  
LEE METCALF, Montana

THOMAS H. KUCHEL, California  
GORDON ALLOTT, Colorado  
LEN B. JORDAN, Idaho  
PAUL J. FANNIN, Arizona  
CLIFFORD P. HANSEN, Wyoming  
MARK O. HATFIELD, Oregon

JERRY T. VERKLER, *Staff Director*  
STEWART FRENCH, *Chief Counsel*  
ROY WHITACRE, *Professional Staff Member*  
E. LEWIS REID, *Minority Counsel*

SUBCOMMITTEE ON WATER AND POWER RESOURCES

CLINTON P. ANDERSON, New Mexico, *Chairman*

HENRY M. JACKSON, Washington  
FRANK CHURCH, Idaho  
FRANK E. MOSS, Utah  
QUENTIN N. BURDICK, North Dakota  
CARL HAYDEN, Arizona

THOMAS H. KUCHEL, California  
GORDON ALLOTT, Colorado  
LEN B. JORDAN, Idaho

# CONTENTS

---

	Page
S. 1946-----	1
Departmental reports:	
Bureau of the Budget-----	2
Interior Department-----	2

## STATEMENTS

Crider, Hon. Tom, mayor, city of Cordell, Okla.-----	60
Engleman, Charles E., president, Foss Reservoir Master Conservancy District, Clinton, Okla.-----	34
Harris, Hon. Fred R., a U.S. Senator from the State of Oklahoma.-----	14
Holum, Kenneth, Assistant Secretary for Water and Power Development, Department of the Interior, accompanied by Jack A. Hunter, Maurice N. Langley, and Charles H. Clark.-----	26, 67
Monroney, Hon. A. S. Mike, a U.S. Senator from the State of Oklahoma.-----	12
Nonast, Paul, representing the mayor of Bessie, Okla, and member of the board of directors of the city of Bessie, Okla.-----	69
Phelps, Joe, consulting engineer, Phelps, Spitz, Ammerman, & Thomas, Inc., of Oklahoma City, Okla., consulting engineers for Master Conservancy District.-----	71
Raab, Frank, representing the National Reclamation Association, Oklahoma City, Okla.-----	63
Simmons, Hon. Pete, mayor, city of Hobart, Okla.-----	66
Smith, Hon. James M., mayor, city of Clinton, Okla.-----	61
Smith, Hon. James V., a Representative in Congress from the Sixth District, State of Oklahoma.-----	20
Steed, Hon. Tom, a U.S. Representative in Congress from the State of Oklahoma.-----	25

## COMMUNICATIONS

Holum, Kenneth, Assistant Secretary of the Interior: Letter to Hon. Clinton P. Anderson, chairman, Water and Power Resources Subcommittee, dated August 15, 1967.-----	31
--	----

## ADDITIONAL INFORMATION

Bureau of Reclamation:	
Contract between the United States and the Foss Reservoir Master Conservancy District.-----	42
Amendatory contracts between the United States and the Foss Reservoir Master Conservancy District.-----	53, 56

## APPENDIX

Katz, William E., vice president, Ionics, Inc.: Letter to Hon. Clinton P. Anderson, chairman, Water and Power Resources Subcommittee, dated August 15, 1967.-----	75
---	----

# CONTENTS

1	1910-11 Departmental reports Bureau of the Budget Finance Department
STATEMENTS	
60	Bridge, Hon. Tom, majority of Goidik Oil Engeman, Charles E., president, Fox Reservoir Water Conservancy District, Indian, Okla.
61	Harts, Hon. Fred R., U. S. Senator from the State of Oklahoma Health, Assistant Secretary for Water and Power Development Department of the Interior, accompanied by Jack A. Hume, Maurice N. Lander, and Charles H. Clark
62	Lomboy, Hon. A. S., U. S. Senator from the State of Oklahoma Young, Paul, representing the Mayor of Ross, Okla., and member of the Board of Directors of the City of Ross, Okla.
63	Phelps, J. O., consulting engineer, Phelps, Stone, Zimmerman & Thomas Inc., Oklahoma City, Okla., consulting engineers for Master Conservancy District
64	Ratz, Frank, representing the National Reclamation Association, Okla. State, Okla.
65	Starnes, Hon. W. B., majority, U. S. House of Representatives Smith, Hon. James A., Representative in Congress from the State of Oklahoma
66	District of Oklahoma U. S. Representative in Congress from the State of Oklahoma
67	U. S. Representative in Congress from the State of Oklahoma
COMMUNICATIONS	
68	Hobbs, Kenneth, Assistant Secretary of the Indian Affairs to Hon. Charles R. Anderson, chairman, Water and Power Planning Subcom- mittee, House, August 15, 1967
ADDITIONAL INFORMATION	
69	Bureau of Reclamation Conflict between the United States and the Fox Reservoir Master Conservancy District
70	Membership contract between the United States and the Fox Reservoir Master Conservancy District
APPENDIX	
71	Katz, William E., vice president, United States of America, Clinton, N. York, chairman, Water and Power Resources Subcommittee, dated August 15, 1967

## FOSS RESERVOIR, OKLA.

THURSDAY, AUGUST 10, 1967

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

The subcommittee met pursuant to notice at 10:05 a.m., in room 3110, New Senate Office Building, Senator Henry M. Jackson (chairman of the full committee) presiding.

Present: Senators Jackson, Jordan, Burdick, and Allott.

Also Present: Jerry T. Verkler, staff director; Stewart French, chief counsel; Roy Whitacre, professional staff member; William Van Ness, special assistant, and Darryl Hart, assistant minority counsel.

Senator JACKSON. The Chair will turn over further proceedings now to the able chairman of the subcommittee, Senator Anderson, in connection with the next item on the agenda, S. 1946, a bill to amend the repayment contract with the Foss Reservoir and for other purposes.

The Foss Reservoir is a part of the Washita River Basin reclamation project, authorized in 1956.

Although the project is completed, the water has been of such poor quality that it cannot be used for municipal and industrial purposes.

This bill, if enacted, would provide for the construction of a 3-million-gallon-per-day water treatment plant in the Foss Reservoir. The cost would be nonreimbursable.

Before calling our first witness, a copy of the bill and any executive communications that have been received will be placed in the record. (The documents referred to follow:)

[S. 1946, 90th Cong., first sess.]

A BILL To amend the repayment contract with the Foss Reservoir Master Conservancy District, and for other purposes

*Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That, (a) for the purpose of promoting the Federal saline water conversion and the Federal water pollution control programs, the Secretary of the Interior is authorized—*

(1) to enter into an agreement with the Foss Reservoir Master Conservancy District of Clinton, Oklahoma, providing for (A) the construction by such district of a three-million-gallon-per-day plant to treat water stored in Foss Reservoir, Washita River Basin project, Oklahoma, in accordance with plans approved by the Secretary and subject to right of the Secretary to review all costs of such construction and to provide for the operation of such plant pursuant to an agreement entered into under section 2 of this Act, and (B) the amendment of the existing repayment contract with such district, numbered 14-06-500-322, dated February 14, 1958, as amended, in order to reduce the amount of the construction charge obligation under such contract by the amount of the cost of the construction of such plant; or

(2) to construct such plant with funds appropriated for the purpose of this Act.

(b) The Secretary of the Interior is authorized to provide for such additional features in such plant whether constructed pursuant to clause (1) or (2) of subsection (a), as will best promote the purposes of such Federal programs.

SEC. 2. The Secretary of the Interior is further authorized to enter into such agreements with the Foss Reservoir Master Conservancy District as may be necessary to provide for (1) the operation and maintenance of any plant constructed pursuant to the first section of this Act in such manner as will best promote the Federal saline water conversion and Federal water pollution control programs, and (2) the payment of such equitable portion of the cost of such maintenance and operation as the Secretary determines in view of the contribution of such plant to such programs.

SEC. 3. The Secretary of the Interior is authorized to relieve the Foss Reservoir Master Conservancy District (1) of the obligation of making any further construction charge payments under the contract referred to in the first section of this Act, and (2) of any interest accrual on its total obligation, until the initial delivery of water for municipal use from the plant constructed pursuant to this Act. The Secretary is also authorized (a) to refund to such district the amount of \$218,364.62 representing the amount already paid under such contract and to revise such contract by adding such amount to the obligation for future payment, and (b) to further revise such contract so that future construction charge payments will be rescheduled in a manner satisfactory to the Secretary over a period not to exceed fifty years from the date of such initial delivery of water from such plant.

---

EXECUTIVE OFFICE OF THE PRESIDENT,  
BUREAU OF THE BUDGET,  
Washington, D.C., August 10, 1967.

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

DEAR MR. CHAIRMAN: This is in reply to your letter of June 22, 1967, requesting the views of the Bureau of the Budget on S. 1946, a bill "To amend the repayment contract with the Foss Reservoir Master Conservancy District, and for other purposes."

This bill, if enacted, would authorize the Secretary of the Interior to construct a three-million-gallon-per-day desalting plant and to undertake additional measures for the purpose of improving the quality of water stored in the Foss Reservoir in Oklahoma.

The Department of the Interior, in a report it is submitting to your Committee, recommends the substitution of alternative language for the language of S. 1946. This draft language would provide for adjustments in the existing repayment contract with the Foss Reservoir Master Conservancy District to assist the District in solving its water supply problems and would authorize a Federal feasibility investigation to provide a basis for identifying alternative solutions.

The Bureau of the Budget would not object to enactment of S. 1946 if amended as recommended in the report of the Department of the Interior.

Sincerely yours,

WILFRED H. ROMMEL,  
*Assistant Director for Legislative Reference.*

---

DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., August 9, 1967.

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

DEAR SENATOR JACKSON: This responds to your request for the views of this Department on S. 1946, a bill "To amend the repayment contract with the Foss Reservoir Master Conservancy District, and for other purposes." Pursuant to the proposals outlined in this report, we recommend that a substitute bill be enacted.

In May 1967, the Department appointed a special board of consulting engineers to study the problems associated with the poor quality of water available from Foss Reservoir of the Washita River Basin Project, Oklahoma. The board made

its initial report to the Department on July 28, 1967. A copy of that report is enclosed for your information. The board's recommendations have been included in this report, and have our concurrence.

Under Section 1 of S. 1946, the Secretary of the Interior would be authorized to enter into an agreement for the District to construct a 3-million-gallon-per-day (m.g.d.) desalination plant, the plans for which would be subject to approval by the Secretary. The existing repayment contract with the District, numbered 14-06-500-322, dated February 14, 1958, as amended, would be further amended to reduce the construction charge obligation thereunder by the amount of the cost of constructing the plant. As an alternative, the Secretary could construct such plant with funds appropriated for this purpose. The Secretary would also be authorized to construct additional plant capacity as needed.

Section 2 would further authorize the Secretary to enter into an agreement with the District for the operation and maintenance of the desalination plant in such manner as will benefit the Federal saline water conversion and water pollution control programs, and to provide for payment of the cost of such operation and maintenance as he determined equitable in view of the contribution of such plant to such Federal programs.

Under Section 3 the Secretary would be authorized to relieve the District (1) of the obligation of making any further construction charge payments under its contract and (2) of any interest accrual of its total obligation, until the initial delivery of water is made from the desalination plant. The amounts already paid by the District, totaling \$218,364.62, would be refunded by the Secretary. The remaining obligation would be rescheduled over a period not to exceed 50 years from the date initial delivery of water is made from the plant. The provisions of section 3 would be implemented through an amendatory repayment contract.

Incurred first-stage reimbursable construction costs of the Foss Division allocable to the District presently total about \$6,626,000. This includes \$1,155,000 for dam and reservoir costs and \$5,471,000 for aqueduct costs. Interest during construction computed through June 30, 1966, amounts to \$916,000 bringing the total obligation to \$7,542,000. Repayment is scheduled over a 50-year period, with annual installments varying from \$148,000 to \$390,030. The first payment was made in full in 1965. About 56 percent of the 1966 payment has been received by the Government.

The Act of Congress approved February 25, 1956 (Public Law 84-419, 70 Stat. 28), authorized the construction, operation, and maintenance of the Washita River Basin Project for municipal and industrial water, irrigation, flood control, fish and wildlife, and recreation purposes. First-stage construction of the Foss Division was essentially completed December 31, 1964, when the construction office was closed. This included the dam and reservoir, appurtenant facilities, an aqueduct and pumping plants for delivery of municipal and industrial water, and operation and maintenance headquarters and caretaker buildings. The responsibility for operation and maintenance of first-stage facilities was transferred to the Foss Reservoir Master Conservancy District, effective January 1, 1965. Until late in 1966, it was contemplated that the District would construct and operate a central water treatment plant for treating and softening project water for its member cities. Because the member cities were unable to agree on the need for a central treatment plant and a method of financing it, considerable time has elapsed since the initial storage of water in Foss Reservoir.

During 1965, plans were developed by a firm of consulting engineers retained by the District to construct a 3 m.g.d. conventional treatment plant. Finances to the extent of \$365,000 were assured by the Community Facilities Administration under a bond purchase arrangement. While the loan was still under consideration by the CFA, the consulting firm withdrew and a new firm was retained by the District.

After much further examination and investigation of the water quality of Foss Reservoir, the new consulting firm determined that water quality was such that conventional treatment would not produce a potable water supply. The firm recommended desalination. Desalination would present the problem of the effect of brine disposal on water pollution control downstream from the dam. Construction costs and operation and maintenance of the desalination plant and brine disposal system would be financially prohibitive for the District to underwrite. The consulting firm for the District determined that the construction of a 3 m.g.d. desalination plant would cost about \$2 million exclusive of the cost of brine disposal facilities. This estimate has been confirmed by the Office of Saline Water.

The Water Quality Section of the Definite Plan Report, Volume II, Foss Division, dated January 1958, estimated in Table 28, page B-138, that the Foss

Reservoir releases would contain 750 p.p.m. TDS and 391 p.p.m. of sulfates. This predicted quality was based upon limited hydrologic data, the assumption that there would be average runoff, the irrigation portion of the project would be in operation, and that the cities would be using their entire allocations to provide cyclic operation of the reservoir. Plate 20, page 136, estimated that these amounts would be exceeded in many years even with the project in full operation. In the discussion in page B-137, the statement is made that "Local interests have been alerted to the fact that the chemical quality of water at Foss is poor, especially from a sulfate standpoint." The District's Board of Directors was aware that the quality of water would be poor, but it believes that the present quality is much poorer than expected. Recent water samples from Foss Reservoir show that the level of total dissolved solids (TDS) is about 1,780 p.p.m. and the level of sulfates is near 900 p.p.m.

It is generally accepted by water quality specialists that: (1) conventional chemical water treatment and softening are suitable for water with total dissolved solids (TDS) up to about 950 p.p.m.; (2) conventional chemical treatment and softening plus desalination are suitable for water with TDS between 950 p.p.m. and 3,500 p.p.m.; and (3) above 3,500 p.p.m., some type of vaporization is required. Based on this assumption the average quality water from Foss Reservoir would require desalination for M&I use. However, if the quality of the water in the reservoir should be under 950 p.p.m., it would be possible to bypass the desalination phase at the treatment facility.

This Department convened a Consulting Board to review the water quality problem at Foss Reservoir. In its report to the Secretary the Consulting Board made the following findings:

1. The waters in Foss Reservoir are not suitable for municipal and most industrial purposes.

2. The SCS program for the Washita watershed above Foss Reservoir has reduced the amount of surface runoff reaching the Washita and Foss Reservoir.

3. Since 1961, the storm pattern on the upper Washita basin has differed substantially from that which occurred during the Reclamation study period. As a result, the water quality and quantity have been adversely affected.

4. A relationship exists between the quality of the water entering Foss and the streamflow in the Washita. As the river flow decreases, the total dissolved solids of the river water increases.

5. At the time the departmental planning report was prepared, there were insufficient quality and streamflow data at Foss as well as an apparent lack of knowledge by Reclamation of the extent of future SCS programs to properly assess the impact on water quality and quantity projections. There still is not sufficient field data.

6. No major long-term improvement in Foss water quality can be expected in the future. Short-term improvement may result from occasional intense storm runoff.

7. The member cities of the District require additional water to supplement their existing supplies.

8. A desalination plant to produce 2 m.g.d. will satisfy the District's supplemental water needs until 1980.

9. The desalination plant should provide water of a quality meeting the Public Health Service (PHS) Drinking Water Standards.

10. Of the methods of desalting considered as being feasible, electro dialysis appears to be the best suited for this specific application at this time if production level is sought. Pilot studies show that reverse osmosis has excellent possibilities.

11. Methods of disposal of the concentrate from the desalination plant include subsurface injection, return to the Washita River below Foss, return to Foss Reservoir, and evaporation ponds. The ultimate disposal method depends upon detailed study and analysis of the entire project.

12. A method of cost sharing between the District and the United States for the treatment facilities should be devised because it was implicit in the DPR that Foss Reservoir water would be suitable for municipal and industrial use.

13. Though it was not part of the specific charge to the Board, the Board feels that it should draw attention to the fact that there are alternate short-term sources to the Foss supply for municipal and industrial water and that these should be investigated and evaluated in terms of the gains that would accrue by waiting for an evaluation of reverse osmosis.

14. On a long-term basis, Foss Reservoir water appears to be the only real solution to the needs of these communities.

15. The member cities of the District should make fullest use of their existing resources, as long as they are available.

The Department of the Interior recognizes an obligation to assist the District to provide water which is suitable for use by the District. It is obvious that, for a number of reasons, the water in Foss Reservoir is not suitable and not what the District expected to receive when it entered into agreements with this Department.

Pursuant to this obligation and the report of the Departmental Consulting Board, we believe an approach modified somewhat from that of S. 1946 should be taken to alleviate the water problems at Foss Reservoir. The Board has determined that the cities of the District, with the exception of Bessie, Oklahoma, may be able to develop adequate water supplies from near by surface and subsurface sources. The Department proposes to conduct feasibility studies immediately to determine the extent of these alternative water sources and to decide upon the most practicable solution to the problems of water quality and supply facing the Foss Reservoir Master Conservancy District. The Consulting Board has recommended that a 2 m.g.d. electro dialysis plant be constructed on the premise that this process is the best currently perfected process for plants of this size. However, the Consulting Board did not consider other alternatives such as conventional storage or ground water, which might be available to solve the water problems of the Foss District. Further, results of research by the Office of Saline Water indicate that within a short time reverse osmosis may prove to be the most efficient and economical process to treat water of the quality that Foss presents.

We, therefore, recommend that a substitute bill be enacted in lieu of S. 1946 to provide for additional studies and research by the Department. Our proposed substitute bill is enclosed with this report. Under section 1 of the proposed bill, the Secretary would be authorized to conduct feasibility studies in order to determine alternative water sources and the most practicable and feasible methods of alleviating the problems associated with the poor quality and supply of water in Foss Reservoir.

Section 2 of the proposed bill is very similar to section 3 of S. 1946 in that the District would be relieved of making any further construction-charge payments under its repayment contract with the United States, and of any interest accrual on its total obligation until initial delivery of water is made. In addition, the amounts that the District has already paid, totaling \$218,364.62, would be refunded. Such financial relief would enable the District to develop alternate sources of water while the feasibility studies are going forward. Also the current repayment obligation of the District would be reduced as the Secretary deems proper to assist the District in financing whatever solution is recommended by the feasibility studies. It should be recognized, however, that storage available in Foss Reservoir may well have value to the District in the future development of water supplies. It is anticipated that the feasibility studies will cover the near, intermediate, and long-term value of storage in Foss Reservoir. This will provide a basis for determination in connection with the renegotiation of the repayment contract.

Section 3 would authorize the Secretary of the Interior to use any funds available to him to carry out the feasibility studies authorized by this Act. By using this method of financing, the Secretary could immediately start on the studies called for by this bill. We shall furnish as soon as possible an estimate of the cost involved in conducting the studies. The cost of proceeding with the plan resulting from these studies cannot be estimated at the present time.

We believe the adoption of our proposed substitute bill would enable the Department of the Interior to seek the best solution to the whole Foss situation.

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

Sincerely yours,

KENNETH HOLUM,  
*Assistant Secretary of the Interior.*

A BILL To amend the repayment contract with the Foss Reservoir Master Conservancy District, 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 conduct feasibility studies in the area serving the Foss Reservoir Master Conservancy District to determine alternative water sources and the most

practicable and feasible methods of alleviating the problems associated with the poor quality and supply of water stored in Foss Reservoir, Washita River Basin Project, Oklahoma.

SEC. 2. In order to assist the Foss Reservoir Master Conservancy District in developing an adequate interim water supply, the Secretary of the Interior is authorized to relieve the District (1) of the obligation of making any further construction charge payments under its repayment contract with the United States, numbered 14-06-500-322, dated February 14, 1958, as amended, and (2) of any interest accrual on its total obligation, until initial delivery of water is made which the Secretary considers to be satisfactory for municipal and industrial use. The Secretary is also authorized (a) to refund to the District the amount of \$218,364.62, representing the amount already paid under such contract and to revise such contract by adding such amount to the obligation for future payment, (b) to further revise such contract so that future construction charge payments will be rescheduled in a manner satisfactory to the Secretary over a period not to exceed fifty years from the date of the aforementioned delivery of water, and (c) to reduce the current repayment obligation of the District by such amount as he deems proper to assist the District in financing whatever recommendations are made by the Secretary as a result of the feasibility studies authorized in section 1 of this Act.

SEC. 3. The Secretary of the Interior may use any funds that are otherwise available to him to carry out this Act.

RESOLUTION OF THE UNSUITABILITY FOR MUNICIPAL AND INDUSTRIAL USE OF  
THE WATER PRESENTLY STORED IN THE FOSS RESERVOIR

(Part 1 of a two-part study by the Departmental Consulting Board on Foss  
Reservoir water quality problems)

STATEMENT OF THE PROBLEM

In March 1961, the Bureau of Reclamation (Reclamation) initiated storage in the Foss Reservoir. As a part of the project, waters from Foss were to be supplied to the Foss Reservoir Master Conservancy District (District) for municipal and industrial purposes. In partial fulfillment of their contractual obligations, the District has already paid over \$200,000 to the United States for their share of the project.

Preliminary engineering studies were made by the District regarding possible treatment facilities for Foss water. The facilities included a softening plant. However, analysis of the reservoir waters indicated that the total dissolved solids (TDS) content ranged between 1400 and 1800 mg/l which is not acceptable for municipal and most industrial purposes. These levels were over twice the TDS content predicted by Reclamation in its Definite Plan Report (DPR).

In order to make the water quality acceptable to the District, Congressional Bills S1643 (amended as S1946) and H.R. 11037 have been introduced which would authorize construction of a 3 million gallon per day (MGD) desalting plant and amend the existing contract with the District. Provisions for refunding payments made by the District have been included. Hearings on these bills are scheduled to start in early August.

In order to adequately report upon the legislation introduced in the Congress, the Secretary of the Interior appointed a Consulting Board to conduct an engineering evaluation of the problem. The Board members are George W. Reid, Director, School of Civil Engineering and Environmental Sciences, University of Oklahoma; John R. Erickson, Consulting Engineer, Phoenix, Arizona; and Rolf Eliassen, Professor of Sanitary Engineering, Stanford University and Partner, Metcalf & Eddy, Engineers.

OBJECTIVES OF THE STUDY

In a letter from Assistant Secretary Kenneth Holum, the objectives of the study were stated in two phases as follows:

1. "Your immediate concern should be recommendations in resolution of the unsuitability for municipal and industrial use of the water presently stored in the reservoir. So that we may adequately report on pertinent legislation which has been introduced in the Congress, we would appreciate your recommendations on this facet if possible by August 1, 1967. Your report on this facet should outline definite remedial measures that can be accomplished in an expedited manner to furnish an acceptable quality of

municipal and industrial water from the reservoir to cities in the Foss Reservoir Master Conservancy District."

2. "Of less immediate concern, but of great importance, is a study to determine whether conflict exists in the various water resource programs being conducted in the Washita River watershed by different Federal and State agencies, and if so, what can be done to resolve such conflicts and to prevent recurrence of same. We would appreciate the results of this study by October 1, 1967."

This report covers the first facet of the study.

#### MEETINGS OF BOARD MEMBERS

It is perhaps desirable to first briefly review the activities of the Board. The first meeting was in Washington with Assistant Secretary Holum to receive the charge and to discuss its implementation. This was on May 11, 1967. George W. Reid was asked to be Chairman and Charles H. Clark of the Bureau of Reclamation, Region 5, to provide technical backup and administrative details.

The next opportunity for the Board to meet was on June 14 and 15, which they did at Norman, Oklahoma. Prior to this time, Clark had furnished the Board with most of the detailed data from the files of Reclamation. The Board flew over and visited the Foss site, including the watershed. They conferred with officials from the District at Clinton, Oklahoma; their consulting engineers, Phelps, Spitz and Associates; representatives of the State Water Resources Board; representatives of the local office of Reclamation; and representatives of the Soil Conservation Service (SCS) of Cheyenne, Oklahoma.

Prior to this meeting, Reid had accumulated local data, and had made a water quality examination of random samples from the upstream structures. The Board noted the additional material needed, and partitioned the work. Reid and Clark mailed the Board the additional data requested as rapidly as possible, and the next meeting was scheduled for July 10 and 11 at the Regional Office of Reclamation in Amarillo, Texas. The framework of the Phase I report was developed at this meeting. Reid wrote a preliminary report and it was reviewed and finalized in the most recent meeting held on July 28 in Palo Alto, California at the office of Metcalf & Eddy. This locale was selected so that Eliassen could attend; Franklin L. Burton, Senior Associate of Metcalf & Eddy, had been substituting for him after the Washington meeting. Prior to the Palo Alto meeting, the Board members had in addition to making detailed calculations, made a number of pertinent contacts. To name a few: Burton, Clark, Eliassen and Reid conferred with Ionics; Burton visited the electro dialysis (ED) plant in Coalinga, California; Reid and Clark visited the ED plant at Port Mansfield, Texas; Erickson visited the ED plant at Buckeye, Arizona; Reid conferred with the State and regional SCS Offices, the Oklahoma State Health Department, the Federal Water Pollution Control Administration, the Bureau of Business Research of the University of Oklahoma, and Pro ess Research, Inc. at Cambridge, Mass.

The findings of the Board are unanimous and are presented herein as briefly as possible, documenting only what amounts to digested results and not the mass of detailed interviews, data and calculations.

#### FINDINGS

The findings of the Board are:

1. The waters in Foss Reservoir are not suitable for municipal and most industrial purposes.
2. The SCS program for the Washita watershed above Foss Reservoir has reduced the amount of surface runoff reaching the Washita and Foss Reservoir.
3. Since 1961, the storm pattern on the upper Washita basin has differed substantially from that which occurred during the Reclamation study period. As a result, the water quantity and quality have been adversely affected.
4. A relationship exists between the quality of the water entering Foss and the streamflow in the Washita. As the river flow decreases, the TDS of the river water increases.
5. At the time the DPR was prepared, there were insufficient quality and streamflow data at Foss as well as an apparent lack of knowledge by Reclamation of the extent of future SCS programs to properly assess the impact on water quality and quantity projections. There still is not sufficient field data.

6. No major long-term improvement in Foss water quality can be expected in the future. Short-term improvement may result from occasional intense storm runoff.

7. The member cities of the District require additional water to supplement their existing supplies.

8. A desalting plant to produce 2 MGD will satisfy the District's supplemental water needs until 1980.

9. The desalting plant should provide water of a quality meeting the Public Health Service (PHS) Drinking Water Standards.

10. Of the methods of desalting considered as being feasible, ED appears to be the best suited for this specific application at this time if production level is sought. Pilot studies show that RO has excellent possibilities.

11. Methods of disposal of the concentrate from the desalting plant include subsurface injection, return to the Washita River below Foss, return to Foss Reservoir, and evaporation ponds. The ultimate disposal method depends upon detailed study and analysis of the entire project.

12. A method of cost sharing between the District and the United States for the treatment facilities should be devised because it was implicit in the DPR that Foss Reservoir water would be suitable for M and I use.

13. Though it was not part of the specific charge to the Board, the Board feels that it should draw attention to the fact that there are alternate short-term sources to the Foss supply for M and I water and that these should be investigated and evaluated in terms of the gains that would accrue by waiting for an evaluation of RO.

14. On a long-term basis, Foss Reservoir water appears to be the only real solution to the needs of these communities.

15. The member cities of the District should make fullest use of their existing resources, as long as they are available.

#### DISCUSSION OF FINDINGS

##### *Hydrological factors*

Records since 1949-50 (water years) to present indicate no real change in water quality in relation to runoff in the Washita River. The values range widely from 440 to 2010 mg/l TDS. The analyses of quantity-quality considerations indicate responsiveness ordinarily encountered in waters of this type and origin. Random samples recently taken from the flood retardation structures and the tributaries throughout the watershed ranged from 103 to 6860 mg/l TDS. The values decrease progressively with the distance upstream from the Foss Reservoir. Analysis of Foss Reservoir water indicate consistently poor quality ranging from 1420 to 1864 mg/l TDS. These data cover the period from 1963 to date.

An analysis of SCS practices to date, a matter that will be dealt with in depth in the second phase of the Board's activity, indicates that conservation activities, such as terraces, checks, ponds, hydraulic flood control structures, seeding and so forth, are accomplishing their purpose. This program in the Foss watershed is substantially complete.

Studies such as double mass plots and regression and component analyses, show a definite negative correlation of this program to runoff. The input into the Foss site over the last 41 years of record (1926 to 1966) ranges from 225,000 acre feet per year (AFY) to 11,000 AFY, with an average of 73,700 AFY. The DPR estimated 31,300 AFY yield from Foss. Based on the above noted SCS practices, particularly the effect of the 201 flood detention structures and assuming average rainfall, no appreciable number of new structures, unchanged operation of the existing structures, and no marked changes in land treatment and land use practices, the reduced input and yield levels would probably be of the order of approximately 50 percent. Even with this reduction there will be sufficient water for project municipal and industrial uses in 1980, in fact, to 2000.

Running averages of precipitation indicate the presence of an eleven-year cycle. If this pattern continues, rainfall will increase compared to the 1961-1966 data over the next ten years, but the quality apparently will not be materially improved in the Foss Reservoir regardless of increased precipitation. Based on a conservation storage of 250,000 AF, Foss Reservoir will have an average retention of approximately seven years, or in excess of half the cyclic period, consequently providing a water quality equalizing effect. The upstream SCS activities function in a similar fashion. Some improvement might be accomplished in quality and quantity by revision in upstream management practices and this will be dealt with in the second phase of the study.

*Water quantity requirements of the District*

The Board investigated the present and projected water quantity requirements of the four cities comprising the District, Clinton, Cordell, Bessie, and Hobart, and arrived at the following:

## AVERAGE WATER REQUIREMENT

[In millions of gallons per day]

	1967	1970	1980
Clinton.....	1.74	1.80	2.60
Cordell.....	.54	.60	.90
Bessie.....	.01	.03	.04
Hobart.....	.99	1.00	1.50
Total.....	3.28	3.43	5.04

## PEAK WATER REQUIREMENT

Total peak requirement.....	5.2	5.5	7.6
-----------------------------	-----	-----	-----

The present level of 3.28 MGD and associated peaking capability is the apparent limit of the present sources. The 1980 water requirements could be met by constructing a desalting plant capable of producing 2 MGD. This will provide water up to 1980 as follows:

[In millions of gallons per day]

	1967	1970	1980
Desalted Foss water.....	2.00	2.00	2.00
Present sources.....	1.28	1.43	3.04
Total.....	3.28	3.43	5.04

Present supplies will provide make-up between the total and Foss water.

The Board feels that target date of 1980 is justified because:

1. There is considerable uncertainty in the population and unit consumption estimates. Estimated requirements were available from several sources and varied considerably. The recommended desalting process, ED, is modular and can be easily expanded, if (as is considered unlikely) all four cities were to develop as estimated, providing capacity to 1990 and possibly 2000.

2. Evidence indicates a real possibility of process breakthrough between 1967 and 1980. For example, the cost of desalting by Reverse Osmosis (RO) may become equal to if not less than ED, but RO is in the developmental stage at present, and its applicability to large plants has not been demonstrated.

*Water quality objectives of treated water from Foss*

The finished water quality levels of the Foss plant should meet the PHS Drinking Water Standards. Hardness, not included in the PHS Standards, should be established at a level suitable for consumer acceptance. These levels are:

Total Hardness (TH) 100 mg/l as CaCO<sub>3</sub>

Total Dissolved Solids (TDS) 500 mg/l

Sulfate (SO<sub>4</sub>) 250 mg/l

The quality of the water being currently used is:

	TH mg/l as CaCO <sub>3</sub>	TDS mg/l	SO <sub>4</sub> mg/l
Clinton.....	210	380	36
Cordell.....	246	315	20
Hobart.....	200	360	71

Bessie is currently using brackish water for purposes other than drinking and is importing drinking water by tank truck.

With the blending of treated water from Foss and the present water, based on a proration of water at contract levels and using existing sources for supplemental water, the resulting quality in 1980 would be:

	TH mg/l as CaCO <sub>3</sub>	TDS mg/l	SO <sub>4</sub> mg/l
Clinton.....	163	432	128
Cordell.....	205	367	84
Hobart.....	158	500	250
Bessie <sup>1</sup> .....	100	500	250

<sup>1</sup> Bessie will get its entire supply from Foss.

The municipal and industrial contract levels were, in MG per year:

Clinton.....	1840
Cordell.....	419
Hobart.....	1018
Bessie.....	11

The blended water is better than was implicit in the DPR: 364 mg/l TH, 750 mg/l TDS and 391 mg/l SO<sub>4</sub>.

In general, it is concluded that:

1. There is a demonstrated need for water quality improvement.
2. If the water quality objectives are attained, the quality level of the treated Foss water will be superior to that anticipated by the DPR.

#### *Treatment possibilities*

Three methods of desalting were considered: ED, distillation and RO. ED has found wide application in the United States and abroad for desalting brackish waters. Over a hundred electro dialysis units are in operation, the largest of which is a 650,000 gallons per day plant at Buckeye, Arizona. Distillation has been used extensively for desalting but it is most economically used on high solids waters, such as seawater. RO, as stated previously, is in the developmental stage and will not be available for a large scale installation for several years. Hence, the Board concluded that ED was the most suitable process for desalting Foss water. However, conventional water treatment, i.e., chemical coagulation, softening, sedimentation and filtration, is required ahead of ED.

In order to meet the treated water quality objectives, a three stage ED plant is required. Using Foss raw water of 1800 mg/l TDS and 65 percent of the TDS remaining after each stage, the product water would be  $1800 \times (.65)^3 = 495$  mg/l TDS  $\approx$  500 mg/l.

A real possibility exists using a systems approach on mixes of all of the treatment elements in developing an optimum plant design.

#### *Disposal of concentrates*

With inland desalting plants, disposal of the concentrate stream is a significant problem. Several evident solutions presented themselves; (1) return to Foss with an incremental increase per year of 30 to 50 mg/l TDS; (2) addition to the river below the dam; (3) subsurface disposal and (4) evaporation ponds having a minimum area of about 200 acres. Recognition of FWPCA requirements concerning enhancement of water quality ruled out discharge to the Washita. Preliminary geological studies indicated subsurface disposal is not suitable. Return to Foss and evaporation ponds are possible solutions but because of the complexity of the problem, detailed studies will be required to determine the most suitable ultimate method of disposal. The exact choice will depend upon a systems analysis of all factors.

#### *Cost estimates*

For using 2 MGD the following costs appear reasonable using a conventional ED plant:

[Cost per 1,000 gallons]

1. Foss Reservoir cost to the District 1968 (O. & M. and debt service)---	\$0. 29
2. Debt for preliminary and chemical treatment-----	. 03
3. Operating and maintenance costs, treatment plants:	
Preliminary and chemical treatment-----	. 15
ED (3-stage)-----	. 21
Concentrate stream disposal (assuming evaporation ponds)-----	. 05
Total-----	. 73

The blended costs using existing supplies of cheaper water would be less.

The approximate cost of the treatment facilities excluding disposal of the concentrate stream is \$1,700,000. This cost consists of \$500,000 for the preliminary and chemical treatment plant and \$1,200,000 for the ED plant. The above unit costs do not include amortization of the ED plant.

#### *Management*

As to management, two possibilities present themselves: one as is noted in S1643 and S1946, that the treatment be undertaken by the District; the other which the Board understands is feasible would be for the Bureau of Reclamation to undertake to furnish treated water to the District. Operation and maintenance by the District is most desirable. However, the Board feels that at least initial operation should rest with Reclamation because of the possible changes in user demands and the possibility of the need for the expertise of Reclamation and the Office of Saline Water. This period could be relatively short.

#### *Short-term alternative supplies*

Small additions to the present supply appear to be available from impoundment of surface water and from short-term groundwater sources. Development of these sources would serve only as a temporary "stop gap" measure and should not materially aid in the solution of the long-term water supply problem. The surface supplies are limited because of quality consideration, while ground water is primarily limited in yield and its availability may be complicated by distance and possible legal conflicts.

Foss Reservoir offers the only long-term dependable source of water for this area short of long distance transmission. The Reservoir is there, constructed by the United States, and the resource should be made usable by the best means available.

#### RECOMMENDATIONS

The Board recommends that:

1. Pilot scale studies on both ED and RO be conducted on Foss water prior to selection of production level process type, and that short-term alternates to Foss be utilized in the interim, if necessary;
2. Based on the studies, a desalting plant be constructed to produce 2 MGD to meet the supplemental water needs of the District until 1980.
3. The method of concentrate disposal from the desalting plant be subject to detailed systems analysis of water management for the Foss Division of the Washita Basin Project;
4. Water from the treatment plant meet PHS Drinking Water Standards and be of a hardness suitable for consumer acceptance;
5. Reclamation be designated to select and design the aforementioned plant; and
6. Because superior quality to that anticipated by the District originally will be realized, costs of the desalting treatment facilities be shared between the District and the United States.
7. Reclamation be instructed to investigate the alternate sources of water for the District.
8. More quantity and quality data be obtained at the reservoir and in its watershed, to permit better evaluation of the problem.

Senator JACKSON. Mr. Chairman, I note that the senior Senator from Oklahoma is here, as well as the junior Senator, and I think they would probably like to make a statement on the problem.

Senator ANDERSON. Senator Monroney.

**STATEMENT OF HON. A. S. MIKE MONRONEY, A SENATOR FROM  
THE STATE OF OKLAHOMA**

Senator MONRONEY. Mr. Chairman, members of the subcommittee, I am happy to come before you today, in company with a group of distinguished Oklahomans, to speak in support of legislation which Senator Harris, and I have proposed to meet a critical water quality need affecting a large section of western Oklahoma.

I understand that Senator Harris and two Members of the House of Representatives, Congressman Tom Steed and Congressman James Smith, want to present statements concerning this problem also.

It is my privilege at this time to introduce to you the citizens from the affected area in Oklahoma who have come here especially to explain the predicament in the Foss Reservoir area.

They are—

Mr. Charles E. Engleman, president, Foss Reservoir Master Conservancy District, Clinton, Okla.

Mr. Frank Raab, representing the National Reclamation Association of Oklahoma City.

Hon. Tom Crider, mayor, city of Cordell, Okla.

Hon. James M. Smith, Jr., mayor, city of Clinton, Okla.

Hon. Pete Simmons, mayor, city of Hobart, Okla.

Mr. Paul Nonast, representative of the mayor of Bessie, Okla.

Mr. L. A. Collier of Hobart, Okla., a member of the Foss Reservoir Master Conservancy District Board of Directors.

Mr. Joe Phelps, representing the consulting engineer for the Foss Reservoir Master Conservancy District and a member of the Oklahoma City engineering firm of Phelps, Spitz, Ammerman & Thomas, Inc.

Hon. Al Fuchs, city councilman, Hobart, Okla. He will not testify.

Several of these gentlemen have prepared statements, but they are aware of the committee's limited time and will, therefore, be as brief as possible.

Several of them plan to limit their statements but supply fuller comments for the record along with supporting data.

S. 1946 was introduced after much travail and a great amount of soul searching, both within and without the Federal Government, as a reasonable solution to an exceedingly difficult problem.

We now have seen a substitute proposal which this committee has received from the Secretary of the Interior, and we are pleased that his suggestions are generally in agreement with the purposes of our original language.

Now the problem has resulted basically from an unexpected concentration of certain minerals in the Foss Reservoir on the Washita River. This concentration is approximately twice what was anticipated by the Bureau of Reclamation when this project was surveyed. Congress authorized the project on the basis of water quality forecasts which have since proven inaccurate. This inaccuracy remained unrecognized until very recently.

The citizens of the area contracted for municipal and industrial water supplies from this reservoir in the mistaken belief that its waters could be made potable using the conventional lime-soda ash treatment process.

The gentlemen who appear with us today from the cities of Clinton, Hobart, Cordell, and Bessie will describe in detail this unfortunate series of events resulting from an original miscalculation regarding the type of water which would be impounded at Foss.

It is only fair to state before this subcommittee that the Congress itself authorized the construction of this project, along with its elaborate water distribution system, on the basis of erroneous or incomplete data.

My first reaction upon learning last autumn for the first time about this problem was to establish responsibility for the original error, but I soon came to the conclusion that, regardless of the cause of this crisis, the most important objective should be to find the least expensive and most effective way to correct it. That is why Senator Harris and I have introduced S. 1946.

You have the bill before you. It is very simple and straightforward. Mr. Holum, speaking for the Secretary of the Interior and the three agencies within the Department of the Interior vitally concerned, will outline a proposed revision which deserves careful consideration.

We are grateful that the officials in the executive branch have given urgent attention to this problem since it was brought to their attention by Senator Harris and myself late last year. They have recognized the fundamental responsibility that rests within the executive branch and have indicated they are as eager as any of us to provide a workable and reasonable solution.

The bill, as now drawn, would authorize the Secretary of the Interior to amend the existing contract or establish a new contract with the Foss Reservoir Master Conservancy District, with the provision that the board would be relieved of an equivalent portion of the construction debt it has assumed in order to deal with the unanticipated water quality problem.

Section 2(c) of the bill, as redrawn, authorizes the Secretary to reduce the current construction payments and postpone the accrual of interest until the demineralization plant has been put on stream. In addition, the district will be entitled to a refund of amounts already paid under that contract—money spent for water Uncle Sam hasn't been able to deliver.

This has the appearance of being a bill of local interest only, but it has implications of great consequence to the entire Nation.

Throughout the Plains States, from south Texas into the Dakotas, similar sulfate problems exist in surface water systems. Gyp water was bad news for the pioneers who crossed the plains and prairies to settle this vast area in the 19th century. It still flows from the rugged hills in some areas, and it must be dealt with in this instance because it has invaded an existing reservoir which represents an investment of some \$21 million of Federal dollars.

One thing has been driven home to me in the course of working on this problem: we are not dealing with pollution in the normal sense of the word. This water, while unfit for human consumption, actually may be suitable for irrigation.

As we learn more about the intricate chemistry of this particular fluid, we may find that the byproducts, or waste solutions, from demineralization processes, actually can be put to agricultural use in an economic fashion.

But for the present, we must rectify a terrible water shortage that has been created in the Foss Reservoir area through no fault of those citizens represented here today who have depended on this project for their normal, regular water supply.

In this connection, I would like to place in the record at this point a communication I have received from Mr. Clark McWhorter, State director of the Farmers Home Administration in our area, concerning his agency's vital interest in this dilemma.

In this letter, which I will not attempt to read but will submit for the record, Mr. McWhorter points out the Farmers Home Administration expects that within a very short period of time the Foss project will be required to supply a rural population of 20,000 people and will require treatment facilities of approximately 3 million gallons per day within the next 3 to 5 years.

I do not need to remind the members of this committee of the tremendous boon to rural development the Farmers Home Administration water program has become. In fact, so far as Oklahoma is concerned, the rural water program is about the best antipoverty program in existence, because it is doing so much to revitalize our smaller communities which hold so much more promise for happy, rewarding existence than our crowded and unhappy urban slums.

Let me close these remarks with a plea that your subcommittee act with all possible haste to report favorably on this legislation. I am advised the representatives of the majority of the interests in the Foss Reservoir area enthusiastically endorse the Department's proposed substitute, recognizing it is an honest, reasonable compromise with the provisions of S. 1946 as originally conceived.

I know you are as interested as I am in hearing these gentlemen speak for themselves.

Let me recommend each of them to you in the earnest hope that you will give our cause the expeditious approval we feel it deserves.

Senator ANDERSON. Senator Harris?

#### STATEMENT OF HON. FRED R. HARRIS, A U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator HARRIS. In the interests of time, and so you can hear these people themselves and the representatives of the Department of the Interior, I would like to ask my statement be placed in the record.

Senator ANDERSON. It will be placed in the record following your remarks.

Senator HARRIS. First, to bring to the present time the history of this situation, the towns of Hobart, Clinton, Cordell, and Bessie, Okla., which are located in the semiarid western part of Oklahoma where surface water supplies are scarce, and where ground water supplies are dwindling, have faced severe water shortages in the past few years, and Bessie is hauling drinking water at the present time at a cost of well over \$4 per 1,000 gallons. And I understand that the town of Hobart predicts that it will be out of water by next February and will need more wells.

This all started about 15 years ago, when these towns began a search for a dependable long-range municipal and industrial water supply.

Cordell, Clinton, Hobart, and Bessie each drilled wells, only to find that the underground water was not sufficient to meet their needs. Therefore, in 1958, the Foss Reservoir Master Conservancy District, principally representing the four towns, entered into a contract with the U.S. Department of the Interior under which the Bureau of Reclamation would construct the Foss Reservoir on the Washita River to provide a water supply of some 9 million gallons per day at a total cost of nearly \$8 million to the Foss Master Conservancy District.

The Foss Reservoir was completed in 1962 by the Bureau of Reclamation, yet, due to the unexpectedly high mineral content of the water, the Foss Reservoir Master Conservancy District, and the four towns have never been able to use one gallon of the water in the lake.

Senator Monroney and I took part in a rather dramatic demonstration last November, when we met with the folks from that area, and you can look at the statistics and the engineering reports. They brought us this water first in its natural state with all its salt content and had us take a sip or two of that. Then they handed us cups of water after it had been treated by regular treatment methods, and I want to tell you that the smell and the taste was still so obnoxious that you couldn't really imagine that it had been treated. That is how much salts there are in this water, and there is no way to get it out, so it can be made usable, by any means of treatment method.

Thus after 15 years of planning and waiting, these good folks who are here to testify are the gentlemen who have worked on this project so long and so hard. The payment since the reservoir was constructed by them through organization of a district and the payment so far of some 220,000-plus dollars for a commodity they have never received, should be refunded. The towns find themselves faced with virtually the same problem as when this all began 15 years ago.

Senator Monroney and I worked up a solution with them which is embodied in S. 1946. Since then, the Department of the Interior, as was pointed out, and as you know from the reports you received yesterday from the Department of the Interior, have come up with an alternative suggestion.

In some ways, I don't think it is as good as the bill we introduced, but I want to compliment the Department of Interior and the people from the area who got together and tried to work this out. I join with them and with Senator Monroney in endorsing the alternative bill which the Department of the Interior is here to explain today.

I might say that you have about 40,000 people who live in this area. They have been brought up to think of water as a precious commodity, as I know all of you do on this committee. Recent droughts in the area have made that even more true. Nine million gallons a day are available in the reservoir if the water can be treated so that it can meet the minimum standards for industrial and municipal use. We can't let this water go to waste, and in order to keep that from happening, we are going to have to have forgiveness of the obligation under the contract until the water can be made usable.

We are going to have to have repayment—I think it is only fair—of the amount of money that has been paid up to date under this contract for water that is not usable, and then we are going to have to construct some facilities there at much greater costs than regular facilities would require to make the water usable. Also there should be a reduction

in the obligation of the district and their repayment schedule to compensate for this additional cost.

The details on this proposal will be presented by the Department of the Interior. I join with Senator Monroney and with the people from the area in endorsing this bill, and, Mr. Chairman, we are grateful to you and the committee for your interest in what is really a difficult and serious situation.

Senator ANDERSON. Thank you Senator Harris. We will print your prepared statement at this point and then proceed to questions of you and Senator Monroney.

(The statement referred to follows:)

STATEMENT BY HON. FRED R. HARRIS, A U.S. SENATOR FROM THE STATE OF OKLAHOMA

Mr. Chairman and members of the committee, I appreciate very much this opportunity to appear today to testify on a matter of utmost importance to several communities in the western part of my state. Many hours of discussion and consultation preceded the introduction of S. 1946, and I feel it embodies a solution which is equitable, both for the United States and the Foss Reservoir Master Conservancy District.

Before discussing the specific provisions of the legislation I feel it is important to point out some of the conditions facing the towns of Hobart, Clinton, Cordell, and Bessie, Oklahoma, which are located in the semi-arid western part of Oklahoma where surface water supplies are scarce, and where ground water supplies are dwindling. All of these towns have faced severe water shortages in the past few years, and Bessie is hauling drinking water at the present time at a cost of well over \$4 per thousand gallons. Some 15 years ago, these towns began their diligent search for a dependable long-range municipal and industrial water supply. Cordell, Clinton, Hobart, and Bessie each drilled wells, only to find that underground water was not sufficient to meet their long-range needs. Therefore, in 1958, the Foss Reservoir Master Conservancy District, principally representing the four towns, entered into a contract with the United States Department of Interior under which the Bureau of Reclamation would construct the Foss Reservoir on the Washita River to provide a water supply of some 9 million gallons per day at a total cost of nearly \$8 million to the Foss Master Conservancy District. The Foss Reservoir was completed in 1962 by the Bureau of Reclamation, yet, due to the unexpected high mineral content of the water, the Foss Reservoir Master Conservancy District, and the four towns have never been able to use one gallon of the water in the lake. Thus, after some fifteen years of planning and waiting, and the payment of nearly \$220,000 for a commodity which they have never received, the towns of Cordell, Clinton, Hobart, and Bessie find themselves faced with virtually the same problem they had when they began.

Utilization of the water stored in the Foss Reservoir seems to be the only solution. However, the mineral content of this water is so high that it cannot be filtered in the conventional manner, for that will not remove the dissolved solids, nor the obnoxious taste, nor the undesirable effects of the salts. The only solution seems to lie in a highly sophisticated system of demineralization through electro-dialysis, or reverse osmosis. Both these methods are a great deal more costly than the conventional potash treatment methods, and will require a considerable amount of time and study before they could be put into operation. Meanwhile, the four towns of Cordell, Clinton, Hobart, and Bessie are presently faced with an obligation to pay the United States well over \$100,000 per year for water which they cannot use.

S. 1946 proposes a solution which would be fair to all parties concerned. Let me add at this point, Mr. Chairman, that I understand the Department of Interior has an alternative bill which Assistant Secretary Holum intends to present to the Committee shortly and which has the same basic objectives as S. 1946, with some differences. Both bills approach the problem head-on, and I feel that one or the other, or perhaps a combination of the two should be enacted into law as quickly as possible. Both S. 1946, and the Interior bill provide: (1) That the Foss Master Conservancy District should be relieved of its obligation for repayment under the terms of the contract signed in 1958 until such time as they can begin to take water out of the reservoir for human consumption; (2) The \$218,364.62 previously paid the United States by the Foss Reservoir Master Conservancy District should

be refunded, and an amended contract entered into, to become effective when the Conservancy District begins to use the water for municipal and industrial purposes; and (3) The Secretary of Interior should assist the Conservancy District to meet the additional costs required to construct the more expensive electro-dialysis, or reverse osmosis treatment facility, whichever proves the most feasible, to meet the needs of the Conservancy District. This third provision could be met through a reduction in the previously agreed-to repayment schedule.

Mr. Chairman, the fact that this water is sorely needed is no longer debatable. Some 40,000 people live in this area, and most of them look upon water as a precious commodity. Recent droughts have made this even more true. The Foss Reservoir can provide this water in the amount of 9 million gallons per day, if it can be treated so as to meet the minimum standards for municipal and industrial use. We cannot let this water go to waste when these towns are in such dire need of it, nor can we expect these people to pay for a commodity which they cannot use as intended when present obligations were assumed by them.

Mr. Chairman, this situation is a critical situation for the towns of Cordell, Clinton, Hobart, and Bessie, Oklahoma. I, therefore, urge your Committee to take favorable action on the legislation as rapidly as possible.

Senator ANDERSON. Have there been any studies on the use of this water?

Senator HARRIS. Yes, sir; they called in a board of consultants, and you have their report which was in here yesterday. There was some thought, since it has been dry down there, that if suddenly the area got a big rain to dilute the reservoir water it would be all right. The local engineering firms said that wasn't so, and I think that is well developed by the Department of Interior itself.

Senator ANDERSON. Did they test the water originally?

Senator HARRIS. I think that is exactly right, and I don't know where all the fault is here. Probably there is enough to go around, but we are interested now in trying to get it settled.

Senator ANDERSON. Did the Department of Interior approve the original project?

Senator MONRONEY. It was completely approved by the Department of Interior, and their samplings and tests went over a number of years. Apparently they were taking in years of very heavy rainfall, unusual rainfall, and it did not show this water was of such density and with such a mineral content that it would be unusable for these cities.

When the dam was finally built and water impounded, it proved to contain about twice the mineral content, I believe, that they expected to find in the water as they had reported it to the Congress and to the Department of Interior itself.

Senator HARRIS. Mr. Chairman, the Department of Interior doesn't need to be defended, but I might say further in explanation, sir, at that time we didn't have a lot of these small upstream reservoirs constructed where a lot of this better quality water is now impounded and is not therefore available to dilute these salts downstream. There has been some change in circumstance since the original study, and there may be others that the Department of Interior can explain.

Senator ANDERSON. I am wondering if somebody said it was all right, and the Government said it is all wrong.

Senator HARRIS. No; I think Secretary Holum can respond to that. I think that was done by the Government's own people at that time.

Senator MONRONEY. This is a multipurpose reservoir, flood control, and city water supply for the cities in western Oklahoma, but it was thoroughly approved by the engineers who represented the Federal Government. I think they were Department of Reclamation engineers.

Senator BURDICK. I came late, but as I understand it, this was a facility authorized in 1954, and one of the reasons it was built was for municipal and industrial water.

Senator MONRONEY. It is gyp water. You know what that is like in the Plains areas. It has a high mineral content that cannot be taken out by normal purifying methods.

Senator BURDICK. And no one will buy the water and use it?

Senator MONRONEY. It may be usable for irrigation because of its sulfate and other chemical content that go into fertilizer, but certainly you cannot use it for a city.

Senator BURDICK. The sale of the municipal and industrial water was a part of the feasibility ratio originally?

Senator MONRONEY. Yes.

Senator ANDERSON. I can remember that this was all right in the beginning but it is all wrong now.

Senator MONRONEY. The potable water didn't develop as had been anticipated by the engineers. These projects, as you know, are very carefully studied, measurements are taken, but sometimes they don't prove out the way it is anticipated.

They can, I think, by the construction of a demineralization filtering system, make the water very potable and very useful.

The specialized electro dialysis system, which we are using in the desalinization program, could be used in order to make the water potable. But it will cost a great deal more than the minor amount necessary under normal purification filtration systems.

Senator ANDERSON. I am curious. We passed one originally that was wrong; we might pass another one that is wrong. Is that possible?

Senator MONRONEY. The Secretary has asked to study not only alternate supplies of water, but the feasibility of the construction of a demineralization system so that the dam could be used for the purpose for which it was intended.

It would require investment and aside from relieving the cities until the water is made usable, the Government will not be out any money. Then the city—the cities expect to pay for this water and it will be amortized over 50 years to pay out their share of the cost of the construction of the plant that they—the cities—will build.

Senator BURDICK. Do I understand from you that the expenditure of the additional funds, together with the money for the original project, had not changed the benefit-to-cost ratio?

Senator MONRONEY. It will be retained on the water purchased. It may be diminished to a degree because of the excessive costs of the demineralization plant, but still will be a repayment for the water being served.

Senator BURDICK. And, of course, the municipal and industrial water was reimbursable in the beginning?

Senator MONRONEY. Yes. It has not been used, and can't be.

Senator ANDERSON. It worries me that the project was examined carefully, was built, and it was found the water wasn't any good. We could make another mistake, and then we would have another waste.

Senator MONRONEY. I don't believe there will be another mistake. The samples were taken from a running river. They had to be, at various periods of the year.

Now you have the residual water that has accumulated over a period of 10 years flowing in there, and you have a big mix, and you

do not have the high flowage you had in some of those earlier years when apparently these samples were taken.

Senator BURDICK. What is the additional cost?

Senator MONRONEY. It will increase to some degree. We trust because of the extraordinary processing necessary, the cost to the cities, it would be diminished some in order to provide for the necessary treatment of water.

Senator BURDICK. Have you had any expression from the cities about this water?

Senator MONRONEY. They are anxious to get the water. We feel there is no other source. The Secretary would make studies to see if any other source is available.

Senator ANDERSON. Doesn't it wipe out interest?

Senator MONRONEY. It postpones the payment of interest because no water has been supplied to the cities at all, and it provides for a refund of about a quarter of a million dollars that the cities have paid.

They will have to repay it again.

Senator ANDERSON. They do refund the money?

Senator MONRONEY. Yes, to finance a temporary solution of their water problem out there, money they have already paid in advance for water they have not been able to use will be refunded.

It will probably be necessary to drill wells which will probably be of short duration.

Senator ANDERSON. Senator Jordan?

Senator JORDAN. Is the project now in arrears? Are the payments—

Senator MONRONEY. No; the interest has been paid. I agree there may be a last payment due that has not been made, since the discovery that they can't build an ordinary treatment plant to use the water. The witnesses will be able to give you full testimony, sir.

Senator JORDAN. You are asking for a rebate of interest the cities have paid, and then they will pay it again when they get a potable water supply.

Senator MONRONEY. Yes; when the water is usable they will resume their payments of interest and repay the money back which is now being refunded to them as they withdraw the water.

Senator HARRIS. Subject, of course, to possible renegotiation between the Secretary and the conservancy district to reduce the obligation on the basis of this increased cost that wasn't anticipated.

You are going to have to go into electro dialysis or reverse osmosis, which is a costly process.

Senator JORDAN. Are there other cities to use the water?

Senator HARRIS. These are the four obligated.

Senator MONRONEY. There are others. Water is scarce out there, and once it becomes potable, they are going to need a great deal more.

This would not affect the cities' participation in the sharing of the cost of the dam for water supply. It would merely mean help in helping to defray the extraordinary and unexpected expense of this electro dialysis or other, more sophisticated processes that would have to be used to demineralize the water.

Senator HARRIS. The basic intent is to put these towns back where they thought they were when they signed this original contract.

Senator JORDAN. That part of the reservoir to be used for irrigation is still usable?

Senator MONRONEY. It is earmarked for irrigation. We have not used it. We don't know what the quality of the water will be.

Also, it is used for flood control on the Washita, which was an important part of the project itself. It was originally thought more of as a flood control dam than as a water supply dam.

Senator BURDICK. Do you mean there is some question whether this water is suitable for agricultural use?

Senator MONRONEY. They want to be sure. It has a high mineral process.

Senator BURDICK. What was the basis of the project in the first place, then?

Senator MONRONEY. The Bureau of Reclamation showed that the water would be suitable under normal purification treatment.

Senator ANDERSON. Go ahead.

**STATEMENT OF HON. JAMES V. SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OKLAHOMA—SIXTH DISTRICT**

Mr. SMITH. Mr. Chairman, distinguished committee members, it is a pleasure for me to appear here today and speak in behalf of Senate bill, S. 1946. This bill, introduced in the Senate by Oklahoma's distinguished senior Senator, Senator Monroney, and cosponsored by the distinguished junior Senator from Oklahoma, Senator Harris, proposed the authorization of the method and procedures, either of which the Secretary of the Interior may employ to complete the Foss Reservoir division of the Washita Basin project, located principally in Custer, Washita, and Kiowa Counties of Oklahoma, into a usable source of water for municipal and industrial use.

On June 20 I introduced a bill, H.R. 11037, in the House of Representatives, similar to the amended Senate bill, S. 1946. H.R. 11037 differs slightly from S. 1946, in that it adds three features I believe most significant in authorizing Federal relief, and assistance in the resolution of the problem, and I believe the committee should include them in the final Senate bill.

Before discussing the three differences in the proposed legislation, I would like, however, to discuss one area of identity. In the nearly 5 months I have had this project under study, I have tried to objectively evaluate each item of fact or data that has been supplied, either directly by the parties of vested interest or by the news media.

The Foss Reservoir Master Conservancy District is a public corporation of the State of Oklahoma. It consists of a board of directors and the usual corporate officers, all of which are businessmen of the local area, none of which have in the past or can be expected in the future to devote their full time to the pressing problem of the expeditious and successful completion of the Foss project.

The district has the two full-time maintenance employees whose duties are principally to prevent deterioration of the existing structures. None of these individuals—officers, directors or employees—has, as best I have been able to determine, the technical or professional education, background or experience to direct or manage, a research project of the magnitude proposed in this legislation, and this is notwithstanding the fact that they have devoted a great deal of time and sacrifice in dedication to the furtherance of this project.

Mr. Chairman, it is my recommendation that the course of action, option one, be removed from further consideration, and that the Secretary of the Interior be instructed by this legislation to proceed under option two, to accomplish the goals proposed in the public interest.

The first of the three additional features I feel this committee should consider is the authority for the Secretary of Interior to secure any additional land that may become necessary for brine or other waste disposal.

In the research phase, and eventually in the operational life of the proposed plant, large volumes of water containing nearly saturated levels of mineral salts must be disposed of in a manner that will prevent pollution of any other surface or ground water source.

These salt solutions cannot be disposed of by reentry into the reservoir without in the long run aggravating the very problems that are the basis for the proposed legislative relief.

The Secretary should have the authority to obtain any land needed for disposal of operational wastes, and for resolution of this potential pollution problem in the best interests of all the people affected by this legislation.

The second added consideration is the manner and the amount of forgiveness of accrued interest and principal paid or to become due from the conservancy district. It is my intent, and I believe the intent of the sponsors of S. 1946, to forgive and refund all moneys, both interest and principal, paid or due on the project; that interest on construction money will accrue during the research period, however long, and to start over on a new repayment schedule when the project is in fact complete and water is in fact available for sale to all contracting cities of the conservancy district.

The Secretary should effect no refund to the conservancy district unless and until he has the necessary assurance and agreement that the refunded money will be returned, in full, to the member communities that constitute the Foss Reservoir Conservancy District.

The third difference is that H.R. 11037 directs the Secretary to physically complete the water delivery aqueduct on a temporary basis.

Five months of investigation and study have developed no valid reason why the remaining 700 feet, more or less, of this aqueduct system should not be completed, the system properly tested, and the waters of Foss Reservoir, in their present state be made available for use and sale by the communities if a customer, agricultural or industrial, develops.

The water in Foss Reservoir is, today, principally deficient in its municipal qualities but it is suitable for irrigation and it is equal to or possibly better than the water used by industry—reclaimed from sewage—in Amarillo and El Paso, Tex.

The people of the United States have invested many millions of dollars in the municipal and industrial features of this project. If the communities can start repayment by development of the industrial potential, including agriculture, the municipal problem, pending resolution, should stand aside. Therefore, the Secretary should take whatever action is prudent, and in the public interest, to complete the Foss Reservoir aqueduct system.

This third item takes congressional notice that the Foss Reservoir division of the Washita Basin project, has, in fact, not been constructively completed, and this fact is the basis for the refunding and forgiving all moneys paid without abrogating the presently existing contract for repayment between the United States and the conservancy district.

Mr. Chairman, this project should be remanded to the control of the Secretary of the Interior in all of its phases involving municipal and industrial water until such a time as its costs can reasonably be expected to be repaid by the sale of water delivered to the communities of the conservancy district, in accordance with their publicly ratified contracts with the conservancy district.

The Secretary should also, while the project is under his control, develop a master plan that will insure the timely availability of municipal and industrial water to each of the communities that have underwritten the eventual repayment.

The 3 million gallons per day research project plan proposed in this legislation will accommodate less than one-third of the expected yield demand, less than the expected ultimate requirement of either two of the communities and, therefore, a plan for the provision of future facilities must be considered even before the first drop of research water is available to be put up for grabs.

Without attempting to explain why a potable water aqueduct is in existence, throughout the length of the Foss project, when document project plans do not indicate a filtration plant or any type of conventional treatment was anticipated at or near the reservoir for cleaning or treating the project water prior to transmission, it must be acknowledged that such an aqueduct was built and does exist.

Filtration to remove suspended solids is a first step in any treatment process, conventional or exotic, offers no research value and, therefore, any costs of filtration process equipment or structures should be reimbursable costs to the Government.

The Secretary, after evaluation of the long-range requirements of each of the contracting communities, should determine whether central filtration at the reservoir and continued expensive maintenance of a potable aqueduct is more desirable than a nonpotable water conveyance, and filtration and treatment as necessary at the several terminals.

If central filtration is determined to be desirable by long-term economic evaluation, then it should be provided and the system activated. It matters little to the taxpayer if funds are provided by the Secretary of Housing and Urban Development, or by the Secretary of the Interior. It is my opinion that such costs should be reimbursable as a municipal and industrial feature.

The research value of this project appears to be in the area of more effective and economical softening of extremely hard waters. On this basis alone this project is justified in the public interest.

The proposed, ultimate, demineralization capacity or requirement cannot be foretold. Three million gallons a day certainly will not approach the total eventual requirement, unless the quality of reservoir inflow can be improved and the quantity increased, as Senator Monroney referred to a few minutes ago.

The Secretary of Interior and the Secretary of Agriculture should jointly evaluate all programs of the Soil Conservation Service in the

reservoir watershed area, and modify or eliminate any current practices that are determined to contribute substantially to the high mineralization of Foss Reservoir.

Mr. Chairman, if the Secretary of Interior determines, after study and evaluation, that 3 million gallons per day of demineralized water can be the ultimate expected requirement, then the research project should be located to serve the total aqueduct system.

If this quantity is only an increment of the total, then possibly the project should be so located totally to serve an economic increment of the system without denying less desirable hard water to the ingenuity of other prospective consumers.

The president of the Foss Reservoir Master Conservancy District has stated publicly in his newspaper, in effect, that if this project is not enough to serve the ultimate demand, then the United States has a moral obligation to provide more.

Mr. Chairman, I say let the Secretary of Interior, when authorized by the Congress, furnish the research and the proposed plant, and, further, place this project in a state of usable completion, a state of operation such that the quality of the water will improve, and be available to serve as a useful resource in the economies of all the communities the project was designed to serve.

And I understand in the last few days that there has been a recommendation by the Bureau of Reclamation for a solution which appears upon my study, which has not been too heavy to date, that should be strongly considered, and I am glad to give my support to it, and I commend the Senators from our State, Senator Monroney and Senator Harris, in their judgment and statements given here this morning, and I commend the various citizens interested, and for their testimony to you later in the afternoon.

Thank you.

Senator ANDERSON. Have you checked on the project in general?

Mr. SMITH. Yes, sir; I have.

Senator ANDERSON. And you say that the water today is unsuitable for municipal qualities, but it is suitable for irrigation. Is it suitable for irrigation?

Mr. SMITH. This is the opinion of some who have studied this water condition. This is not, I am sure, in agreement with other studies.

Senator ANDERSON. It wasn't in agreement with what I thought the Senator said a minute ago.

Mr. SMITH. Yes, I understand.

Senator ANDERSON. You say it is usable for irrigation?

Mr. SMITH. It is my understanding it can be used.

Senator ANDERSON. The reservoir has been built for some time. Has the water ever been used for irrigation?

Mr. SMITH. There has never been any water run through the line for any purpose, Mr. Chairman.

Senator ANDERSON. How do they pay off the money then, how do they collect? When was the project finished?

Mr. SMITH. I am not sure I understand the question, Senator. I am sorry.

There are, I believe, 700 feet of line not completed. There has never been any water run through the line. It is there in an unusable condition, and the purpose of the testimony thus far, sir, today, has been to bring something about whereby this could be used for municipalities. That is what it was designed for mainly, as I understand it.

Senator ANDERSON. Somebody committed a debit of \$40 million. If there hasn't been any water run through this line at all, how do they pay off the bill?

Mr. SMITH. Well, the cities had been paying moneys in view of the fact that they would receive water one day, and this has not come about. The water as it stands in the lake today has become increasingly mineralized to a point that it is not usable.

The main brunt of my presentation is to get water for the cities. Western Oklahoma has the prospect of high industrial development. The mayors of the cities will give testimony here of industries that can be located in western Oklahoma, but they must have the water, and this is the main part of my argument: I think the Reclamation Bureau should have the main responsibility to proceed to this goal and—

Senator ANDERSON. You say on page 2:

It is my recommendation that the course of action, option 1, be removed from further consideration, and that the Secretary of Interior be instructed by this legislation to proceed under option 2 to accomplish the goals proposed in the public interest.

What is the main difference between option 1 and option 2?

Mr. SMITH. Further information has indicated this would be acceptable and to the best interests of those concerned.

Senator BURDICK. I would like to ask the Congressman a hypothetical question.

Assuming this water is not suitable for agricultural purposes, and assuming that this project may become a 100-percent municipal-industrial water supply project, would the communities be willing to share the costs for the water?

Mr. SMITH. I believe the cities will pay any cost for water that is reasonable, and that they can get back from industry and the citizen on the water mains. They are very much interested in this, and I would have to see a cost analysis after the plant is set up and put into operation before I would be willing to speak for the cities, if indeed I could at that time. It is my opinion that they would.

Senator BURDICK. Thank you.

Senator JORDAN. A mention has been made of a number of ponds that have been built on the headwaters of this watershed by the Soil Conservation Service. Is that program going forward at an expanding rate? Would you know, Congressman?

Mr. SMITH. I don't believe at the present time it is expanding at such a fast rate, but most of it is firmly established, and these smaller retention dams, farm reservoirs and what have you, have retained runoff water for the production of downstream conditions in the lowlands and for livestock purposes.

Senator JORDAN. As a contributing factor, the fact that this water is intercepted higher on the watershed in farm ponds has been quoted as being a contributing factor for the heavy mineralization in the stored water in the reservoir.

Mr. SMITH. Yes, sir.

Senator JORDAN. I can believe that if the two programs are going forward at the same time, is not the one always going to negate the other?

Mr. SMITH. I am sure that this will always have an effect on the Foss Reservoir. I think this is undeniable, and I am not sure I know what the answer to that is.

Senator ANDERSON. Thank you very much.

Mr. SMITH. Thank you.

Senator ANDERSON. Congressman Steed of Oklahoma has submitted a statement for the record which will be included at this point.

(The statement referred to follows:)

STATEMENT OF HON. TOM STEED, A U.S. REPRESENTATIVE IN CONGRESS FROM  
THE STATE OF OKLAHOMA

Mr. Chairman, I am not able to be with you personally this morning and appear before your subcommittee because of an unavoidable conflict with a hearing of the House Treasury-Post Office Appropriations Subcommittee, of which I am chairman. I regret very much not being able to be present, and I appreciate your courtesy in permitting my statement to be made a part of the record.

The problem that faces us in connection with the unusable nature of the water in Foss reservoir is a potential disaster for four communities of western Oklahoma. They face an urgent situation, and I want to express my thanks for the attention your subcommittee is giving this emergency.

I am sponsor of a measure identical with the bill, S. 1946, introduced by Senators Monroney and Harris. These measures would amend the repayment contract with the Foss master conservancy district and authorize the Secretary of the Interior to proceed with steps to obtain construction of a three-million gallon per-day electro dialysis plant to treat the water.

This project, located in Custer county, Oklahoma, was built by the Bureau of Reclamation primarily to provide municipal and industrial water for the cities of Clinton, Bessie, Cordell and Hobart, Oklahoma, as well as irrigation water for the area.

The cities involved formed a master conservancy district under state law.

Now, more than five years after the completion of the reservoir, the water does not meet quality requirements and is unsuitable for domestic use because of the high amount of dissolved solids it contains. This situation is contrary, of course, to the advance estimates of the Bureau of Reclamation.

Engineering reports show that conventional de-mineralization treatment will not be enough to deal with the problem, and that a demineralization plant will be necessary.

There is an urgent need for water in this area, where some 50,000 people must be served. By now, the cities involved had expected on the basis of the pre-construction estimates to be retiring facilities that are already in poor condition.

I am aware of the proposed alternative language just advanced by the Department of the Interior on the basis of its projected implementation of the findings by the departmental consulting board of engineers specially appointed to consider the problem in May. The second part of the board's studies is yet to be concluded.

I am glad to note that the department's proposed bill shares the same objective as that of the legislation sponsored by Senator Monroney, Senator Harris and me. Specific provisions differ, beginning with the proposal of the department that the Secretary be authorized to conduct a feasibility study to determine alternative water sources and the most practicable means of alleviating the problem. The department believes on the basis of the expert findings that further work is needed before it will be certain what specific solution of the problem is best. The feasibility study would be completed within twelve months.

The officials of the conservancy district, headed by Mr. Charles Engleman of Clinton, will present detailed information, as will Senators Monroney and Harris.

I will not encumber the Record by going into these details, but I do want to say that failure to take whatever steps are necessary to render the situation would be a tragedy. These communities have kept their part of the bargain with the Federal government in good faith, and their need must be answered.

It is not a question of whether we must do it, but how it can be most quickly and effectively accomplished.

Rainfall in this region averages only some 20 inches per year. Alternative temporary sources are available, if financing can be obtained, but Foss reservoir is the only possible quantity source in the area for the longtime solution that is essential.

The action of your subcommittee in taking up this problem is deeply appreciated, and I am glad to have the opportunity of joining in bringing before you the problem faced by these communities.

Senator ANDERSON. Secretary Holum, may I ask a question of you? How long would you think this study would take? Is it going to be 6 months or 6 years? They have to have water out there now. They are thirsty.

Mr. HOLUM. We would think the study provided for in the substitute which we sent to the committee yesterday on an expedited basis, be made in 6 months or a year. Maybe my conservative colleagues will cringe when I say that, but they will work with us on that.

Senator ANDERSON. I hope you can give us some kind of answer on it. The reservoir has been completed for several years, since 1964.

**STATEMENT OF HON. KENNETH HOLUM, ASSISTANT SECRETARY FOR WATER AND POWER DEVELOPMENT, DEPARTMENT OF THE INTERIOR; ACCOMPANIED BY JACK A. HUNTER, MAURICE N. LANGLEY, AND CHARLES H. CLARK**

Mr. HOLUM. May I proceed with my prepared statement?

I have with me Maurice Langley, Chief of the Division of Irrigation and Land Use, and Charles Clark, the Regional Irrigation Supervisor from Amarillo. They will be available to provide detailed information that the committee requires.

Senator ANDERSON. Do you have here with you the witnesses who might have checked this project originally? Is anybody here who checked the original project?

Mr. HOLUM. No. This project was authorized in 1956, and none of these people, and certainly you know that I was not connected with the Bureau of Reclamation at that time.

Senator ANDERSON. I hate to reveal my age, but I know what the project was at that time.

Mr. HOLUM. The project and the urgency of the problems we have been emphasizing here this morning I know have been emphasized very competently by the statement from the delegation and the exchange of information between the members of the committee and the delegation.

I want to say that this problem was first called to the attention of Secretary Udall and myself in November of 1966, when we received a letter from Senator Harris and Senator Monroney calling this problem to our attention.

It has given us a great deal of concern and it requires and has received a great deal of careful thought on our part since that time.

We are happy to be in a position here this morning to recommend to the committee for its consideration draft legislation which we believe is equitable both to the United States and to the conservancy district.

Our report reached you yesterday afternoon. It has been a matter under urgent consideration by the Department, and we received our consultants' study on Monday of this week. So we have had to work in an expedited fashion in order to be prepared for this hearing this morning.

Since we first became aware of the problems associated with the poor quality of water available from Foss Reservoir of the Washita River Basin project, the full resources of the Department have been working toward developing solutions for those problems.

In addition, in May of 1967 the Department appointed a special board of consultants to study the situation. The Board made its initial report to the Department on July 28, 1967. A copy of that report has been furnished your committee. The recommendations of the Board have our concurrence.

Under section 1 of S. 1946, the Secretary of the Interior would be authorized to enter into an agreement for the district to construct a 3 million gallon per day desalination plant, the plans and costs of which would be subject to approval by the Secretary.

Preliminary studies indicate that the cost of such plant, exclusive of brine disposal facilities, would be about \$2 million. The existing repayment contract with the district, dated February 14, 1958, as amended, would be further amended to reduce the construction charge obligation thereunder by the amount of the cost of constructing the plant.

As an alternative, the Secretary could construct such plant with funds appropriated for this purpose. The Secretary would also be authorized to construct such additional plant facilities as needed for testing or demonstration purposes in either the saline water or water pollution control programs.

Section 2 would further authorize the Secretary to enter into an agreement with the district for the operation and maintenance of the desalination plant in such manner as will benefit the Federal saline water conversion and water pollution control programs, and to provide for payment of the cost of such operation and maintenance as he determines equitable in view of the contribution of the plant to such Federal programs.

Under section 3 the Secretary would be authorized to relieve the district (1) of making any further construction charge payments under its contract and (2) of any interest accrual of its total obligation until the initial delivery of water is made from the desalination plant.

The amounts already paid by the district, totaling \$218,364.62, would be refunded by the Secretary. The remaining obligation would be rescheduled over a period not to exceed 50 years from the date initial delivery of water is made from the plant. The provisions of section 3 would be implemented through an amendatory repayment contract.

Incurred first-stage reimbursable construction costs of the Foss Division allocable to the district total about \$6,626,000. This includes \$1,155,000 for dam and reservoir costs and \$5,471,000 for aqueduct costs. Interest during construction computed through June 30, 1966, amounts to \$916,000 bringing the total obligation to \$7,542,000.

Repayment is scheduled over a 50-year period, with annual installments varying from \$148,000 to \$390,030, according to the water demands anticipated when the repayment contract was negotiated. The first payment was made in full in 1965. About 56 percent of the 1966 payment has been received by the Government.

These payments have created a heavy financial burden on the cities which have marketed no M. & I. water from the project. Until the water is of such quality that it can be marketed, the district will not have sufficient income to make the payments due under the contract.

A combination of circumstances has placed the district in a position of having no salable water to produce the revenue necessary to finance a large existing debt and also being confronted with the need to finance and construct extensive additional facilities to desalt and treat a poor quality of water which appears to be the only feasible remaining long-term source of supply.

The act of Congress approved February 25, 1956, authorized the construction, operation, and maintenance of the Washita River Basin project for municipal and industrial water, irrigation, flood control, fish and wildlife, and recreation purposes.

First-stage construction of the Foss Division was essentially completed December 31, 1964. This included the dam and reservoir, appurtenant facilities, an aqueduct and pumping plants for delivery of municipal and industrial water, and operation and maintenance headquarters and caretaker buildings.

The responsibility for operation and maintenance of first-stage facilities was transferred to the Foss Reservoir Master Conservancy District, effective January 1, 1965.

Until late in 1966, it was contemplated that the district would construct and operate a central water treatment plant for treating and softening project water for its member cities. Because the member cities were unable to agree on the need for a central treatment plant and a method of financing it, considerable time has elapsed since the initial storage of water in Foss Reservoir.

During 1965, plans were developed by a firm of consulting engineers retained by the district to construct a 3-million-gallon-per-day conventional treatment plant. Finances to the extent of \$365,000 were assured by the Community Facilities Administration under a bond purchase arrangement. While the loan was still under consideration by the CFA, the consulting firm withdrew and a new firm was retained by the district.

After much further examination and investigation of the water quality of Foss Reservoir, the new consulting firm determined that water quality was such that conventional treatment would not produce a potable water supply.

The firm recommended desalination. Attendant to desalination would be the effect of brine disposal on water pollution control down stream from the dam. Construction costs and operation and maintenance of the desalination plant and brine disposal system would exceed the financial resources of the district.

The consulting firm for the district estimated that construction of a 3-million-per-day desalination plant would cost about \$2 million, plus the cost of brine disposal facilities. This estimate has been confirmed by the Office of Saline Water.

The water quality section of the Bureau of Reclamation's definite plan report for the Foss Division, dated January 1958, estimated that the Foss Reservoir releases would contain 750 parts per million total dissolves solids and 391 parts per million of sulfates.

This predicted quality was based upon insufficient hydrologic data, the assumption that there would be average runoff, that the irrigation portion of the project would be in operation, and that the cities would be using their entire space allocations to provide cyclic operation of the reservoir.

The report further estimated that the total dissolved solids would be exceeded in many years even with the project in full operation. The statement is made in the definite plan report that—

Local interests have been alerted to the fact that the chemical quality of water at Foss is poor, especially from a sulfate standpoint.

The district's board of directors was aware that the quality of water would be poor. Recent water samples from the Foss Reservoir show that the level of total dissolved solids is about 1,780 parts per million, and the level of sulfates is near 900 parts per million, which then greatly exceeds the original estimates.

It is generally accepted by water quality specialists that (1) conventional chemical water treatment and softening are suitable for water with total dissolved solids up to about 950 parts per million; (2) conventional chemical treatment and softening plus desalination are suitable for water with total dissolved solids between 950 and 3,500 parts per million; and (3) above 3,500 parts per million, some type of vaporization is required.

Based on this assumption the average quality water from Foss Reservoir would require desalination for municipal and industrial use. However, if the quality of the water in the reservoir should be under 950 parts per million, it would be possible to bypass the desalination phase at the treatment facility.

Evaporation from the reservoir and low inflows during the initial storage period have contributed to the present salinity of water in Foss Reservoir. About these reductions in flows the Interior Department's Consulting Board made the following comment:

An analysis of SCS practices to date, a matter that will be dealt with in depth in the second phase of the Board's activity, indicates that conservation activities, such as terraces, checks, ponds, hydraulic flood control structures, seeding and so forth, are accomplishing their purpose. This program in the Foss watershed is substantially complete.

Studies such as double mass plots and regression and component analyses show a definite negative correlation of this program to runoff. The input into the Foss site over the last 41 years of record—1926 to 1966—ranges from 225,000 acre feet per year (AFY) to 11,000 AFY, with an average of 73,700 AFY. The DPR estimated 31,300 AFY yield from Foss. Based on the above-noted SCS practices, particularly the effect of the 201 flood detention structures and assuming average rainfall, no appreciable number of new structures, unchanged operation of the existing structures and no marked changes in land treatment and land use practices, the reduced input and yield level would probably be of the order of approximately 50 percent \* \* \*.

That is the end of the quotation from the Board's report.

That Board is making a further study of the effects of the watershed programs on both the quantity and quality of water reaching Foss Reservoir; we will furnish you a copy of its study when we have received it, and we have asked that it be completed by about October 1.

Reservoir storage, total dissolved solids, total hardness expressed as  $\text{CaCO}_3$  and sulfates of the reservoir water were determined by the U.S. Geological Survey from November 1963 through September 1966.

Analysis of these data indicates that under conditions actually experienced, water quality has been poor continuously from near the beginning of storage to the present time.

In general, the quality deteriorates when reservoir content remains constant or decreases, and improves with increased storage. This is due to concentration by evaporation, high total dissolved solids con-

tent of low inflows, and increasingly better quality water as rates of inflow increase. Only a very small amount of water has ever been released from the reservoir, and there have been no flood inflows. Flood inflows could have a beneficial effect on water quality.

In its report to the Secretary of the Interior, the Department's Consulting Board recommended that—

1. Pilot-scale studies on both electro dialysis and reverse osmosis be conducted at the Foss Reservoir site prior to selection of production level process type, and that short-term water supply alternates to Foss be utilized by the cities in the interim, if necessary;

2. Based on the studies, a desalination plant be constructed to produce 2 million gallons per day to meet the supplemental water needs of the district until 1980;

3. The method of concentrate disposal from the desalination plant be subject to detailed systems analysis of water management for the Foss Division of the Washita River Basin project;

4. Water from the treatment plant meet the drinking water standards of the Public Health Service and be of a hardness suitable for consumer acceptance; namely, total dissolved solids of 500 parts per million, sulfates of 250 parts per million, and total hardness of 100 parts per million;

5. Reclamation be designated to select and design the aforementioned plant;

6. Because water of a quality superior to that originally anticipated by the district will be realized, costs of the desalination treatment facilities be shared between the district and the United States;

7. Reclamation be instructed to investigate the alternative sources of water for the district; and

8. More quantity and quality data be obtained at the reservoir and in its watershed, to permit better evaluation of the problem.

In light of the Board's recommendations, we recommended in our departmental report that a substitute bill be enacted which is slightly different from the one introduced by Senators Monroney and Harris.

Under section 1 of our proposed substitute bill, the Secretary of the Interior would be authorized to conduct feasibility studies to examine alternative conventional water sources and the most economic method of resolving water quality problems at Foss Reservoir. The Department's Consulting Board has advised that short-term alternatives possibly could be developed but that Foss Reservoir is the only available long-term source of supply.

Our proposed legislation and the report on the bill recognizes that there is an obligation on the part of the United States to assist in rectifying the present problem on the Foss storage and we think that the proposed legislation represents an equitable solution to all parties.

As a result of this experience we recognize that the relationship between prospective upstream watershed treatment and storage developments and downstream flows is a matter which must be given increasing consideration in the planning, construction, and operation of future water resource storage projects.

Section 2 of our proposed substitute bill is very similar to section 3 of S. 1946. It would also authorize the Secretary to reduce the district's repayment obligation by the amount necessary for the district to finance a recommended solution. With the relief afforded by this action, the district would have the financial resources necessary to develop an interim water supply.

Section 1 of S. 1946 provides an option for the construction of the treatment plant by either the district or the Secretary. Our proposed substitute bill would only provide for such construction by the district with the plans approved by the Secretary.

Section 3 would authorize the Secretary to utilize any funds available to him to carry out the purpose of the bill.

Because this is an urgent and critical problem, Mr. Chairman, and one that we are anxious to see resolved as quickly as possible, we do hope that our recommended legislation receives favorable consideration by the Congress.

Senator ANDERSON. It was authorized in 1956, and this is 1967, but there has been no use at all to the present time. And you say it is recognized that there is an obligation on the part of the United States to assume this. Did the Government of the United States push this project, Mr. Holum?

Mr. HOLUM. When I say an obligation on the part of the United States, I think an obligation on the part of the United States to the conservancy district and the cities that have contracted with us and assumed a repayment obligation totaling \$7 million for a water supply that is not usable under present conditions.

Senator ANDERSON. Is that the fault of the Government?

Mr. HOLUM. Yes, Mr. Chairman, I think in part it is. The definite plan report indicated that the water would be not good, but not really as bad as it is, about 700 parts per million total dissolved solids.

We have not produced that type of water. The water is much worse than any of the parties expected it would be when the conservancy district assumed this contractual obligation with us.

Senator ANDERSON. Were you here when the hearing was conducted in 1955?

Mr. HOLUM. Not personally. I know the record makes it clear in 1955 that water would not be of good quality.

Mr. ANDERSON. I don't believe it does.

Mr. HOLUM. I have seen a quotation that I thought came from the hearings in 1955 or 1956 where recognition was given to the fact. I don't know whether it came from the House hearings or the Senate hearings, or what part of the record it was, but I have seen this one quotation.

(Following the hearing the Department of the Interior submitted additional information as follows:)

DEPARTMENT OF THE INTERIOR,  
OFFICE OF THE SECRETARY,  
Washington, D.C., August 15, 1967.

HON. CLINTON P. ANDERSON,  
Chairman, Subcommittee on Water and Power Resources, Committee on Interior and Insular Affairs, U.S. Senate, Washington, D.C.

DEAR SENATOR ANDERSON: During the hearings of August 10, 1967, before your subcommittee on S. 1946, a bill "To amend the repayment contract with the Foss Reservoir Master Conservancy District, and for other purposes," a number of questions were raised by the committee members as to the differences between predictions of water quantity and quality made during the planning and authori-

zation period as compared to the situation that exists today. We believe the data furnished by the enclosed table may be helpful to you and your subcommittee in considering the merits of the bill.

While specific numbers as to quantity and quality cannot be assigned to each factor listed on the enclosed table, we believe that the Definite Plan Report included sound estimates based on available data on conditions existing at that time. The conditions on which these estimates were based have changed, thereby affecting the quantity and quality of water in Foss Reservoir.

Sincerely yours,

KENNETH HOLUM,  
*Assistant Secretary of the Interior.*

[Enclosure]

	Basis of 1957 DPR estimates	Actual 1961-66
Annual flows (acre-feet)....	31 years of record 1926-56 <sup>1</sup> .....	Only 6 years of record 1961-66. <sup>2</sup>
Maximum.....	206,000 (1934).....	37,800 (1962).
Minimum.....	7,846 (1956).....	8,400 (1966).
Average.....	67,500.....	21,800.
Sources of runoff.....	From upper watershed grassland (best quality water) and the lower broken lands of the Permian red beds (gypsum outcrop and poorer quality water).	Largely the lower watershed as the runoff from storms on the upper watershed is largely held in the detention reservoirs.
Watershed detention structures.	50 planned of which 33 had been constructed.	205 planned of which 201 constructed.
Outlet works.....	Bottom of pool so as to drain detention reservoir after each storm.	Placed high for large sediment pool so that reservoirs are currently holding approximately 36,000 acre-feet in storage.
Foss Reservoir operation....	Cyclic, with annual releases and inflows about equal after initial storage.	All water reaching reservoir has been held since 1961, thereby retaining all salts and increasing concentration by evaporation.
Evaporation from water surfaces as a concentration of salinity.	Only from Foss Reservoir with surface area decreased by cyclic operations as inflows decreased.	From 5,000 surface acres of Foss accumulated storage since 1961, plus approximately 5,000 acres of water surface in detention reservoirs and stock ponds on watershed.
Water quality:		
Total dissolved solids....	750 parts per million.....	1,780 parts per million.
Sulfates.....	391 parts per million.....	900 parts per million.

<sup>1</sup> Flows at Foss damsite adjusted to reflect effects of estimated depletions resulting from Soil Conservation Service operations.

<sup>2</sup> Inflows into Foss Reservoir.

Senator ANDERSON. You say on page 4 of your statement:

After much further examination and investigation of the water quality of Foss Reservoir, the new consulting firm determined that water quality was such that conventional treatment would not produce a potable water supply.

Who examined that?

Mr. HOLUM. Which paragraph is that?

Senator ANDERSON. On the bottom of page 4, you talk about a new consulting firm:

The new consulting firm determined that water quality was such that conventional treatment would not produce a potable water supply.

Mr. LANGLEY. That consulting firm is the consulting firm that is represented here today with the city and district, Phelps, Spitz, Ammerman & Thomas, Inc., of Oklahoma City.

Senator ANDERSON. What processes would you use to clear up this water situation?

Mr. HOLUM. For desalting?

Senator ANDERSON. Yes.

Mr. HOLUM. Jack Hunter, who is in the room, may want to supplement what I want to say, but I am sure that Mr. Hunter would agree that electro dialysis is the process immediately available to deal with problems such as this. I know he and his department have hopes

for the reverse osmosis process which is not commercial at this time, and I think they agree it would be a good process here.

This is Mr. Hunter.

Mr. HUNTER. I quite concur in the Secretary's statement.

Senator ANDERSON. Do you think there is a process ready now to improve this water so it can be utilized?

Mr. HUNTER. Yes. The electro dialysis process would be suitable.

Senator ANDERSON. Where is it now used?

Mr. HUNTER. We now have a similar process operating at Webster, S. Dak., and the water there is very similar.

Senator ANDERSON. You think that this system would achieve the necessary results?

Mr. HUNTER. Yes, sir; you could produce satisfactory water by that process at the present time.

Senator ANDERSON. What is the benefit-cost ratio now?

Mr. HUNTER. The cost of that plant, of course, being an experimental plant, would not be directly comparable. It has extra features in instrumentation.

I was going to say if you were to build a production plant on a straight commercial proposition, we would estimate the cost of water at about 80 cents a thousand gallons.

This is not a commercial——

Senator ANDERSON. It has not achieved the 80 cents?

Mr. HUNTER. We have not built a plant of this size, either, sir, and this would produce savings.

Senator ANDERSON. What is the other process?

Mr. HUNTER. The reverse osmosis process.

Senator ANDERSON. Where is that in operation?

Mr. HUNTER. It is not in operation. It is in late laboratory stages. We have constructed an experimental unit at 50,000 gallons per day, and the process is an extremely promising process. For this particular type water, we think when it has been proven for production operation, it should produce a more economic solution, and this is one reason why we would like to have the opportunity to directly test this process in pilot plant form on the particular water to determine its ability to be considered for a production plant.

Senator ANDERSON. But you haven't yet tested it?

Mr. HUNTER. We have not yet built any production plants.

Senator ANDERSON. How can you estimate the figure?

Mr. HUNTER. This is based upon the energy requirements for the process, and upon the current production of small quantities extrapolated to a larger production run, the cost components there.

I readily admit it is not the commercially proven process in this size unit.

Senator ANDERSON. If you sold that water you improved, what price would you get for it?

Mr. HUNTER. The question of price of water, I think, is not really within my province. I can only say that because of the improved quality the water should be more valuable to the user than the marginal quality that was projected for this reservoir in the first place.

Senator ANDERSON. Would it be 30 or 50 cents per 1,000 gallons?

Mr. HUNTER. No. I would estimate it would be more nearly, again on a commercial financing basis, more nearly 60 cents.

Senator ANDERSON. If it is only worth 60 cents, can you make it less than a dollar?

Mr. HUNTER. We do make desalted water for less than a dollar. These figures of \$1 are related to sea water. The most recent plant to go in operation is the Florida Keys aqueduct plant, which produces water for about 85 cents.

Brackish water is somewhat more easily desalted and the cost would be somewhat less.

Senator ANDERSON. You have two plants. Does either of them show any promise at the present time?

Mr. HUNTER. We have only one plant that is comparable to this situation and that is the Webster plant. The other plants we have are a distillation process, and these are generally for sea water with the exception of Roswell, which is extremely difficult water.

So the only thing that is comparable to the Foss Reservoir, is the Webster, S. Dak., plant.

Senator ANDERSON. If you have an automobile and it sells for \$600, and the manufacturing cost is \$1,000, you wouldn't make very much of a profit?

Mr. HUNTER. That is right.

Mr. ANDERSON. If water is sold at 60 cents, I don't think it would be a very profitable venture. I am sorry, but I have mixed up with these plants somewhat, and I think it is not safe to say this is justified.

If you have sold it and said, "We sell it to this town at 60 cents and take up the loss of it," I think that would be a pretty poor risk.

Mr. HUNTER. I might point out, sir, that the cost of water is very much subject to the financing terms involved.

One of the prices I spoke of, which I emphasized was related to a straight commercial venture—

Senator ANDERSON. I am sorry. We have a quorum call. We will have to adjourn until 2:30.

(Whereupon, at 12:35 p.m., the subcommittee adjourned for a quorum call, to reconvene at 2:30 p.m. the same day.)

#### AFTERNOON SESSION

Senator ANDERSON. Does anyone else have a statement they wish to make at this time?

#### STATEMENT OF CHARLES E. ENGLEMAN, PRESIDENT, FOSS RESERVOIR MASTER CONSERVANCY DISTRICT, CLINTON, OKLA.

Mr. ENGLEMAN. Mr. Chairman, I am Charles Engleman, president of the Foss Reservoir Master Conservancy District, and I would be pleased to make my statement at this time.

Senator ANDERSON. We would be pleased to have you make your statement at this time.

Mr. ENGLEMAN. Mr. Chairman, it is a privilege to be able to appear before you today in behalf of Senate bill 1946 and the substitute. It is gratifying to us, Mr. Chairman, to know that you are conducting this hearing.

Some of us remember several hearings conducted on this project in the past years during which your sound judgment concerning the role of Federal Government in the development of flood control and water resources was greatly appreciated.

There are three of us here today who remember the sound judgment you displayed on the matters of flood control and water resources development. We appreciate that and we do appreciate your long record of service to the Senate and to your State and to the country.

We know that you remember a lot about this project in the early stages.

Senator ANDERSON. I do and I also know my great and good friend Bob Kerr was very much interested in this. He took me one time to Oklahoma City to meet all kinds of water workers.

Mr. ENGLEMAN. That is right. This was one of his pet projects.

I think we have to remember today we are talking of some of the things he said about it. This project probably was not for the people who were working on it at the time but it was for their children and grandchildren who would reap the benefits.

There are some people here who were not introduced by Senator Monroney this morning and we appreciate their coming up, taking time off from their business and appearing even though some of them will not make a statement.

I would like to name the entire group briefly.

Hon. Tom Crider, mayor, city of Cordell, Okla.; Hon. James M. Smith, Jr., mayor, city of Clinton, Okla.; Mr. Frank Raab, from Oklahoma City, representing the National Reclamation Association; Hon. Pete Simmons, mayor, city of Hobart, Okla.; Mr. Paul Nonast, representing the mayor of Bessie, Okla.; Mr. L. A. Collier, representing the mayor of Hobart, Okla., and a member of the Foss Reservoir Master Conservancy District Board of Directors; and Mr. Joe Phelps, consulting engineer for the Foss Reservoir Master Conservancy District and a member of the Oklahoma City engineering firm of Phelps, Spitz, Ammerman & Thomas, Inc.

Senator ANDERSON. Now that you have brought these people here they can be helpful to all of us.

Mr. ENGLEMAN. Thank you, sir.

We believe, Mr. Chairman, that this statement which I have prepared and submitted for the record was prepared largely in support of Senate bill 1946 but since we arrived here the new substitute bill has been shown to us and we believe that although it is not a final solution to our problem, we believe it is a step in the right direction so we are glad to go on record as supporting the substitute bill.

I believe that passage of this legislation will clear the way for solutions, or at least a partial solution, to the critical water quality problems at Foss Reservoir in western Oklahoma—a Bureau of Reclamation project virtually completed since 1962, but still not usable as a municipal water supply.

By virtually complete I mean that the only construction work remaining on the dam and aqueduct is a short gap just below the dam—for installation of a water treatment plant—and the final hookups between the aqueduct and the four distribution systems of the project cities. However, this completion must await solution of the water quality and treating problems at the reservoir.

Senator ANDERSON. Many years ago I suggested much of this could be done by desalinization. We had a report from the Atomic Energy Commission concerning water treatment plants.

I asked one scientist about the relationship of atomic energy to this water program. He got very much interested and he wrote a paper published in 1955. Subsequently, he had calls from a number of people to discuss this and he is now fulltime with the Department of Interior on the saline water program. He predicts now they will have energy which will not only produce potable water at reasonable prices but even at agricultural prices. He thinks this is 15 years in the future. This price range will be reached in time and possibly much earlier than it has ever been thought. The utilization of brackish and saline waters is very important and I am going to help all I can with development of practical processes.

Mr. ENGLEMAN. That certainly sounds interesting, sir, and I hope that works out.

While I am thinking of it, you asked a question earlier today about whether this water could be used to irrigate or not. It is now being used just below the dam for irrigation in a small way where people pump out of the stream below the reservoir. To our knowledge, no adverse effects have been reported.

When I said not usable a moment ago, I think that, too, has been mentioned here today and everybody agrees that that is true. The water has an extremely offensive, obnoxious taste and has a high concentration of epsom salts and similar dissolved solids. It must be classified as not potable, not fit to drink.

We have some water here today in three stages, the raw stage after treatment with the so-called soda ash softening and filtering, and some that would be similar to demineralized water. If any members of the committee would care to taste it, we have it on hand.

The cities of Clinton, Bessie, Cordell, and Hobart, together with the Foss Irrigation District, have been included in the Foss Reservoir Master Conservancy District since it was created by the Oklahoma Supreme Court in 1957.

These cities contracted with the district, and the district with the Bureau of Reclamation, to repay approximately \$8 million of the construction costs of the Foss project, plus interest, in return for municipal water allocations of 9 million gallons per day.

The cities of district now find themselves in the unfortunate position of paying for water their citizens cannot drink. The situation cannot be solved by conventional soda ash softening and filtering of the water, for that does not remove the dissolved solids—or the obnoxious taste—nor the undesirable effects of the epsom salts, according to the opinion and judgment of the engineers we consider thoroughly reliable.

After a long period of misunderstandings, delays, frustrations, and disappointments, district board members finally received approval, with the able assistance of Senator Mike Monroney and other members of the Oklahoma delegation, for a \$365,000 loan from the Community Facilities Administration last year for the purpose of building a conventional water treating and softening plant.

But before the loan was advanced, the newly named consulting engineers for the district discovered and reported to the board members that even after treatment in that conventional plant, the Foss water would still contain approximately 1,600 parts per million of dissolved solids, or even more.

They recommended that the plant should not be built unless equipment for demineralizing the water could be included. So, board members decided to cancel plans to build the conventional plant.

Demineralization of the Foss water, however, will be expensive, so expensive, in fact, that it is far out of the reach of the financial ability of the project cities, if contract repayments as now scheduled are also met.

All of the project cities have paid the first annual contract repayment, and three of them have paid a second annual contract repayment—altogether totaling about \$220,000.

The third annual repayment is due September 1, 1967. In addition, the four cities have contributed nearly \$75,000 during the past 32 months for the operation and maintenance of the Foss project works during its current "mothball" period.

Month after month, year after year, week after week, interest under the repayment contracts is accruing at a current rate of about \$448.50 per day.

But not one drop of water has been delivered to the cities. If it were delivered to the cities at the present time, in its present condition, it could not be used.

So, what is the future of Foss Reservoir at this point, nearly 10 years after our cities agreed to pay for, and the Bureau of Reclamation agreed to deliver, municipal water for this usually productive, but frequently drought-stricken area of western Oklahoma?

Can it be possible that the 50,000 or so people in this area will see their high hopes for Foss Reservoir as a dependable, plentiful water supply become a mere mirage?

Demineralization—one of the new wonders of modern technology—could salvage the municipal phase of this project. With modern demineralization equipment, and its operation, the reservoir could be "rescued" and made to fulfill its full mission.

With officials of these project cities trying to stretch budgets in order to meet already contracted dam and aqueduct repayments and worried about meeting other operating costs of the project, and costs of maintaining present systems, it becomes crystal clear to us that the cost of demineralization is far beyond the ability of the district cities to meet.

That is why our delegation is appearing before you today, Mr. Chairman. Included are mayors, conservancy district board members, and representatives of mayors of the four Foss project cities.

I feel and they feel that the immediate passage of Senate bill 1946 or the Department of the Interior substitute bill is important, vital, and necessary if Foss Reservoir is to fulfill its destiny as a dependable municipal and industrial water supply.

Most of the people of western Oklahoma are descendants of self-reliant pioneers and frontiersmen. They do not expect the Federal Government to furnish them with drinking water.

So, neither our cities nor our conservancy district are asking for municipal water at any less cost than they agreed to pay, and the Bureau of Reclamation agreed to deliver, when repayment contracts were signed in 1958 and 1959.

But, if the Foss water is to be made potable and usable for municipal purposes, the necessary demineralization must become a Federal responsibility, as Senate bill 1946 provides.

And the demineralization should be planned for an eventual treatment capacity of 9 million gallons per day as contracted for by the district and its cities. The first phase must provide a capacity of at least 3 million gallons per day.

With any less capacity, the project cities could not meet our expected summer demands from the reservoir unless they continued the expensive, frustrating practice of drilling more low-producing wells, repairing obsolete water treatment plants, and otherwise spending money on presently inadequate water systems.

I would like, Mr. Chairman, to submit for the record water consumption reports for the four project cities from the Oklahoma State Department of Health showing that the average daily summertime use by the four cities amounts to more than 4 million gallons per day.

Senator ANDERSON. We will place those figures in the record. (The table referred to follows:)

## APPENDIX A

## WATER CONSUMPTION DATA FROM THE RECORDS OF THE OKLAHOMA STATE DEPARTMENT OF HEALTH, STATE CAPITOL, OKLAHOMA CITY, OKLA.

*Average daily usage of municipal water during the 3 summer months of June, July, and August, 1966*

City:	Daily average for 3 months (gallons)
Cordell, Okla.-----	781, 500
Hobart, Okla. <sup>1</sup> -----	818, 330
Clinton, Okla-----	2, 450, 000
Bessie, Okla. <sup>2</sup> -----	35, 000
Total-----	4, 084, 830

<sup>1</sup> According to records of Hobart's city clerk, as reported by the mayor of Hobart, that city's average daily water usage during June, July, and August of 1966 was 1,342,500 gallons.

<sup>2</sup> According to Bessie City records.

Mr. ENGLEMAN. Population increases and new industries are expected to increase that average daily summertime usage to a level of 5 million gallons per day within the next 2 years, especially if potable water can be furnished from Foss Reservoir.

While present water systems could be used for peaking purposes during the first few years of project operation, the least amount of money required for the maintenance of the old systems naturally is preferred by the project cities.

And any less than 3 million gallons of daily demineralization capacity at the dam would be so inadequate that the confidence of the cities in Foss Reservoir probably would not be restored, unless alternative water sources could be developed through a feasibility study.

In all fairness, the money already paid to the Bureau of Reclamation by the district as dam and aqueduct construction repayments should be refunded, with no construction repayments due until potable, demineralized water is available. This is a provision in the substitute bill.

In all fairness, the district and the district cities should be reimbursed for the amount of project operation and maintenance costs during the present "mothball" period.

In all fairness, the interest on dam and aqueduct repayments should not begin accruing until potable, demineralized water is available to the project cities from the reservoir.

The cities should not be expected to continue to pay for what they cannot get or use.

Civic leaders and people of the district had no warning nor information from the Bureau of Reclamation nor any other source that demineralization of Foss water would be needed to make it potable—neither during the contract negotiation period nor later—until the district's present consulting engineers, Phelps, Spitz, Ammerman & Thomas, made the discovery of the extent of natural pollution in Foss Reservoir last year and courageously recommended that the conventional water treatment plant, which they had been employed to design, not be built.

The conservancy district and project towns are indebted to them for their assistance and advice.

These engineers, after extensive and intensive research by them and the district directors, have designed what we believe are excellent plans for a Foss water treatment plant, one which would include the most advanced type of demineralization treatment, as well as a conventional filtering and softening system.

A feasibility study launched jointly by the Secretary of the Interior and the Foss Reservoir Conservancy District, with the assistance of the qualified technicians from the Office of Saline Water, the Water Pollution Control Administration, and possibly from one of our Oklahoma universities could be of tremendous value to people facing similar problems in many other areas of the Nation.

This program of dealing with natural pollution in water is just as important as the search for ways to cope with manmade pollution.

Mr. Chairman, I would like to submit for the record reprints from the Bureau of Reclamation's Project Planning Report No. 5-13.02-2, dated September 1951, pages 92 and 88. I have been informed that this same information was included in the Bureau of Reclamation's final definite planned report for the Washita Basin project—appendix B and C.

Senator ANDERSON. We will put those in the record.  
(The data referred to follow:)

#### APPENDIX B

(Reprinted From Page 92 of the Bureau of Reclamation's "Plan of Improvement for Washita River Sub-Basin"—Project Planning Report No. 5-13.02-2, September, 1951, Serial No. 141)

The hardness of water probably is of greatest concern to cities. Calcium and magnesium bicarbonates and sulfates are the soap-consuming constituents usually found in water.

It is generally agreed that the following terminology may be applied to waters of different hardness: water having a hardness of less than 60 p.p.m. is generally rated as soft, and its treatment for the removal of hardness for ordinary use is not essential. Hardness between 61 and 120 p.p.m. is not generally objectionable. Water having a hardness in the range of 121 to 180 p.p.m. is noticeable, and if the hardness is above 180 p.p.m., it is common practice to soften the water for household use.<sup>1</sup>

Water from Foss Reservoir would be suitable for municipal use with treatment. It is within the limits recommended by the Public Health Service except for sulfates which make up a large part of the hardness content (383 p.p.m.), and the need for softening is indicated.

Water from Fort Cobb reservoir is of better quality for municipal use than that from Foss reservoir and is much better than that now used by Anadarko and Chickasha. It is within the limits recommended by the Public Health Service. The weighted average hardness (242 p.p.m.) is higher than desirable and a softening plant would be justifiable.

<sup>1</sup> Collins, W. D., Lamar, W. L., and Lohr, E. W., The Industrial Utility of Public Water Supplies in the United States, 1932, U.S. Geological Water-Supply Paper 658.

## APPENDIX C

(Reprinted From Page 88, Table 30, of the Bureau of Reclamation's "Plan of Improvement for Washita River Sub-Basin"—Project Planning Report No. 5-13.02-2, September, 1951, Serial No. 141)

TABLE 30.—QUALITY OF WATER SUMMARY, WASHITA RIVER AT FOSS DAMSITE

Item	Total dissolved solids	Total hardness as CaCO <sub>3</sub>	Cations			Anions		
			Ca	Mg	Na+K	CO <sub>3</sub> +HCO <sub>3</sub> <sup>1</sup>	SO <sub>4</sub>	Cl+NO <sub>3</sub> <sup>1</sup>
Maximum:								
P. p. m.-----	1,740	1,360	328	141	97	301	1,120	49
E. p. m.-----			16.37	11.60	4.21	4.93	23.32	1.37
Percent-----			66	42	30	54	89	10
Minimum:								
P. p. m.-----	236	171	44	15	3	116	79	4
E. p. m.-----			2.20	1.23	.15	1.90	1.65	.11
Percent-----			47	21	1	9	41	2
Weighted average:								
P. p. m.-----	536	383	103	31	20	130	286	15
E. p. m.-----			5.11	2.56	.85	2.13	5.96	.43
Percent-----			60	30	10	25	70	5

<sup>1</sup> Predominantly HCO<sub>3</sub> and Cl.

Mr. ENGLEMAN. In brief, this information states that—

Water from Foss Reservoir would be suitable for municipal use with treatment. It is within the limits recommended by the Public Health Service except for sulfates which make up a large part of the hardness content—383 ppm—and the need for softening is indicated.

Table 30 shows a "weighted average" of total dissolved solids of 536 parts per million, and a total hardness "weighted average" of 383 parts per million.

Actually, analysis of water samples taken by the district's consulting engineers, and records of those taken by our previous consulting engineers, indicate that during most of the past 5 years, total dissolved solids has ranged from 1,600 to 1,800 parts per million and above, instead of the predicted average of 536 parts per million.

Recent tests show that total hardness at the reservoir is 958 parts per million instead of the estimated "weighted average" of 383 parts per million.

How much of the blame for this situation can be laid to low inflow, either because of lack of heavy downpours above the dam or because of the construction of 207 water-storing detention reservoirs on tributaries above the dam by the Department of Agriculture, is problematical.

But we are not looking for someone to blame at this point. We can attest to the good faith of all parties and interests involved. We are not looking for scapegoats, we are looking for solutions.

We do know that inflow has been slow, and at the present time, more than 5 years after the dam was closed, the reservoir still is less than one-third full. This has not been due entirely to drought conditions, as bumper crops have been produced in all parts of the watershed during the past 5 years.

Low inflow, plus evaporation, could have increased the concentration of natural pollution in the reservoir, but analysis of Washita River water, both below and above the reservoir over a long period of time, indicate similar natural pollution of dissolved solids.

So, there seems to be no proof that the quality of Foss Reservoir water will improve substantially even with faster watershed runoff and reservoir inflow.

None of the blame for this deplorable water quality situation can be attributed to the people living in or near the Foss Reservoir Conservancy District. It should be understandable, then, why they are not willing to accept water which fails to meet U.S. Public Health Service standards, and which is of substantially worse quality than that which they are now using.

We cannot adopt a wait-and-see attitude. It has been nearly 10 years since the contracts were signed. If our cities cannot look to Foss Reservoir as a dependable supply of good municipal water, they must then face another frustrating necessity, that of trying to get by on low-producing wells from unpredictable underground sources, or trying to build extremely small reservoirs.

For a long time we have known—after 25 years or more of searching—that Foss Reservoir is the only municipal water supply available in our area of sufficient size to serve our long-range future needs.

There is a widespread, sincere desire on the part of the leadership of Foss project cities and our conservancy district to live up to all of the terms of the repayment contracts.

We are fearful, however, that if demineralization of Foss Reservoir water is not accepted as a Federal responsibility or if alternative water sources are not developed, there will be no possible way for the project cities to carry out their part of the contracts.

Because of the unique aspects of this case, we do not believe that Federal financing of demineralization would set a precedent for installing water treatment facilities for any other municipalities.

By extending our financial ability to the ultimate, the Foss project cities will be able and willing to meet all of our commitments, as rescheduled under Senate bill 1946 or the Department of Interior substitute bill, and including the cost of conventional filtering and softening.

We can foresee no alternative, however, to demineralization of Foss reservoir water or the development of alternative water sources as a Federal responsibility, for although the contracts did not guarantee the quality of the water, neither did they warn us that the Foss water might not be fit to drink.

We are perfectly willing, however, to cooperate with the Secretary of Interior's expressed desire to conduct feasibility studies during a reasonable period of time before recommending solutions to the current problems of the poor water quality and supply of water stored in Foss Reservoir.

Gentlemen, we thank you for your courtesy and attention.

Mr. Chairman, you asked about the urgency of the thing. It is just the fact that we needed the water 10 years ago and we need the water now and it is as simple as that.

Senator ANDERSON. You planned it and completed it in 1962?

Mr. ENGLEMAN. I say it was permanently completed in 1962.

Senator ANDERSON. One of your statements said that none of your citizens should be blamed about this situation. Who should be blamed then?

Mr. ENGLEMAN. We are not here to assess blame on anybody and we are not looking for scapegoats; we are just looking for solutions.

Senator ANDERSON. Someone must have designed this, and someone must have advocated and someone must have pushed it through the Congress. Whose fault was it?

Mr. ENGLEMAN. Well, we just do not think it was our fault. A lot of times, Senator, and I am sure you have cities the same way in your State, we are faced with rationing water to some of our towns practically every year—we need the water. That is the urgency of it, and we agreed to pay for it, and we are willing to pay for it.

Would any of the members of the committee care to taste some of this water?

Senator ANDERSON. It just happens many of us have tasted saline water from plants that have been operating, and I think we know the taste.

Do you have an agreement that is signed that could be filed?

Mr. ENGLEMAN. I am sorry; I did not understand you.

Senator ANDERSON. Could you file with us the contract you have with the conservancy district?

Mr. ENGLEMAN. We do not have a copy with us, but we can get it. The Department of Interior could furnish copies of those.

(The data referred to follow:)

[Contract No. 14-06-500-322]

U.S. Department of the Interior—Bureau of Reclamation

(Washita River Basin Reclamation Project, Oklahoma—Foss Division)

CONTRACT BETWEEN THE UNITED STATES AND THE FOSS RESERVOIR MASTER  
CONSERVANCY DISTRICT

This contract, made this 14th day of *February*, 1958, between the United States of America, hereinafter called the United States, acting through the Secretary of the Interior, and pursuant to the Federal Reclamation Laws, and the Foss Reservoir Master Conservancy District, hereinafter called the District, organized and existing pursuant to the laws of the State of Oklahoma, with its principal place of business and office at Clinton, Oklahoma.

Witnesseth that:

Whereas, the Act of Congress approved February 25, 1956, (Public Law 419, 84th Congress, 2nd Session) authorized the construction, operation and maintenance of the project, and

Whereas, the District desires to contract with the United States for payment of the reimbursable costs of construction, operation and maintenance of the project in accordance with Reclamation Law, and

Whereas, the District is empowered to contract with the United States for payment of the reimbursable costs of construction, operation and maintenance of project works, and is vested with all necessary powers for accomplishment of the purposes of this contract.

Now, therefore, in consideration of the mutual and dependent covenants herein contained, it is mutually agreed between the parties hereto as follows:

#### GENERAL DEFINITIONS

1. Where used in this contract,
  - a. "Contracting Officer" shall mean the Secretary of the United States Department of the Interior or his duly authorized representative.
  - b. "Federal Reclamation Laws" shall mean the Act of June 17, 1902 (32 Stat. 388) and all acts amendatory thereof or supplementary thereto.
  - c. "Project" shall mean the Foss Division of the Washita River Basin Reclamation Project, Oklahoma.
  - d. "Project Works" shall mean all works or facilities constructed, together with land and rights of way for such works.
  - e. "Project Water Supply" shall mean that portion of the total water supply of the Washita River available through project works as allocated under the laws of the State of Oklahoma for use on District lands, or for domestic, municipal and industrial uses not to exceed, however, the amount of water that may be used beneficially on the lands of the District, and for such domestic, municipal and industrial purposes.

- f. "Year" shall mean the period January 1 through the next following December 31.
- g. "Organizations" shall mean any irrigation district, water users association, city, town or other legal entity organized under state law and which has the capacity to enter into contracts for a water supply.
- h. "Municipal Water Supply" shall mean that portion of the project water supply allocated to domestic, manufacturing, and industrial uses.
- i. "Municipal Water Facilities" shall mean pipelines, pumping facilities and related works for providing a municipal water supply.
- j. "Irrigation Works" shall mean such diversion facilities and irrigation canals, conduits and laterals, and drainage systems of sufficient size to serve the irrigable lands of the project to the extent of the available water supply therefor, and including necessary equipment, tools, and supplies.
- k. "Reservoir" shall mean the Foss Dam and Reservoir and related facilities.
- l. "First Stage Construction" shall refer to construction of the municipal water facilities and the reservoir.
- m. "Second Stage Construction" shall refer to construction of the irrigation works.

#### ALLOCATION OF RESERVOIR COSTS

2. The costs of constructing Foss Dam and Reservoir shall be allocated as follows: a. Flood Control \$11,270,000; b. Fish and Wildlife \$438,000.
- c. Municipal water supply and irrigation. All remaining costs. All such costs shall be reimbursable by the District and shall be allocated 50 percent to municipal uses and 50 percent to irrigation. Provided, however, that in the event Hobart and Rocky fail to contract for a municipal water supply, then said costs shall be allocated 48 percent to municipal uses, and 52 percent to irrigation.

#### PROJECT PLAN

3. The proposed plan of construction for the project is to construct Foss Dam and Reservoir and the required pipelines, pumping facilities and related works for regulating and delivering municipal water to the District as first stage construction. No treatment of project water for municipal or other use is included in the project plan. Second stage construction will consist of the irrigation works, including diversion facilities, irrigation canals and laterals, and drainage systems of sufficient size to serve the irrigable lands of the project to the extent of the water supply determined to be available therefor.

#### COST OF PROJECT WORKS

4. a. To the extent that funds may now or hereafter be available by appropriation, the United States will expend, exclusive of interest costs:
- (1) Toward construction of municipal water facilities and the reservoir, a sum not in excess of \$22,350,000.
  - (2) Toward construction of the irrigation works, a sum not in excess of \$4,640,000.
  - (3) Such additional amounts, if any, as may be required for completion of any portion of the project works by reason of changes in the costs of construction of the types involved in this project as shown by engineering indices. *Provided*, however, that no such additional amounts are required to be spent by the United States unless the District has executed an amendatory contract or contracts by which it agrees to repay the reimbursable portion of such additional costs.
- b. The United States will acquire equipment, tools, and supplies for use of the District in operating and maintaining irrigation works to the extent requested by the District and determined essential by the contracting officer. The total cost of these items shall in no event exceed \$125,000. Title to such movable property shall be transferred to the District pursuant to the provisions of the Act of July 29, 1954 (68 Stat. 580).
- c. When expenditures on first stage construction have been made to the limit provided in Article 4a(1) above plus any additional amounts which may have been agreed upon under the provisions of Article 4a(3), or so much thereof as the contracting officer considers necessary and useful for construction of the municipal water facilities and the reservoir, the contracting officer shall notify the District thereof in writing, and said facilities and the reservoir shall thereupon be deemed to have been completed within the meaning of this contract.
- d. When expenditures on second stage construction have been made to the limit provided in Article 4a(2) above plus any additional amounts which may have been agreed upon under the provisions in Article 4a(3), or so much thereof as the

contracting officer considers necessary and useful for construction of the irrigation works, the contracting officer shall notify the District thereof in writing, and said irrigation works shall thereupon be deemed to have been completed within the meaning of this contract.

CONSTRUCTION CHARGE OBLIGATION

5. a. The District will repay to the United States the actual reimbursable costs (including simple interest during construction on the municipal water supply allocation) incurred by the United States in constructing the project works.

b. The repayment obligation for construction of municipal water facilities and the reservoir shall not be in excess of \$10,901,500 plus interest on the unamortized balance of the allocation to municipal water use at the rate of 2.591 percent per annum. No interest charge shall be payable on the irrigation allocation.

c. The repayment obligation for construction of irrigation works shall not be in excess of \$4,640,000.

d. Said reimbursable costs, plus interest as specified, shall be the construction obligation. The construction obligation for a municipal water supply shall consist of the portion of the cost of Foss Dam and Reservoir allocated to municipal water, the cost of all municipal water facilities, and simple interest during construction on one-half of each fiscal year's expenditures allocated to municipal water, at 2.591 percent annually together with interest at the same rate annually on the full amount of such expenditures during previous fiscal years. The construction cost obligation for a municipal water supply, plus interest at 2.591 percent on the unamortized balance of the allocation to a municipal water supply shall be paid in 50 annual installments, the first of which shall become due on September 1st of the year next succeeding the year in which project works are, as announced by the contracting officer under the provisions of Article 4c hereof, complete and water is available to serve municipal users. Subsequent annual installments shall become due on September 1st of each succeeding year. It is intended that total annual installments of principal and interest shall be closely proportioned to the expected buildup in demand for water for municipal uses. For the purpose of preparing the following table, it has been estimated that the total construction obligation (including simple interest during construction) allocated to the municipal water supply will be \$8,158,000. Payments shall be made in accordance with the following schedule until the actual reimbursable construction costs have been determined, at which time this table shall be corrected, and the remaining annual installments payable by the District shall be adjusted to provide repayment of the actual reimbursable construction costs over the contract period.

*Annual installments*

<i>Number</i>	<i>Payment</i>	<i>Number</i>	<i>Payment</i>
1	\$179,990	26	\$332,090
2	185,360	27	337,520
3	193,210	28	343,000
4	199,750	29	348,320
5	206,130	30	353,610
6	212,780	31	357,930
7	219,310	32	362,260
8	225,700	33	366,460
9	232,340	34	370,780
10	238,830	35	375,090
11	244,940	36	379,350
12	251,120	37	383,600
13	257,080	38	387,810
14	263,080	39	391,920
15	269,180	40	395,530
16	275,030	41	399,130
17	280,980	42	402,250
18	287,050	43	405,330
19	292,990	44	408,400
20	298,890	45	411,460
21	304,430	46	414,500
22	310,120	47	417,520
23	315,500	48	420,550
24	321,110	49	423,550
25	326,540	50	406,800

e. After complete repayment of the reimbursable construction obligation of the project allocated to municipal uses, annual payments to the United States by the District (from payments by the users of the municipal water supply) shall continue at the same rate until that portion of the construction cost of the reservoir allocated to irrigation is fully repaid. Following complete repayment of the reimbursable construction costs of the reservoir, said annual repayment rates shall continue so long as the costs of irrigation works are unpaid.

f. When the irrigation works are completed as the second stage of construction, as determined and announced by the contracting officer under Article 4d hereof, the construction cost obligation for such works shall be repaid to the United States by the District in 55 equal annual installments beginning with September 1 of the first year following the close of the development period; *Provided*, however, that repayment of this portion of the District's obligation may be made in accordance with a variable repayment formula acceptable to the contracting officer if the District so elects, and such variable repayment shall govern repayment by the District in lieu of the fixed payments set forth in this subparagraph.

g. Upon completion of second stage construction as determined by the contracting officer under Article 4d hereof, the contracting officer shall announce the estimated second stage construction cost. When notice of the actual second stage construction cost has been given the District, installments due thereafter from the District under Article 5f above shall be adjusted to reflect the difference between the estimated construction cost and the actual construction cost of the irrigation works.

h. If construction of the municipal water facilities and the reservoir shall have been commenced, but is terminated prior to completion by reason of lack of funds, failure to secure a valid amendatory contract, or for any other reason, the District shall then repay to the United States its proportionate share of the total amount of the construction charge obligation theretofore expended or obligated at such time and in such manner as the contracting officer may then prescribe. If construction of the irrigation works shall have been commenced, but is terminated prior to completion by reason of lack of funds, failure to secure a valid amendatory contract, or for any other reason, then the District shall pay to the United States its proportionate share of the total amount theretofore incurred or obligated at such time and in such manner as the contracting officer may then prescribe.

#### ADDITIONAL COSTS TO BE PAID BY THE DISTRICT

6. In addition to all other payments, the District shall pay to the United States on or before May 1 of the year following that in which they have been incurred, the following costs:

a. Such items for the administration, supervision, and general expenses as are properly and equitably chargeable to the District.

b. The cost of inspection and repairs to project works incurred by the United States.

#### CONDITIONS PRECEDENT TO CONSTRUCTION

7. The United States shall be under no obligation to commence, or having commenced, to continue construction of the first stage construction of the project works until water use contracts acceptable to the contracting officer have been negotiated by the District with qualified organizations, and shall be under no obligation to commence construction of second stage construction until water use contracts have been negotiated covering the irrigation water supply, which are acceptable to the contracting officer. Said contracts shall not be amended without the written consent of the contracting officer. Contracts covering delivery of municipal water by the District after the 50th year shall require that annual repayments established under Article 5e shall continue so long as the costs of the reservoir and irrigation works are unpaid.

#### OPERATION AND MAINTENANCE BY THE DISTRICT

8. a. The District shall care for, operate and maintain the project works following construction without cost or expense to the United States except as provided in Article 16, and in full compliance with the Federal Reclamation Laws, the rules and regulations of the Secretary pursuant thereto, the terms of this contract, and in such a manner that the project works shall remain in as good and as efficient operating condition, as when operation thereof was undertaken by the District. No substantial change shall be made by the District in any of the project works without first obtaining the written consent of the contracting officer.

b. The District shall make promptly any and all repairs to the project works which the contracting officer may determine are reasonably necessary. If the contracting officer determines that any part of the project works is for any cause unfit for service, he may order the water shut off and turned out until in his opinion such part of the project works is put in proper condition for service. Failure to pay and/or failure to shut off water when ordered shall constitute a breach of contract. In case of neglect or failure of the District to make such repairs, the contracting officer may cause the repairs to be made and the cost thereof, as determined by the Secretary, shall be paid by the District to the United States as provided in Article 6.

c. The contracting officer shall cause to be made, from time to time, reasonable inspections of project works.

#### OPERATION AND MAINTENANCE BY THE UNITED STATES

9. a. In the event the District is at any time in default of any of its obligations to the United States under this contract or is found by the contracting officer to be operating the project works or any part thereof in violation of this contract, then at the election of the contracting officer, the United States shall take over from the District the care, operation and maintenance of the project works by giving written notice to the District of such election, the effective date thereof, and the funds required to be advanced by the District to the United States. Thereafter, during the period of Government operation, the District shall pay to the United States annually in advance of the use of such project works the cost of operation and maintenance of such works, as fixed in notices from the contracting officer to the District. Such works may be retransferred to the District upon proper notice. The District shall surrender possession and accept the retransfer on being given the notice provided for herein.

b. The District shall hold the United States, its officers, agents and employees harmless as to any and all damages which may in any manner grow out of the care, operation and maintenance of any of the project works by the District.

#### RESERVE FUND FOR OPERATION AND MAINTENANCE

10. Commencing with the eleventh calendar year following the year in which the construction cost notice for first stage construction is issued and continuing until such time as all sums of money becoming due hereunder shall have been paid to the United States, the District shall accumulate and maintain a reserve fund which will be available for use in the manner, for the purposes, and in the circumstances hereinafter set forth. Such reserve fund shall consist of annual deposits by the District of not less than \$10,000 to a special account created by the District for the purpose. Such deposits shall continue until the amount in the reserve fund is not less than \$50,000. Expenditures shall be made from such reserve fund for meeting major unforeseen costs of operation and maintenance, repair, betterment and replacement of the project works, and for operation and maintenance during periods of special stress, such as may be caused by drought, floods, or other emergencies. When said reserve funds has been depleted by expenditures therefrom, it shall be restored to not less than the amount set forth above by the accumulation of annual deposits as provided for establishing the reserve. Such additional deposits shall commence with the year next following that in which the fund is depleted below \$50,000. During any period the operation and maintenance of the project is made the responsibility of the United States, such fund shall be available for like use by the United States.

#### DEVELOPMENT PERIOD

11. A development period not exceeding ten (10) years for the irrigable lands in the District will be established by the contracting officer by appropriate notice issued prior to the notification that the irrigation works are completed as provided in Article 4d.

#### RIGHTS OF WAY

12. a. The District shall, if and when requested by the contracting officer, acquire by condemnation or otherwise, and convey to the United States all lands or interests in lands required for the construction, operation and maintenance of the project works.

b. Title to all lands or interests in lands and improvements acquired through negotiation by the District shall be taken in the name of the United States at

prices not exceeding the appraised value as supported by the appraisal reports approved by the contracting officer. In acquiring said title, the District shall use such forms of contracts, deeds, and other necessary papers as may be required by the United States. After title has been found satisfactory to the United States, payments for rights acquired through such negotiation shall be made directly by the United States to the seller. Payments of more than the appraised value will be made only upon the approval of the contracting officer.

c. Where the District acquired lands by condemnation, upon approval by the contracting officer of the title to be acquired and of the amount of the condemnation award, the United States will pay into the appropriate state court for and on behalf of the District the amount of such condemnation award plus all proper court costs and the District simultaneously therewith will deliver to the United States a properly executed warranty deed conveying to the United States the title or interests in lands being acquired in such condemnation proceedings. The District will defend against any landowner's appeal from a condemnation award or judgment and, at the request of the contracting officer, will prosecute to the fullest extent of its remedies an appeal from any unfavorable award or judgment. The United States will pay into the appropriate court for and on behalf of the District the amount required to satisfy the award as finally determined plus appropriate court costs. Should the amount of the award be reduced, the District will make appropriate refunds to the United States. In any condemnation proceedings commenced by the District where the contracting officer disapproves of the condemnation award originally made and determines to acquire the necessary property rights in a manner other than as prescribed in this Article 12, the United States will reimburse the District in the manner prescribed in Section d of this article for any costs incurred.

d. To the extent approved by the contracting officer, expenses (other than overhead, general, and continuing expenses) incurred by the District in connection with the acquisitions above provided for shall be paid to the District. Statements of such expenses shall be submitted by the District to the United States at the close of each calendar month in which they have been incurred, and to the extent that such expenses are paid by the United States, they shall be treated as construction costs.

#### DISPOSAL OF WATER DURING CONSTRUCTION

13. During construction of the project works, any project water which may become available and usable by the District may be distributed by the District at such rental rates as the contracting officer may determine and establish. Payment for water so used shall be made in advance and the places of measurement and delivery shall be established by the contracting officer after consultation with the District directors. The balance of proceeds in excess of operation and maintenance cost accruing from the use of such water shall be applied to reduce the reimbursable construction obligation.

#### PROTECTION OF WATER SUPPLY

14. In no event shall the United States be obligated to commence any of the work contemplated by this contract or perform any other act in pursuance of this contract until and unless water rights for project purposes satisfactory to the contracting officer have been obtained. In case a dispute arises as to the character, extent, priority or validity of the right of the United States or the District to use the water supply claimed for the District, the District shall promptly bring and diligently prosecute or defend judicial proceedings for the determination of such dispute and shall take all other measures necessary toward the defense and protection of the water supply.

#### DISTRICT FACILITIES—ISSUANCE OF BONDS

15. a. In addition to the project works specified in Article 3 hereof, the District or participating organizations may require filtration plants, regulatory reservoirs, distribution systems, and other facilities to make water available to the consumers, which facilities are referred to herein as District or participating organizations' facilities. The District or participating organizations must pay for the same and finance the acquisition of such facilities by the issuance of bonds and other securities pursuant to the laws of the State of Oklahoma.

b. Nothing in this contract shall be construed to deny:

(1) The right of the District or its participating organizations to construct, lease, purchase or otherwise acquire additional necessary facilities, or the right of the District or its participating organizations to issue bonds or other evidence of indebtedness to finance the acquisition of such facilities;

(2) The right of the District or its participating organizations to operate and maintain such additional facilities which are not directly integrated with project works free of all supervision or control by the United States;

(3) The right of the District or its participating organizations to impose separate charges or to levy separate assessments for water treated or distributed, or both, by means of their facilities, in addition to those charges and assessments required to meet the obligations of the District to the United States under this contract.

c. If revenues from the sale of project water are ever insufficient for paying the obligations of the District to the United States under this contract, and it becomes necessary to supplement such income with an ad valorem tax, the United States has a prior claim to such part of the proceeds of ad valorem taxes permitted to be levied by the District pursuant to Oklahoma law as are properly designated for servicing this contract and any obligations it contains. The United States has a prior claim to that part of the District's income from its contracts with participating organizations designated for the purchase and sale of the project water supply, as may be necessary in each year to assure the prompt payment of the amount due the United States hereunder in such year, and such prior claim is hereby expressly recognized by the District.

#### RULES AND REGULATIONS

16. a. There is reserved to the contracting officer the right, so far as the purport thereof may be consistent with the provisions of this contract, the laws of the United States and of the State of Oklahoma, to make rules and regulations and to add to and modify them as may be deemed proper and necessary to carry out this contract, and to supply necessary details of its administration, and the District agrees to observe such rule and regulations.

b. A portion of the cost of constructing the project has been allocated on a non-returnable basis to flood control, recreation, and for the preservation and propagation of fish and wildlife. To insure securing the benefits for which participation by the United States has been included in the cost of constructing the project, operation of project works by the District shall be in accordance with rules and regulations prescribed by the Secretary of the Interior and the Secretary of Defense. During all periods of project operation by the District, the reasonable annual cost of operation and maintenance allocated to Flood Control as determined by the contracting officer shall be a credit or offset against payments due the United States.

#### DEFAULTS

17. a. Should the District fail to levy the assessments, tolls, or other charges against any tract of land in the District required to be levied, or having levied, should the District be prevented from collecting such assessments, tolls, or other charges by any judicial proceedings, or otherwise fail to collect them, no such tract of land shall be entitled to receive water to be delivered under this contract or to the use of the project works.

b. No water shall be delivered to the District pursuant to this contract, or by the District through project works or otherwise, to or for the use of persons or lands therein during any period in which the District may be:

(1) More than 12 months in arrears in the payment to the United States of any construction charges accrued under this contract.

(2) In arrears in the advance payment to the United States of the operation and maintenance charges fixed under Article 9 of this contract.

c. No water shall be delivered by the District through project works or otherwise to any person or lands therein which may be in arrears in the payment to the District of any assessments, tolls, or other charges levied or established by the District for the purpose of raising revenues to meet the payment by the District to the United States of any of the District's obligations under this contract.

d. All rights of action for breach of this contract are reserved to the United States as provided in Section 3737 of the Revised Statutes of the United States, as amended (41 U.S.C. 15).

#### IRRIGATION DEVELOPMENT

18. Any contracts negotiated between the District and other organizations involving construction of irrigation works exclusive of Foss Reservoir shall be consummated within ten (10) years from the commencement of the delivery of municipal water from said reservoir. Such contracts shall be approved by the

contracting officer and the terms of repayment in no event shall be over a period of more than fifty-five (55) years, exclusive of the development period, or as near thereto as is consistent with the adoption and operation of a variable payment formula which, being based on full repayment within the period stated under average conditions permits variance in the required annual payments in the light of economic factors pertinent to the ability of the organization to pay. *Provided*, that nothing in this contract is intended to preclude the temporary furnishing of irrigation water under contracts appropriate for that purpose from Foss Reservoir with or without the construction of specific irrigation works.

#### RECREATIONAL DEVELOPMENT

19. The District shall operate and maintain without cost to the United States any basic recreational facilities constructed by the United States, keeping them in as good condition and repair as when constructed. Subject to advance approval of the plan by the contracting officer and his determination that such use is in the public interest, the District may construct, operate and maintain additional public park and recreational facilities on lands owned by the United States adjacent to the Foss Reservoir, or negotiate a suitable agreement for such construction, operation and maintenance with any qualified agency of the State of Oklahoma or a political subdivision thereof. No recreational use shall be permitted which is inconsistent with the laws of the State of Oklahoma and of the United States for the protection of fish and game. The cost of constructing, operating and maintaining any additional facilities for such public park and recreational purposes shall not be charged to or become a part of the costs of the project.

#### LEVY OF ASSESSMENTS, TOLLS, AND CHARGES

20. The District shall cause to be levied and collected all necessary assessments, tolls, and other charges, and will use all of the authority and resources of the District to meet the obligations of the District to make in full all payments to be made pursuant to this contract on or before the date such payments become due and to meet its other obligations under this contract.

#### PENALTY FOR DELINQUENT PAYMENTS

21. Every installment or charge required to be paid to the United States under this contract and which shall remain unpaid after it shall have become due and payable, shall be subject to a penalty of one-half of one percent per month from the date of delinquency. *Provided*, That no penalty shall be charged to or be paid by the District unless such delinquency continues for more than thirty (30) days.

#### EXCESS LANDS

22. a. As used herein the term "excess land" means that part of the irrigable lands within the District in excess of 160 acres held in the beneficial ownership of any single person; or in excess of 320 acres held in the beneficial ownership of husband and wife as joint tenant or as tenants in common. The term "large landowner" means an owner of excess lands, and the term "non-excess land" means all irrigable land under the project which is not excess land as defined herein.

b. Each large landowner as a condition precedent to the right to receive water for any of his excess lands shall:

(1) Before the initial delivery date or before the expiration of six months from the announcement thereof, whichever occurs first, execute a valid recordable contract in form satisfactory to the contracting officer, agreeing to dispose of his excess lands in accordance therewith to persons who can take title thereto as non-excess land as herein provided and at a price not to exceed the approved appraised value of such excess land, and within a period of ten (10) years after the date of the execution of said recordable contract, and agreeing further that if said land is not so disposed of within said period of ten (10) years, the contracting officer shall have the power to dispose of said land subject to the same conditions on behalf of such large landowner subject to conditions all as herein provided; and the District agrees that it will refuse to deliver water to any large landowner other than for his non-excess lands until such owner meets the conditions precedent herein stated.

(2) Within thirty (30) days after the date of notice from the United States requesting such large landowner to designate his irrigable lands under the project which he desires to designate as non-excess land, he will file in the office of the District, in duplicate, one copy thereof to be furnished by the District to the contracting officer, his written designation and description of lands so selected to be non-excess lands, and upon his failure to do so the District shall make such designation and mail a notice thereof to such large landowner. In the event the District fails to act within such period of time as the contracting officer considers reasonable, such designation will be made by the contracting officer, who will mail a notice thereof to the District and to the large landowner. The large landowner shall become bound by any such action on the part of the District or the contracting officer, and the District will deliver water only to the land so designated to be non-excess land.

#### VALUATION AND SALE OF LANDS

23. a. The value of the irrigable lands within the District for the purpose of Article 22 of this contract shall be determined subject to the approval thereof by the contracting officer by three appraisers. One of said appraisers shall be designated by the contracting officer and one shall be designated by the District, and two appraisers so designated shall designate a third. If the appraisers designated by the contracting officer and the District are unable to agree on the designation of a third, the judge of the court which has jurisdiction of the proceedings involving the confirmation of this contract shall be requested to designate the third appraiser.

b. The following principles shall govern the appraisal:

(1) No value shall be given such lands on account of the existing or prospective possibility of securing water from the project.

(2) The value of improvements on the land at the time of said appraisal shall be included therein, but shall be set forth separately in such appraisal.

c. The excess land of any large landowner shall be reappraised at the instance of the United States or at the request of said landowner. The cost of the first appraisal and each subsequent appraisal requested by the United States shall be paid by the United States.

d. Any improvements made or placed on the appraised land after the appraisal hereinabove provided for prior to sale of the land by a large landowner may be appraised in like manner.

e. Future sales of excess irrigable lands of large landowners within the District shall not carry the right to receive water hereunder for such land and the District agrees to refuse to deliver water to land so sold until, in addition to compliance with the other provisions hereof, a verified statement showing the sale price upon any such sale shall have been filed with the District.

f. The District agrees to take all reasonable steps requested by the contracting officer to ascertain the occurrence and conditions of all sales of irrigable lands of large landowners in the District and to inform the contracting officer concerning the same.

g. A true copy of the contract and of such appraisal made pursuant thereto shall be maintained on file in the office of the District and like copies in such principal office of the Bureau of Reclamation as may be established hereafter in connection with the project and shall be made available for examination during the usual office hours by all persons who may be interested therein.

#### WATER SHORTAGES, QUALITY OF WATER, WASTE, SEEPAGE AND RETURN FLOWS

24. a. On account of drought or other causes, there may occur at times during any year a shortage in the quantity of water available for delivery to the District by the United States pursuant to this contract. In no event shall any liability accrue against the United States or any of its officers or employees for any damage, direct or indirect, arising out of any such shortage.

b. The United States makes no warranty as to the quality of the water delivered to the District under this contract.

c. It is the understanding of the parties hereto that there may be other organizations which will contract with the United States concerning other works to be constructed by the United States as a part of the Washita River Basin Reclamation Project for the employment of the waters of the Washita River and its tributaries. In any year there may occur a shortage of water available to any of such organizations. In such event, the water supply available from the Washita River and its tributaries shall be apportioned to the extent possible to reduce the

shortages. The governing bodies of each of such organizations in consultation with the contracting officer, shall mutually agree upon a plan to carry out the intent expressed in this Article 24c and the method of carrying out such plan. It is the intention of the United States that a provision similar to this Article 24c shall be incorporated in all contracts between the United States and other organizations contracting with the United States whose water users are the beneficiaries of works constructed by the United States as a part of the Washita River Basin Reclamation Project for the employment of waters of the Washita River and its tributaries. In the event such other contracts do not so provide, this Article 24c shall be inoperative.

d. The United States claims all of the waste, seepage and return flow water derived from water delivered pursuant to this contract and the same is hereby reserved and retained by the United States for beneficial use on the project.

#### RIGHTS TO BENEFICIAL USE OF WATER

25. Beneficial use shall be the basis, the measure and the limit of the right to the use of project water. Such water shall be used on lands within the District and by municipal and miscellaneous users who contract for the use thereof.

#### PREFERENCE RIGHT OF MUNICIPAL WATER USERS

26. Water users of the District contracting for a municipal water supply shall have the prior right to use available water of the project to a maximum of 11,800 acre-feet annually, provided that no releases shall be made for irrigation use when water in storage at Foss Reservoir is less than 45,000 acre-feet. If Hobart and Rocky fail to contract for a municipal water supply before project design details are completed by the United States, as determined by the contracting officer, then water users of the District contracting for a municipal water supply shall have the prior right to use available waters of the project only to a maximum of 8,600 acre-feet annually, and no releases shall be made for irrigation use when water in storage is less than 36,000 acre-feet.

#### AGREED CHARGES A GENERAL OBLIGATION OF THE DISTRICT

27. The District as a whole is obligated to pay to the United States the charges becoming due as provided in this contract, notwithstanding the default in the payment to the District by individual water users of assessments, tolls, or other charges levied by the District. *Provided*, however, that no charges shall be assessed by the District against irrigable lands of the District for repaying reimbursable costs allocated to furnishing a municipal water supply.

#### AMENDMENT OR REPEAL OF FEDERAL RECLAMATION LAWS

28. In the event that the Congress of the United States may repeal or amend any of the provisions of the Federal Reclamation Laws, the United States agrees, at the option of the District, to negotiate amendments of appropriate articles of this contract, consistent with the provisions of the laws effecting any such repeal or amendment.

#### COMPUTATION OF COSTS

29. The costs which shall be the basis of determining the District's construction charge obligation as well as the various charges to be paid by the District to the United States under this contract shall embrace expenditures of whatsoever kind in connection with, growing out of, or pursuing from the work or operation described, including but without limitation by means of this enumeration, the cost of labor, material, equipment, engineering and legal work, superintendence, administration and overhead, general expenses, rights of way, inspections, special services, property and damage of all kinds. The determination of what costs are properly chargeable hereunder and the amount thereof shall be determined by the contracting officer.

#### ACCESS TO BOOKS AND RECORDS

30. Each party shall have the right, during office hours, to inspect and to make copies of the other party's books and official records relating to matters covered by this contract.

## CONTINGENT ON APPROPRIATIONS OR ALLOTMENTS OF FUNDS

31. The expenditure of any money or the performance of any work by the United States herein provided for, which may require appropriations of money by Congress or the allotment of funds, shall be contingent on such appropriations or allotments being made. The failure of Congress to appropriate funds, or the failure of any allotment of funds shall not, however, relieve the District from any obligations theretofore accrued under this contract, nor give the District the right to terminate this contract as to any of its executory features. No liability shall accrue against the United States in case of such funds not being appropriated or allotted.

## ASSURANCES RELATING TO VALIDITY OF CONTRACT

32. This contract shall not be binding upon the United States nor shall any water be delivered pursuant to this contract until the proceedings on the part of the District for the authorization of the execution of this contract shall have been confirmed by decree of a court of competent jurisdiction or pending appellate action if ground for appeal be laid. Upon the execution of this contract, the District diligently shall prosecute to final conclusion such confirmation proceedings. The District at its cost shall furnish to the United States two certified copies of the decree of confirmation and all pertinent supporting records.

## CHANGES IN DISTRICT ORGANIZATION

33. While this contract is in effect, no change shall be made in the District by inclusion or exclusion of lands by proceedings to dissolve, consolidate, merge, or otherwise, except upon the Secretary's written consent thereto.

## DISTRICT TO KEEP BOOKS AND RECORDS AND REPORT CROP AND OTHER DATA

34. The District shall establish and maintain account and other books and records and furnish to the contracting officer reports and statements as to information contained therein pertaining to:

- a. Accounts and financial transactions of the District.
- b. Crops raised and agricultural or livestock products produced on the lands within the District.
- c. Water supply and the disposition thereof. A report thereon shall be furnished to the contracting officer annually on or before December 31, or on such other date or dates as may be fixed by the contracting officer.

## NOTICES

35. Any notice authorized or required by this contract shall be deemed properly given, except where otherwise herein specifically provided, if mailed postage prepaid, to the Regional Director, Region 5, Bureau of Reclamation, Amarillo, Texas, on behalf of the United States, and to the Secretary of the Foss Reservoir Master Conservancy District at Clinton, Oklahoma, on behalf of the District. The designation of the person to be notified, or the address of such person, may be changed at any time by similar notice.

## TITLE TO TRANSFERRED WORKS

36. Title to all works shall be and remain in the United States until otherwise provided by Congress, except that pursuant to the authority of the Act of July 29, 1954 (68 Stat. 580) title to movable property which is necessary for the operation and maintenance of the works of the project and which has been purchased with funds advanced by the District or which has been purchased with appropriated funds as provided in Article 4b and the expenditures therefor are included in the District's construction charge obligation stated in Article 5 shall be transferred to the District at the time project works are transferred to the District for its care, operation and maintenance.

## DISCRIMINATION AGAINST EMPLOYEES OR APPLICANTS FOR EMPLOYMENT PROHIBITED

37. a. In connection with the performance of work under this contract, the District agrees not to discriminate against any employee or applicant for employment because of race, religion, color, or national origin. The aforesaid provision shall include but not be limited to the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination;

rates of pay or other forms of compensation; and selection for training, including apprenticeship. The District agrees to post hereafter in conspicuous places, available for employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of the non-discrimination clause.

b. The District further agrees to insert the foregoing provision in all subcontracts hereunder, except subcontracts for standard commercial supplies or raw materials.

## OFFICIALS NOT TO BENEFIT

38. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share of this contract or to any benefit that may arise herefrom, but this restriction shall not be construed to extend to this contract if made with a corporation or company for its general benefit.

## ASSIGNMENT LIMITED—SUCCESSORS AND ASSIGNS OBLIGATED

39. The provisions of this contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this contract, or any part thereof, or interest therein, shall be valid until approved by the contracting officer.

IN WITNESS WHEREOF the parties hereto have caused this contract to be duly executed the day and year first hereinabove written.

THE UNITED STATES OF AMERICA,  
By ROBERT W. JENNINGS, *Regional Director*.  
THE FOSS RESERVOIR MASTER  
CONSERVANCY DISTRICT,  
By CHAS. E. ENGLEMAN, *President*.

Attest:

RALPH CAMPBELL,  
*Secretary of the Foss Reservoir  
Master Conservancy District.*

[SEAL]

[Contract No. 14-06-500-322—Amendment No. 1]

U.S. Department of the Interior—Bureau of Reclamation

(Washita River Basin Reclamation Project, Oklahoma—Foss Division)

## AMENDATORY CONTRACT BETWEEN THE UNITED STATES AND THE FOSS RESERVOIR MASTER CONSERVANCY DISTRICT

This contract, made this 19th day of June, 1961, between the United States of America, hereinafter called the United States, acting through the Secretary of the Interior, and pursuant to Federal Reclamation Laws, and the Foss Reservoir Master Conservancy District, hereinafter called the District, organized and existing pursuant to the laws of the State Oklahoma, with its principal place of business and office at Clinton, Oklahoma.

Witnesseth that:

Whereas, the parties hereto entered into a certain contract, hereinafter called the original contract, dated February 14, 1958, for the payment by the District to the United States of reimbursable costs of construction, operation and maintenance of the Foss Division of the Washita River Basin Reclamation Project, Oklahoma; and

Whereas, the District proposes to undertake the treatment of water to be supplied to organizations contracting with the District, and in order that the District may finance such water treatment, it is necessary that the District be enabled to assure that the cost thereof be defrayed with the greatest practicable certainty; and

Whereas, the foregoing contingency was within the contemplation of the parties at the time of making said original contract, and the parties now are mutually agreed that the said original contract be amended to meet the said situation; and

Whereas, it is necessary that contracts be negotiated by the District with member organizations to cover all costs of treatment, and to conform with the privileges afforded under Article 10, Section 27A, of the Constitution of the State of Oklahoma, adopted July 1, 1958, and that the original contract between the parties hereto should provide for financing proposed treatment costs;

Now, therefore, it is mutually agreed between the parties hereto that the original contract be amended as follows:

1. Article 15 of the original contract is hereby amended to read as follows:

15. a. In addition to the project works specified in Article 3 hereof, the District or participating organizations may require filtration plants, regulatory reservoirs, distribution systems, and other facilities to make water available to the consumers, which facilities are referred to herein as District or participating organizations' facilities. The District or participating organizations must pay for the same and finance the acquisition of such facilities by the issuance of bonds and other securities pursuant to the laws of the State of Oklahoma. Nothing in this contract shall be deemed to operate in any manner to prevent the District from providing water treatment for municipal water, or from paying for such treatment or for facilities required for such treatment, and the right and power of the District so to do hereby is recognized and affirmed.

b. Nothing in this contract shall be construed to deny:

(1) The right of the District or its participating organizations to construct, lease, purchase or other acquire additional necessary facilities, or the right of the District or its participating organizations to issue bonds or other evidence of indebtedness to finance the acquisition of such facilities;

(2) The right of the District or its participating organizations to operate and maintain such additional facilities which are not directly integrated with project works free of all supervision or control by the United States;

(3) The right of the District or its participating organizations to impose separate charges or to levy separate assessments for water treated or distributed, or both, by means of their facilities, in addition to those charges and assessments required to meet the obligations of the District to the United States under this contract. The proceeds from such separate charges and assessments shall not be subject to any claim of the United States.

(4) The right of the District to include, in the operation and maintenance charges made by the District to participating organizations, the cost and expense of treating water to be delivered to said organizations to make said water suitable for human consumption; or, to include in said charges the annual amount required to be paid by the District for the acquisition and operation and maintenance of any facilities described in this Article 15.

c. (1) If revenues from the sale of project water are ever insufficient for paying the obligations of the District to the United States under this contract, and it becomes necessary to supplement such income with an ad valorem tax or assessments, to such extent as shall be legally permissible under the Constitution and laws of the State of Oklahoma, the United States shall have a prior claim, except as hereinafter in paragraph c(2) of this Article set forth, to such part of the proceeds of said ad valorem taxes or assessments permitted to be levied by the District pursuant to Oklahoma laws as are properly designated for servicing this contract and any obligations it contains. And, except as hereinafter in paragraph c(2) of this Article set forth, the United States shall have a prior claim to that part of the District's income from its contracts with participating organizations designated for the purchase and sale of the project water supply, as may be necessary in each year to assure the prompt payment of the amount due the United States hereunder in such year, and such prior claim is hereby expressly recognized by the District.

(2) In the event that the District shall include, in the price charged for the sale of project water to participating organizations, the costs and expenses described in paragraph b of this Article, then for all purposes of this Contract such portion of the revenues of the District from the sale of project water shall be deemed "separate charges" made and imposed by the District for the purposes set forth in paragraphs a and b of this Article 15 and the same shall be controlled by the provisions of said paragraph b of this Article.

2. In connection with the performance of the work under this contract, the District agrees as follows:

a. The District will not discriminate against any employee or applicant for employment because of race, creed, color, or national origin. The District will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The District agrees to post in

conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.

b. The District will, in all solicitations or advertisements for employees placed by or on behalf of the District, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

c. The District will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the said labor union or workers' representative of the District's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

d. The District will comply with all provisions of Executive Order No. 10925 of March 6, 1961, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

e. The District will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

f. In the event of the District's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled in whole or in part and the District may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 10925 of March 6, 1961, and such other sanctions may be imposed and remedies invoked as provided in the said executive order or by rule, regulations, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

g. The District will include the provisions of the foregoing paragraphs (a) through (f) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to section 303 of Executive Order No. 10925 of March 6, 1961, so that such provisions will be binding upon each subcontractor or vendor. The District will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however*, That in the event the District becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the District may request the United States to enter into such litigation to protect the interests of the United States.

3. The original contract shall remain in full force and effect in all respects not herein specifically modified.

4. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this contract or to any benefit that may arise herefrom, but this restriction shall not be construed to extend to this contract if made with a corporation or company for its general benefit.

IN WITNESS WHEREOF, the parties hereto have caused this contract to be duly executed the day and year first hereinabove set forth.

UNITED STATES OF AMERICA,  
By LEON W. HILL, *Regional Director*.  
FOSS RESERVOIR MASTER  
CONSERVANCY DISTRICT,  
By CHARLES E. ENGLEMAN, *President*.

Attest:

RALPH CAMPBELL,  
*Secretary of the Foss Reservoir  
Master Conservancy District.*

[SEAL]

FOSS RESERVOIR MASTER CONSERVANCY DISTRICT

Extract From the Minutes

At a regular meeting of the Board of Directors of the Foss Reservoir Master Conservancy District at which the following members were present: Roy Kelly, Artie Weichel, V. L. Browne, Jesse G. Stratton, Ed McFarland, C. E. Engleman,

Ralph Campbell and Harry Hilton; held on the 12 day of June, 1961, on motion of Artie Weichel seconded by V. L. Browne, the following resolution was adopted:

## RESOLUTION

Amendment No. 1 to Contract No. 14-06-500-322 with the United States be approved, and that the President and Secretary be directed to execute and seal said contract as a contract with the District in the form as presented.

CHARLES E. ENGLEMAN,  
*President, Foss Reservoir*  
*Master Conservancy District.*

The undersigned, Ralph Campbell, Secretary-Treasurer of the Foss Reservoir Master Conservancy District, hereby certifies that the above and foregoing is a true and correct copy of the resolution resolving that Amendment No. 1 to the Contract No. 14-06-500-322 with the United States be adopted by the Board, as therein set forth.

Dated this 12 day of June, 1961

RALPH CAMPBELL,  
*Secretary-Treasurer,*  
*Foss Reservoir Master Conservancy District.*

[SEAL]

[Contract No. 14-06-500-322—Amendment No. 2]

U.S. Department of the Interior—Bureau of Reclamation

(Washita River Basin Reclamation Project, Oklahoma—Foss Division)

AMENDATORY CONTRACT BETWEEN THE UNITED STATES AND THE FOSS RESERVOIR  
MASTER CONSERVANCY DISTRICT

This contract, made this 17th day of December, 1963, between the United States of America, hereinafter called the United States, acting through the Secretary of the Interior, and pursuant to the Federal Reclamation laws, and the Foss Reservoir Master Conservancy District, hereinafter called the District, organized and existing pursuant to the laws of the State of Oklahoma, with its principal place of business and office at Clinton, Oklahoma.

Witnesseth that:

Whereas, the Act of Congress approved February 25, 1956 (Public Law 419, 84th Congress, 2nd Session) authorized the construction, operation, and maintenance of the Washita River Basin Reclamation Project, Oklahoma, and

Whereas, by contract dated February 14, 1958, hereinafter referred to as the basic contract, the District contracted with the United States for payment of the reimbursable costs of construction, operation, and maintenance of the Foss Division of the Washita River Basin Reclamation Project in accordance with Reclamation Law, and

Whereas, the parties hereto desire to provide for waiving of interest charges as authorized by the Water Supply Act of 1958 as amended and supplemented (Act of Congress approved July 3, 1958, amended by the Act of July 20, 1961);

Now, therefore, in consideration of the mutual and dependent covenants herein contained, it is hereby mutually agreed by the parties hereto as follows:

1. Article 5 of the basic contract is hereby amended to read as follows:

## CONSTRUCTION CHARGE OBLIGATION

5. a. The District will repay to the United States the actual reimbursable costs (including simple interest during construction on the municipal water supply allocation) incurred by the United States in constructing the project works.

b. The repayment obligation for construction of municipal water facilities and the reservoir shall not be in excess of \$10,901,500 plus interest on the unamortized balance of the allocation to municipal water use at the rate of 2.591 percent per annum, but excepting that portion of the interest waived under authority of the Water Supply Act of 1958 and detailed in section *d* below. No interest charge shall be payable on the irrigation allocation.

c. The repayment obligation for construction of irrigation works shall not be in excess of \$4,640,000.

d. Project storage is designed to yield 11,800 acre-feet of water annually for municipal and industrial use. That portion of the firm annual yield provided for

anticipated future water demand is 7,800 acre-feet. The construction cost allocated to storage provided for such anticipated future demand shall be 6.19 percent of the total construction cost of the dam and reservoir including interest during construction. No principal or interest payment is required to be made on such allocation for anticipated future demand during the first 10 years of the repayment term unless all or a portion of said annual yield for anticipated future water demand is used in any year in said 10-year period. In the event of such use of a portion of the storage allocated to anticipated future demand, all payments required to be made in subsequent years shall be adjusted to reflect both principal and interest payments on that portion of the reserved storage then placed in use. Such adjustment will be determined by multiplying the percentage of the yield allocated to future demand which is withdrawn in such year for municipal and industrial use by the cost allocated to future demand.

e. Reimbursable costs itemized in sections *b* and *c*, plus interest as specified, shall be the construction obligation. The construction obligation for a municipal water supply shall consist of the portion of the cost of Foss Dam and Reservoir allocated to municipal water, the cost of all municipal water facilities, and simple interest during construction on one-half of each fiscal year's expenditures allocated to municipal water, at 2.591 percent annually together with interest at the same rate annually on the full amount of such expenditures during previous fiscal years, except as modified by section *d* above. The construction cost obligation for a municipal water supply—plus interest at 2.591 percent on the unamortized balance of the allocation to a municipal water supply shall be paid in 50 annual installments the first of which shall become due on September 1 of the year next succeeding the year in which project works are, as announced by the Contracting Officer under the provisions of Article 4c of the basic contract, complete and water is available to serve municipal users. Subsequent annual installments shall become due on September 1 of each succeeding year. It is intended that total annual installments of principal and interest shall be closely proportioned to the expected buildup in demand for water for municipal uses. For the purpose of preparing the following table, it has been estimated that the total construction obligation (including simple interest during construction) allocated to the District's municipal water supply will be \$7,585,000. Payments shall be made in accordance with the following schedule until the actual reimbursable construction costs plus interest have been determined, at which time this table shall be corrected, and the remaining annual installments payable by the District shall be adjusted to provide repayment of the actual reimbursable construction costs over the contract period.

## Annual installments

Number	Payment	Number	Payment
1.....	\$148,000	26.....	\$298,570
2.....	156,070	27.....	303,940
3.....	163,870	28.....	309,320
4.....	165,550	29.....	314,550
5.....	167,200	30.....	320,060
6.....	168,760	31.....	324,110
7.....	170,400	32.....	328,040
8.....	171,500	33.....	322,220
9.....	173,400	34.....	336,380
10.....	174,200	35.....	340,460
11.....	180,050	36.....	344,500
12.....	188,280	37.....	348,680
13.....	199,480	38.....	352,860
14.....	206,250	39.....	356,920
15.....	212,440	40.....	361,100
16.....	221,800	41.....	363,980
17.....	232,900	42.....	366,920
18.....	243,910	43.....	369,800
19.....	255,030	44.....	372,660
20.....	266,100	45.....	375,780
21.....	271,490	46.....	378,630
22.....	276,860	47.....	381,390
23.....	282,230	48.....	384,370
24.....	287,710	49.....	387,320
25.....	293,080	50.....	390,030

f. After complete repayment of the reimbursable construction obligation of the project allocated to municipal uses, annual payments to the United States by the District (from payments by the users of the municipal water supply) shall continue at the same rate until that portion of the construction cost of the reservoir allocated to irrigation is fully repaid. Following complete repayment of the reimbursable construction costs of the reservoir, said annual repayment rates shall continue so long as the costs of irrigation works are unpaid.

g. When the irrigation works are completed as the second stage of construction, as determined and announced by the Contracting Officer under Article 4d of the basic contract, the construction cost obligation for such works shall be repaid to the United States by the District in 55 equal annual installments beginning with September 1 of the first year following the close of the development period; *Provided, however*, that repayment of this portion of the District's obligation may be made in accordance with a variable repayment formula acceptable to the Contracting Officer if the District so elects, and such variable repayment shall govern repayment by the District in lieu of the fixed payments set forth in this subparagraph.

h. Upon completion of second stage construction as determined by the Contracting Officer under Article 4d of the basic contract, the Contracting Officer shall announce the estimated second stage construction cost. When notice of the actual second stage construction cost has been given the District, installments due thereafter from the District under section *g* above shall be adjusted to reflect the difference between the estimated construction cost and the actual construction cost of the irrigation works.

i. If construction of the municipal water facilities and the reservoir shall have been commenced, but is terminated prior to completion by reason of lack of funds, failure to secure a valid amendatory contract, or for any other reason, the District shall then repay to the United States its proportionate share of the total amount of the construction charge obligation theretofore expended or obligated at such time and in such manner as the Contracting Officer may then prescribe. If construction of the irrigation works shall have been commenced, but is terminated prior to completion by reason of lack of funds, failure to secure a valid amendatory contract, or for any other reason, then the District shall pay to the United States its proportionate share of the total amount theretofore incurred or obligated at such time and in such manner as the Contracting Officer may then prescribe.

2. Article 37 of the basic contract is hereby replaced with the following:

#### EQUAL EMPLOYMENT OPPORTUNITY

37. a. During the performance of this contract, the District, hereinafter in this article referred to as the contractor, agrees as follows:

(1) The contractor will not discriminate against any employee or applicant for employment because of race, creed, color or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, creed, color, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training; including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth provisions of this non-discrimination clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, creed, color, or national origin.

(3) The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency Contracting Officer, advising the said labor union or workers' representative of the contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The contractor will comply with all provisions of Executive Order No. 10925 of March 6, 1961, as amended, and of the rules, regulations, and relevant orders of the President's Committee on Equal Employment Opportunity created thereby.

(5) The contractor will furnish all information and reports required by Executive Order No. 10925 of March 6, 1961, as amended, and by the rules, regulations, and orders of the said Committee, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Committee for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be cancelled, terminated, or suspended, in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 10925, of March 6, 1961, as amended, and such other sanctions may be imposed and remedies invoked as provided in the said Executive Order or by rule, regulation, or order of the President's Committee on Equal Employment Opportunity, or as otherwise provided by law.

(7) The contractor will include the provisions of (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the President's Committee on Equal Employment Opportunity issued pursuant to Section 303 of Executive Order No. 10925 of March 6, 1961, as amended, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as the contracting agency may direct as a means of enforcing such provisions, including sanctions for noncompliance: *Provided, however*, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the contracting agency, the contractor may request the United States to enter into such litigation to protect the interests of the United States.

b. Inclusion of the equal opportunity clause may be by reference to Section 301 of Executive Order No. 10925, dated March 6, 1961, as amended. Subcontractors below the second tier, other than subcontracts calling for construction work at the site of construction, are exempt from inclusion of the clause.

3. All the terms and conditions of the basic contract shall remain in full force and effect save to the extent they are specifically modified by this contract.

4. No Member of or Delegate to Congress or Resident Commissioner shall be admitted to any share or part of this contract or to any benefit to arise therefrom. Nothing, however, herein contained shall be construed to extend to any incorporated company if the contract be for the general benefit of such corporation or company.

IN WITNESS WHEREOF the parties hereto have caused this contract to be duly executed the day and year first hereinabove written.

THE UNITED STATES OF AMERICA,  
By LEON W. HILL, *Regional Director*.  
THE FOSS RESERVOIR MASTER  
CONSERVANCY DISTRICT,  
By CHARLES E. ENGLEMAN, *President*.

Attest:

PAUL NONAST,  
*Secretary of the Foss Reservoir.*  
*Master Conservancy District.*

Senator ANDERSON. You would like to see a water purification plant put in there?

Mr. ENGLEMAN. If there is any alternative to getting potable water under these contracts, we would not object to that, but we see no other way than to see this plant put in; yes, sir.

Senator ANDERSON. Would you be willing to pay for it?

Mr. ENGLEMAN. We are willing to pay what we agreed to pay but we feel that we should get potable water for our money.

We feel if we have to pay for it that our total obligation under the contract should be reduced by probably the amount that it cost to put it in.

Senator ANDERSON. Have you discussed with the Department of the Interior whether it has a saline water branch?

Mr. ENGLEMAN. I understand they do have such a branch.

Senator ANDERSON. Don't you think it would be wise to discuss your problem with them?

Mr. ENGLEMAN. We would certainly be willing to do so.

Senator ANDERSON. Does that complete your statement?

Mr. ENGLEMAN. Yes, sir; and thank you very much for your kind attention.

Senator ANDERSON. We will return to Secretary Holum now.

Did you finish your statement this morning, Mr. Secretary?

Mr. HOLUM. Yes, sir.

Senator ANDERSON. Senator Burdick said he had some questions but he is not here at the present time. While you are here we will ask Mr. Crider to come up. As soon as Senator Burdick arrives we will start back with you again.

Mr. Crider?

#### STATEMENT OF HON. TOM CRIDER, MAYOR, CITY OF CORDELL, OKLA.

Mr. CRIDER. Mr. Chairman, it is a great honor for me to have the privilege to appear before this committee.

As mayor of the city of Cordell, Okla., our city of Cordell must have additional water now.

For more than 15 years the people of our city have been actively promoting, organizing, and cooperating with the Foss Reservoir Master Conservancy District and have consistently and enthusiastically supported it and the Foss Reservoir project.

We have no water treatment plant and our water supply is from wells producing from the localized sandstone area mentioned by the mayor of Clinton.

Our plans since 1962 have been based on the use of water from Foss Reservoir not later than the summer of 1965.

We raised our water rates to the extent necessary to meet our contractual payments for our share of the cost of the reservoir and aqueduct with such payments commencing August 1, 1965, and to meet our obligations for the operation and maintenance of the reservoir and aqueduct commencing January 1, 1965.

Thus far, we have paid the district \$39,715.62 on the cost of the reservoir and aqueduct and \$10,462.50 for the operation and maintenance as planned, but the plans for obtaining water from Foss Reservoir have been shattered.

Our situation is so desperate that we have had no choice but to drill two more wells—both of which are low in both production and quality of water—within the past year at a cost of approximately \$30,000 and it was necessary to ration water consumption last summer.

We are presently operating 17 water wells, eight of which were drilled in 1954 and the remainder of which have been drilled since that time.

These wells have a life expectancy of 3 to 6 years of production. Our present operating budget for the water department is approximately \$98,000 annually. This does not include the payments we are making to the United States of America on our repayment contract.

Our county has issued general obligation bonds in the amount of \$1,250,000 and our city has issued bonds in the amount of \$100,000, both for the purpose of providing industrial expansion.

Our assurance of adequate potable water from the Foss Reservoir has encouraged the entire area to a steady stabilization and improvement of its economy. We expect our water consumption to increase not less than 10 percent each year for the next 3 years.

We do not expect the Nation to furnish us potable water but do feel that we are entitled to have the Government carry out the contract in accordance with its intent.

In our case this must be done quickly or our crisis will become so critical as to force us into a complete new plan for a water supply.

The proposed legislation will solve our problem and we can see no reason why the research program it contemplates will not result in substantial benefit to our Nation.

We have exhausted our financial resources in preparing for the contract and operation and maintenance payments. It is not possible for us to pay any additional for a demineralization plant or for demineralization treatment.

My community, too, concurs with all the statements made by the president of the board of directors of the district heretofore made.

I thank you for the time you have taken to listen and read my remarks.

Senator ANDERSON. Thank you very much, Mr. Crider, for appearing here today before the committee. We appreciate your testimony on this matter.

Mr. CRIDER. Thank you, Mr. Chairman.

Senator ANDERSON. Our next witness is Mr. Smith, mayor of the city of Clinton, Okla.

#### STATEMENT OF HON. JAMES M. SMITH, MAYOR, CITY OF CLINTON, OKLA.

Mr. SMITH. Thank you, Mr. Chairman.

I am Mayor Smith of the city of Clinton, Okla.

The city of Clinton, Okla., which is a part of the Foss Reservoir Master Conservancy District and its citizens wholeheartedly agree with the statement made to this committee by the president of the board of directors of the district.

We will make every effort not to be repetitious.

All of our planning for the development of our city has been based on the premise of the availability of the contracted water from the Foss Reservoir at a quality commensurate with the opinions of the Government technicians at the time our city overwhelmingly voted its authorization for execution of the Clinton contract with the district, which contract was executed in 1958 in accordance with such authorization.

To date, we have paid \$115,997.50 of the cost of the reservoir and aqueduct and, in addition, have paid \$34,875 as our part of the cost of operation and maintenance of the project—which includes flood control, irrigation, recreation, and fish and wildlife aspects as well as municipal and industrial water use.

A turkey processing plant—using a considerable amount of water—has been established in our community since 1958 because the water supply was under contract.

A nationwide soft goods manufacturer has recently constructed a factory in our community on the basis of our assurance of this water supply. We are making every effort to attract new industry to our community and have assured them all of this water supply.

Although I served as a director of the district prior to my election, I did not know and my community had no idea that this water could not be treated in the conventional manner until a few months ago.

Our city for 20 years has been in earnest and intense pursuit of municipal water to supplement our 35-year-old reservoir.

Presently, we are supplementing the reservoir by water wells producing from a localized sandstone underground reservoir—which reservoir is also being used by Cordell, Clinton-Sherman Air Force Base, and local irrigation.

The projected life of this underground reservoir is obviously limited. Extensive pumping and storage facilities are necessary at the present time in order to meet peak demands.

Every indication is that our average daily water usage will increase by at least 20 percent annually for the next 10 years without any new water-using industries.

Our surface reservoir produces water which contains a total dissolved solid of 350 parts per million and has, in past years, produced 3 million gallons per day, but the watershed is small and when drought occurs this production is drastically reduced.

In 1956 our city drilled 20 water wells to supplement the surface reservoir supply. We have recently checked these wells and two of them have already sanded up and must be abandoned. Inasmuch as the water-bearing sands are very fine, continuous pumping results in sanding up the well points. The life expectancy of all the wells is from 3 to 5 years.

In our opinion it is not possible for our city to finance its share of the cost of a demineralization treatment plant. The operation and maintenance budget for our water department for the fiscal year 1965 was approximately \$170,000 and a budget increase of 30 percent will be necessary to provide for a demineralization plant and demineralization treatment. This does not include the payments we are making to the United States of America on our repayment contract.

Therefore, if Senate bill 1946 or its substitute is not adopted, we will have no choice but to seek cancellation of the entire project and commence from the beginning—again—in an effort to obtain potable municipal and industrial water.

It is impossible, of course, for us to be objective about the problem. However, it seems clear to us that we must have some relief, that the Federal Government pollution research and feasibility studies should cover the scientific problems involved in the elimination of natural pollution, that it is fair and equitable that we receive what was intended by the district and the Government at the time of our contracts.

It is an honor and privilege for me to speak for the people of my city before you distinguished gentlemen and I sincerely appreciate your time and your attention.

Senator ANDERSON. You mentioned something about the life of the wells being 5 years. You have me confused.

Mr. SMITH. We had 20 wells and two of them are in use at the present time.

Senator ANDERSON. Do you have to keep moving them right along?  
Mr. SMITH. Yes, sir.

Senator ANDERSON. Thank you very much, Mr. Smith.

Senator ANDERSON. Our next witness is Mr. Frank Raab from Oklahoma City, representing the National Reclamation Association.

**STATEMENT OF FRANK RAAB, REPRESENTING THE NATIONAL RECLAMATION ASSOCIATION, OKLAHOMA CITY, OKLA.**

Mr. RAAB. Mr. Chairman, my name is Frank Raab of Oklahoma City and incidentally, I was raised in the area under discussion and am quite familiar with the problem.

I am immediate past director of the Oklahoma Resources Board with 15 years of service and I am serving my 22d year representing the NRA.

I might say we had one of the finest conferences that we ever had about 2 years ago as we ever had before your committee.

My paper was prepared prior to our coming to Washington yesterday, Senator. It was prepared in support of S. 1946. After arriving here and after your committee received the report from the Secretary of the Interior citing a report that was made by a special board appointed by him in May to look into this problem and to make recommendations, I have had to revise my remarks to include a substitute bill which is now before you and of which you have possession.

My statement deals with the urgency of water supply in western Oklahoma and how we can find a solution to the present problem that faces all of us.

I feel perhaps that a careful investigation should be made as recommended by Mr. Holum and his Department to be sure we know where we are going this time.

My statement is short; may I read it?

Senator ANDERSON. Yes.

Mr. RAAB. Mr. Chairman, I appear before you in support of S. 1946, which would authorize the construction by the Secretary of the Interior, of a saline water conservation plant at the Foss Reservoir, located on the Washita River in western Oklahoma near the town of Foss, Okla.

The Foss Reservoir was authorized for construction by the Congress as a multiple-purpose project, which includes among other proposed benefits, storage for municipal and industrial water supply for the cities of Clinton, Hobart, Cordell, and Bessie

The dam and reservoir have been constructed and water distribution lines have been constructed to the several communities participating, and closure was made on the dam in February 1961 to begin storing water for the beneficial uses assigned to the project.

Since closure was made of the works to impound water, runoff in the watershed above the project has been far below the average annual, as shown by the records of the basin.

Since September 1926 to September 1956 the annual average runoff at the dam site is estimated at 76,980 acre-feet, while the annual average runoff since closure in February 1961 is only 44 percent of the long term average. The result is that the reservoir is approximately 26 feet below the top of the conservation pool elevation. The below normal inflow to the reservoir, together with the annual net evapora-

tion loss from the reservoir of 40 inches, is undoubtedly a contributing factor to the quality of water in the reservoir.

We believe that we will continue to experience below normal precipitation and runoff cycles as we have in the past and are presently experiencing, so that water quality in the reservoir cannot be expected to improve.

During the intervening period when we began storing water in the project, and up to this time, my department in cooperation with the U.S. Geological Survey, Water Quality Branch, has carefully monitored the quality of the water in the reservoir, and we find that sulphates have been building up in the reservoir, and at this time are far above the maximum recommended by the Public Health Service for domestic use of water; and the total dissolved solids are very high, as shown by the most recent analysis.

The participating cities in the project for their water supply are faced with the dilemma of making payments under the existing repayment contract between the conservancy district and the United States, while at the same time the source of revenue to meet the obligations of the cities to the United States is the sale of water, and the present quality of water without adequate treatment cannot be used as intended when the project cities entered into the contract for the construction of the project.

The conservancy district has shown good faith on its part by making substantial payment to the Government, even though sales of water from the project have not been made because of existing water quality.

Mr. WHITACRE. Does the contract between the conservancy district and Department of Interior require they deliver potable water?

Mr. RAAB. It was agreed on both sides of the contract that there would be potable water.

Mr. WHITACRE. In the event they are unable to deliver potable water, is there an obligation on the part of the conservancy district to meet the obligations under the contract?

Mr. HOLUM. We will have Mr. Langley get the exact contract language on this subject.

Mr. LANGLEY. It does not make a guarantee of water quality but I think perhaps the point that is being made is obviously we would not have entered into a contract for municipal and industrial water unless someone thought we were going to deliver it.

Mr. WHITACRE. Didn't the conservancy district assume delivery of potable water?

Mr. RAAB. That would be a fair assumption.

Mr. WHITACRE. What happens if you cannot deliver potable water, which you obviously have not been able to do, and the conservancy district does not make its payments under the contract? Where do you go from there? I think it is important to get this in the record.

Is there an obligation on the part of the conservancy district to pay the annual charges under the contract regardless of whether or not they deliver usable water?

Mr. HOLUM. I don't think we have carried out our consideration to that ultimate question, Mr. Whitacre.

We will be up against that and I think essentially what we are talking to you today, both those of us who speak for the Department and those who are speaking for the conservancy district, is not a

matter of contract operation but a matter of aqueduct capability, and the Secretary is very circumspect in what he can do.

Mr. WHITACRE. That is one reason I thought it might be of interest to find out actually what the contract says.

Mr. LANGLEY. The contract provides in article 24(b) under a heading "Water Shortages, Quality of Water, Waste, Seepage, and Returned Flows":

"The United States makes no warranty as to the quality of water delivered to the district under this contract.

I would like to comment just a moment on that. This is somewhat of a standard boilerplate which has been in our contract for many years up until recently but it carried an additional connotation and that is in contracting for municipal and industrial water we were selling raw water.

We were not guaranteeing it biologically from a health standpoint.

Mr. WHITACRE. Do you want to proceed, Mr. Raab?

Go ahead, Mr. Raab.

Mr. RAAB. Thank you very much.

I think we are all interested in trying to find a solution to the problem.

This project was undertaken because there was not an alternate supply of water available for development. Ground water in the general area of the project cities is very limited and not dependable to meet present and future needs, for the reason that this area overlies the Permian Basin, which carries a high degree of sodium chloride and comprises a large area in midcontinent region and includes major portions of Kansas, New Mexico, Oklahoma, and Texas.

We are grateful to the Congress for recognizing the national significance of this problem of natural pollution by authorizing the Corps of Engineers and the Public Health Service to make surveys and recommend works of improvement to control the purging of natural pollutants into the water supplies of the region.

In my 15 years' service with the Oklahoma Water Resources Board, I am thoroughly familiar with the urgent need for making usable water available to the project cities to supplement existing sources of supply.

In our statewide planning for water development, as provided by Public Law 89-90, our department selected southwestern and western Oklahoma as the most critical areas within our State and gave priority to this area in the planning of water resources program to meet present and future needs as provided by the Federal legislation. The Foss Reservoir is a part to the plan.

Mr. Chairman, I understand some time ago that the Secretary of the Interior did appoint a special committee to investigate the problem of water quality in the Foss Reservoir and to make recommendations for a solution to the problem.

I hope that that report has been made available to your committee for its information and assistance in resolving this urgent problem.

Mr. Chairman, and members of the committee, I cannot urge too strongly that the committee give serious and careful consideration to the adoption of S. 1946, the provisions of which appear to provide the only remedy for a situation that has developed in this project.

Mr. WHITACRE. I think that part of the report was submitted by the Department of the Interior along with the text of a proposed

draft of legislation as a substitute for the bill that is before the committee. I am sure it is in here and the committee is well aware of it at this time.

Mr. RAAB. Now, I will give you my comments on the substitute proposal.

Since arriving here late last evening, we find that the special Board, which I have just referred to, appointed by the Secretary of the Interior in May to study the water quality problems in Foss Reservoir and recommend solutions has made its preliminary part 1 report to the Secretary and finds, among other things, that—

The waters of the Foss Reservoir are not suitable for municipal and most industrial purposes.

It further recommends:

More quantity and quality date be obtained at the reservoir and in its watershed, to permit better evaluation of the problem.

In view of the foregoing report and recommendations contained therein, there is now a substitute proposal to S. 1946 which I believe should be considered by your committee and adopted at the earliest possible date. We have a very serious problem and one that merits the most careful study and consideration for the long-term solution.

Thank you, Mr. Chairman.

Mr. WHITACRE. Thank you very much, Mr. Raab.

I am sure the chairman and the other members of the committee who are tied up on the floor will read your testimony and give it careful attention.

You have been before the committee many times and they recognize your problems. I know they certainly do appreciate your appearance.

Mr. RAAB. We have been concerned with this problem for most of my adult life but I do want to commend the Secretary of the Interior, Mr. Holum, and his staff, for coming up with what I think is a proper approach to this whole problem. It is one we have never had anything comparable to that I can remember in my 40 years of water development in this great country and I believe that a new look at the earliest date is most urgent.

Mr. WHITACRE. I can't speak for the committee, because I just work here, but in view of the circumstances I am sure every consideration will be given to this matter.

The next witness is Hon. Pete Simmons, mayor of the city of Hobart, Okla. You may proceed now and I am sure the members of the committee will read your testimony.

#### STATEMENT OF HON. PETE SIMMONS, MAYOR, CITY OF HOBART, OKLA.

Mr. SIMMONS. Mr. Chairman and members of the subcommittee, Hobart is a member of the Foss Master Conservancy District with a contract executed April 7, 1959, for water from the Foss Reservoir. The people of Hobart have financial repayment obligation greater than any of the other towns in the project. Therefore, we are vitally interested in any legislation that would give the people a useable water at a cost within the ability of the people to pay.

As Hobart's water usage increased over the years, it became apparent that we would need water from the Foss project as our lake at Rocky is silting in and it was necessary to ration the water. Apparently, there was no other unallocated water that was available. Therefore, we have worked with the other towns for the project, and representatives from Hobart came to Washington asking that the Foss project be built.

Our financial obligation is greater than any of the other towns in the project while our allocation of water is less than one-third of the reservoir output for municipal uses. For this reason Hobart is very interested in a solution to the problem of making water available to the users, as our only source of revenue is from the sale of water.

Hobart city officials in the past have not favored the central treatment plant because of increased water costs to Hobart. However, we have made a payment of \$69,981.12 on August 2, 1966, plus operation and maintenance payments amounting to \$19,462.50. It is urged that all payments be refunded to the communities involved.

We appreciate the efforts of our Senators and also our Representatives and the members of this committee. We know that you now realize the problems that we have in western Oklahoma. For this reason, the city of Hobart wholeheartedly goes on record in support of the Department bill as introduced.

Senator ANDERSON. Did anyone ask you about a desalinization plan before you entered into this project?

Mr. SIMMONS. We have our own treating plant in Hobart and we did not know until recently that this water could not be treated.

We obtained raw water thinking we could treat it but we find out now we cannot treat the water. So, we would appreciate some relief because we are getting too low on water as is the town of Bessie.

Senator ANDERSON. I talked to Senator Monroney on the floor just a moment ago. I know how anxious he and Senator Harris are to help this bill along. Certain studies should be made, and we will work for you on this. We are glad you took the time to come here.

Mr. Holum, Senator Burdick now has some questions of you.

Senator BURDICK. Under the proposed legislation, the amount of moneys paid in for the municipalities will be refunded; is that correct?

#### STATEMENT OF KENNETH HOLUM—Resumed

Mr. HOLUM. Yes, under our proposed legislation the Secretary would be authorized to return the money.

Senator BURDICK. You say in your statement that the repayment contract with the Foss Conservancy District would be further amended to reduce the construction charge obligation thereunder by the amount of the cost of the construction of the plant. In other words, the cost of constructing this desalting plant will not be considered a part of the obligation of the project; is that right?

Mr. HOLUM. It is our purpose under this legislation first to conduct the feasibility study and then having conducted the feasibility study to determine what the alternatives are that are available to the district. The Secretary will have the authority at that time on the basis of the new information that is gained to amend the repayment contract with the conservancy district.

Senator BURDICK. In other words, the cost of this new dissolving unit would be about \$2 million. That will not be charged to the project; is that right?

Mr. HOLUM. I would not at this moment want to be quite that specific.

I would want to maintain the right of the Secretary to identify the rights of the United States and of the district before making a final commitment but in general, that is the idea.

Senator BURDICK. What is the rationale behind that?

If these conditions were known at the time of the original authorization, it would have been \$2 million more then, would it not?

Mr. HOLUM. Unfortunately, these conditions were not known then.

Senator BURDICK. Had they been known the project would have cost \$2 million more?

Mr. HOLUM. That is correct.

Senator BURDICK. What is the rationale for removing the money from the project? These people are getting their money back.

Mr. HOLUM. I think the equities fall something like this: That the conservancy district in good faith negotiated a contract with the Department of Interior for municipal and industrial water. They looked at the definite plan report and the expected water of a quality that the definite plan report indicated that they would be saved. Unfortunately, and I think for a variety of reasons, they were not able to deliver water of that quality. I think equity does require a new law.

Senator BURDICK. My point is though, Mr. Secretary, there are facts now that indicate that we should have known it at the time but we did not know it as a legislative body but had we known it and had we wanted the water, the project would have cost \$2 million more back in 1956.

Mr. HOLUM. It is entirely possible that the project would not have been authorized and it is entirely possible, too, that having an opportunity to look at the different costs of water under these conditions, that the conservancy district would not have been interested.

Senator BURDICK. They tell me there is no other source for water.

Mr. HOLUM. It is a substantial increase in the cost of water to them, considering both the capital costs and the operation and maintenance costs.

Senator BURDICK. I want to be as easy as I can upon the people who need the water but I am just trying to get the justification for eliminating the \$2 million.

Mr. HOLUM. All of the available information to us now and our consulting board has said to us substantially that they are not going to be able to deliver potable water from Foss Reservoir of acceptable quality for municipal and industrial uses unless something more is done and unless something substantial more is done than was done when these contracts initiated.

Senator BURDICK. Then in order to get potable water originally we would have to do what we are doing now wouldn't we?

Mr. HOLUM. I cannot say that with absolute finality. I assume that would be the case but there would be other alternatives in the area that would be considered.

Senator BURDICK. If the communities were repaid the amount of money they have paid in they suffer no loss, actually.

Mr. HOLUM. We can only speculate, of course, as to what the decision would have been by the communities, by the Congress, by the Department of the Interior, if these facts had been known at that time but the issues would have been clear and sharp if these facts had been known.

Senator BURDICK. That is all.

Thank you.

Senator ANDERSON. We will try to work out some of these things. We will try to be fair and just when that time comes.

Thank you very much for coming back, Mr. Holum.

Senator ANDERSON. Mr. Paul Nonast, representative of the mayor of Bessie, Okla.

**STATEMENT OF PAUL NONAST, REPRESENTING THE MAYOR OF BESSIE, OKLA., AND MEMBER OF THE BOARD OF DIRECTORS OF THE CITY OF BESSIE, OKLA.**

Mr. NONAST. Mr. Chairman, I am Paul Nonast, member of the board of directors of the town of Bessie.

It was impossible for president of the board of trustees of our town of Bessie, Okla., to be present, but he and the other trustees have authorized me to speak for them.

Our town water system—presently does not produce water which can be used for human consumption. It is so hard that each year or two all faucets and plumbing fixtures must be replaced.

We haul our drinking water.

Our population has increased since we became a part of Foss Reservoir Master Conservancy District and contracted for water. It had slowly but surely decreased prior to that time. Our population is still small and our water consumption is only 35,000 gallons a day during the summer months.

However, we are in the center of a fertile wheat-producing area and, with adequate water of the approximate quality that was originally forecast for Foss Reservoir, our community will have a steady growth and will thereby relieve some of the problems of the larger cities.

We feel that we are in a position to speak for the other small towns in the area, who have been making plans to purchase treated water from the district along the aqueduct although they are not a part of the district and presently have no contracts with the district.

One neighboring community, Butler, has made definite plans to use the water and is, at this moment, faced with a major water crisis. Rocky, Sentinel, and Dill City have all expressed interest in such water purchases.

Because of the interest of these cities and the great interest of various rural communities in rural water cooperatives in the three-counties in which the district is located, the district, through its consulting engineers, has fostered the organization of a tricounty planning commission to organize, assist, and encourage these groups.

The present demand for purchases from nonmember towns, rural water cooperatives, and farmers along the aqueduct is 200,000 gallons per day, which the planning commission estimates will mushroom to 3 million gallons a day in the next 3 to 5 years. Undoubtedly, these demands will steadily and rapidly increase if potable water becomes available from the aqueduct.

Our community contracted with the district for an obligation much greater for each person in the community than the per person cost in any of the other cities in the district. We had the approval of almost all of the voters in the authorization. We knew adequate potable water was essential to our future. We strained our financial muscles in this effort and do not think that we can—or should—spend any more.

The payments made by us on the repayment contract and for operation and maintenance are small, but they represent more of a burden to the individual citizen than that cast upon any of the other citizens of the district.

Our town does not have any local water treatment plant. Our citizens, too, agree completely with the statements made by the president of the district to this committee.

We will not rehash the contentions and information in that statement.

It has been a privilege to represent my hometown before this committee. Thank you.

Senator ANDERSON. Thank you for coming in.

Do you have any questions, Senator Burdick?

Senator BURDICK. Do you know whether or not this water is suitable for agricultural purposes? I am now referring to the water in this project.

Mr. NONAST. No, sir, I do not know whether it is or is not.

Senator ANDERSON. Is any water impounded behind the dam?

Mr. NONAST. There has been water used out of the stream for irrigation, yes, sir.

Senator BURDICK. The water for this project has not been used on any of the farms, has it?

Mr. NONAST. Yes, sir, there has been some that has been let out.

Mr. ENGLEMAN. I am president of the district and I testified a moment ago that there have been releases out of the reservoir that were used for irrigation, for farmers that pumped out of the stream for irrigation.

Senator BURDICK. That was streamflow water?

Mr. ENGLEMAN. That was pumped out of the reservoir.

Senator BURDICK. Was that used prior to the time the dam was constructed?

Mr. ENGLEMAN. Prior and afterwards.

Senator BURDICK. It is natural flow of water they used prior to the time the reservoir was constructed, used both before and after?

Mr. ENGLEMAN. This month there are some releases being made for irrigators below the dam and this has happened each summer for the last three summers.

Senator BURDICK. Has there been enough experience at this time to say whether or not that water is suitable for agricultural purposes?

Mr. ENGLEMAN. The farmers think it is. We have heard no adverse comments nor any response to make us think it is not good for irrigation. This has only been about 3 years, of course.

Senator ANDERSON. Thank you, Mr. Nonast for appearing before the committee. We appreciate having your testimony.

Mr. NONAST. Thank you, Mr. Chairman.

Senator ANDERSON. Mr. Collier?

Mr. ENGLEMAN. Mr. Collier is not going to testify.

Mr. COLLIER. Our mayor has already made a statement and I stand on his comments.

STATEMENT OF JOE PHELPS, CONSULTING ENGINEER, PHELPS,  
SPITZ, AMMERMAN & THOMAS, INC., OF OKLAHOMA CITY,  
OKLA., CONSULTING ENGINEERS FOR MASTER CONSERVANCY  
DISTRICT

Mr. PHELPS. Mr. Chairman and members of the subcommittee: I am Joe Phelps, consulting engineer for the Foss Reservoir Master Conservancy District.

I have prepared a statement endorsing Senate bill 1946 and I wholeheartedly endorse the substitute bill as provided or submitted by the Bureau of Reclamation.

Senator ANDERSON. They are very substantially different. One provides for full relief and the other provides for a study to be carefully done.

Mr. PHELPS. Approximately 1 year ago the conservancy district hired us as their consulting engineers to design a conventional water treatment plant to treat water from the Foss Reservoir.

After making analyses from the Foss Reservoir, it became apparent to us that a conventional water treatment plant treating water from this reservoir would not give a quality of water that was in U.S. water drinking standards and would be a quality of water much poorer than what the cities presently have, and that they would be very dissatisfied with water of this quality.

After much research on our part, we felt that some form of demineralization plant would be necessary to treat the water from the Foss Reservoir. Of the various samples that we took from the reservoir, the total dissolved solids were all the way from 1,400 parts per million up to 1,600 parts per million, and it was using total dissolved solids in this range, that convinced us that a demineralization plant would have to be the answer.

Mr. Chairman, as a matter of fact, after doing all the research that we have done on this project, and spending considerable money in research, we have told the board that unless the demineralization plant was built, that we did not want to design a conventional plant and be responsible for it, in treating the type of water that was in the Foss Reservoir.

Our basis for recommending a 3 million gallon-per-day plant is on the basis that the city of Cordell and Hobart would both like to take practically all of their water from the Foss plant after it is built.

Both of these towns would like to phase out their present systems as soon as possible. Hobart's system is old, their waterplant is obsolete and they are in need of building a new one.

The city of Cordell has several water wells and they are being forced to drill additional wells practically every year. Unless this plant is built, two more wells will have to be drilled this coming year, to meet their summer demands next summer.

Senator ANDERSON. Why is there such short life for these wells?

Mr. PHELPS. Mr. Chairman, the reason for that is this ground water they have out there is limited in quantity and it is a sandstone formation that lies between layers of clay. It is only a shallow formation. When you talk about your irrigation well, you probably have a lot of sand-producing water but these wells are shallow. They lie

between these clay formations and one of the reasons they are so short lived is they pump the reservoir dry and it does not replenish itself. They not only sand up but they deplete their reservoir.

The city of Cordell has lowered their water tables as much as 7 feet in those small reservoirs in 1 year of heavy pumping and it is not a dependable supply.

As has been pointed out here there is no large enough drainage areas in this part of the State that will produce an adequate water supply.

The Washita River is it. Of course, the upper reaches of the Washita in that area and most of the tributaries to it now have these gypsum crops, putting in the high concentration of calcium sulphates and magnesium sulphates into this water.

There has been some reference made in this testimony on the effects that upstream flood control above the Foss Reservoir has had on the reservoir water.

That is definitely true. I am familiar with that program because I served on the board of directors of one of the conservancy districts where we built one of these.

Senator ANDERSON. Could you tell us how many dams were built?

Mr. PHELPS. There were 210 dams above the Washita Reservoir that have been built through this project. There have been almost 1,100 built altogether but there are 210 above this reservoir on tributaries of the Foss Reservoir.

Senator ANDERSON. Since this project was authorized?

Mr. PHELPS. They were being built at that time and they were essentially completed at about the time the Foss Reservoir was built.

The Washita program was in operation or in being several years before this project was authorized but they both came along together.

Senator ANDERSON. Marvin Jones was chairman of the Agriculture Committee and he sponsored these dams in his area and also sponsored those in Oklahoma for Senator Kerr.

Mr. PHELPS. I believe in all dams but I certainly believe in upstream flood-control dams. We have had experience with them. We have reduced floods in my State due to one of these projects. We had two towns that got flooded every year and since we got these six-some structures we have not had a flood since 1958.

But they are contributing factors and there are some of these tributaries that have fairly good water on them and every gallon that they impound in these reservoirs in their sediment storage pools is just that much less water than we have to dilute the calcium and sulphate deposits that would be in the rest of the water coming into the reservoir.

The city of Clinton would like to receive their peakloads at least their peakloads in the summertime from Foss treatment plant, and there are several other small communities, Bessie, Rocky, Burnsflat, and several others, that are just waiting until a treatment plant is put in to obtain their water supply from this area.

It is possible that within a period of 3 to 5 years there will be enough rural water districts in the area that they alone will require upwards of 3 million gallons per day in the summertime.

We might say, "Why are we spending all this money for electro-dialysis plant or a demineralization plant?" May I point out, that most of the surface water and subsurface water of the entire western part of Oklahoma is highly mineralized with gypsum and magnesium sulfate deposits.

There is very little underground storage in western Oklahoma that doesn't contain these high mineral deposits and what storage there is, is not of sufficient quantity to allow cities in the area to depend on them for future and permanent water supply.

It might be pointed out, that this problem of high mineralized water in calcium and magnesium sulfates is not inherent only in western Oklahoma, it is also in west Texas, parts of New Mexico, western Kansas, and even on up into the Dakotas.

If this problem at Foss can be solved, and shown that demineralizing of these highly mineralized waters can be made into an adequate water supply, it will probably pave the way for many projects over this entire area. At the present time there is one demineralization plant being built in western Texas and several others are in the planning stages.

When the conservancy district started figuring on a conventional water treatment plant, they thought that the operation and maintenance cost of such a plant would run in the neighborhood of \$0.07 to \$0.11 per thousand gallons of treated water. Before the conventional treatment was abandoned, this price had increased to around \$0.19 per thousand gallons, and still did not have the quality of water that would even come close to U.S. drinking water standards.

The actual operation and maintenance costs of operating a demineralization plant, including the front end conventional treatment, will run somewhere between 26 and 38 cents per thousand gallons, this will depend upon the degree of treatment to which the demineralization is carried.

A water that will meet U.S. drinking water standards can be produced for approximately \$0.38 per thousand gallons operation and maintenance cost. However, if sulfates are 320 parts per million, 70 parts per million above U.S. standards, the cost will be approximately \$0.26 per thousand gallons.

The district is forced to charge this \$0.38 per thousand gallons plus the additional amount necessary to retire the cost of the reservoir and the aqueduct.

In adding this cost for reservoir and aqueduct amortization, the charge per thousand gallons of treated water to the cities and users will be approximately \$0.50 per thousand gallons.

The cost seems high, but in an area where there are no quality waters to be had, and the people are in great need of better quality water, this price will seem cheap in the long run.

There has been some remark made on the total dissolved solids in the reservoir, actually in low flow coming down the Washita River just at the head of the reservoir just before it gets in there.

We ran tests on it last summer and last fall and we had concentrations up to 2,200 parts per million of total dissolved solids when the Washita River is at low flow and that is one of the problems with these high concentrations is due to the fact that we have had below average runoff on the Washita for several years but we know the history of the State.

We do get floods once in a while but overall, we feel and we have told the board we feel that they will never get the constant pressure of total dissolved solids down in that lake where they can treat it with anything other than some kind of a demineralization process.

Senator ANDERSON. Your comments on the face of the report say half of the money is being appropriated for flood control.

Mr. PHELPS. I didn't understand you, Mr. Chairman.

Senator ANDERSON. I think flood control is about half of the project. If you don't have any floods why do you charge for flood control?

Mr. PHELPS. The flood control end of it I have nothing to do with on the Foss Reservoir.

Senator ANDERSON. It was just used to bolster up the application, was it not?

Mr. PHELPS. I imagine so.

There have been lots of floods on the Washita River and actually the reservoir will, in time, act as a flood control prevention there.

Senator ANDERSON. \$6 million is charged for irrigation and \$11 million for flood control.

Mr. PHELPS. There will be additional floods on the Washita River. These floods will not be as bad as they have been in the past.

Below these structures, downstream further, you still find floods but immediately below this structure, Foss Reservoir is protecting many thousands of dead acres from floods.

Senator BURDICK. Didn't you just say the upstream structures alleviate that?

Mr. PHELPS. The last flood on the Washita River was in the year 1958, I believe.

Actually, gentlemen, if you are familiar with upstream flood control, and I am sure you are, those structures are designed to diminish floods not to eliminate them.

Senator BURDICK. But they have been eliminated.

Mr. PHELPS. For the time being in this area they have been, yes, sir. They are not really designed to store water. They do in the sediment pools due to the fact that the sediment does not fill them up; the water does.

Senator ANDERSON. We work out the ratios of benefits to costs, and on the report which was made in the hearing at least it says something about the benefit-cost ratios.

The life of the project is conservatively figured at 50 years, overall range cost benefit ratio for all of the flood control projects in this country estimated prior to authorization at about  $3\frac{1}{4}$  to 1.

These projects have an open benefit-cost ratio 2 to  $2\frac{1}{2}$  to  $3\frac{1}{2}$  to 1.

They are pretty enthusiastic about this.

Mr. PHELPS. Senator Anderson, I imagine Senator Kerr had a little bit to do with that rosy picture in that original report that you are reading on the benefits of the Washita project.

Senator ANDERSON. I guess he did have.

Mr. PHELPS. Mr. Chairman, it has been a privilege to appear before you and your committee in the support of Senate bill 1946 and the Department bill as introduced. I certainly recommend its passage.

Senator ANDERSON. Thank you very much, Mr. Phelps, for appearing here before the committee today. We appreciate having your testimony.

If that completes the program, we will adjourn the hearings and thank you all very much for being here today.

(Whereupon, at 4 p.m., the hearing was recessed to reconvene subject to the call of the Chair.)

## APPENDIX

(Following the hearing, additional information on costs were received, as follows:)

IONICS, INC.,  
Watertown, Mass., August 15, 1967.

Subject: Electrodialysis costs at Foss Reservoir.

Hon. CLINTON P. ANDERSON,  
*Chairman, Subcommittee on Irrigation and Reclamation, Committee on Interior and Insular Affairs, Washington, D.C.*

MY DEAR SENATOR ANDERSON: At the hearings before your Committee on the Foss Reservoir on August 10, there were questions concerning the cost of removing excess salts and minerals from Foss Reservoir water by electro dialysis ("ED"). Ionics—which pioneered and developed practical ED equipment now in worldwide use—was asked in June of last year to furnish ED cost estimates to the consulting engineers for the Foss Reservoir Master Conservancy District, to the Bureau of Reclamation in Amarillo, and more recently to the consulting Board appointed by the Department of the Interior and chaired by Professor Reid of the University of Oklahoma.

Our cost estimates, which vary from 34¢ to 42¢ per thousand gallons as the annual "load factor" on the plant varies from 90% to 50% are detailed in the attached Table A.

The capital cost estimate of \$1.5-million for a three million gallon per day, three-stage plant is a conservative budget estimate based on constructing the plant today using proven ED technology. The O&M costs of 23¢ per thousand gallons cover amounts for electrical energy consumption, chemical consumption, membrane replacement and replacement of other parts which we are prepared to guarantee by contract over a five-year period, as has been done successfully at Buckeye, Arizona; Port Mansfield, Texas; and other commercial installations.

There are at least two types of ED technology. The type developed by Ionics utilizes the "tortuous path" concept. Costs and performance for other ED technologies, such as that developed in Japan and utilized in the demonstration plant at Webster, South Dakota, are not necessarily comparable. This difference sometimes has caused confusion.

The attached estimates do not include "waste disposal" or "pretreatment" costs. "Pretreatment" by conventional treatment methods would be required on the Foss Reservoir water even if it had a low mineral content, and hence, is not an additional cost due to the unexpected high mineral content. We believe that the optimum method of operating an ED plant on this project will result in little or no additional cost for "waste disposal" and will have substantial beneficial downstream effects.

There are currently more than 150 Ionics ED units in operation throughout the world. In the United States, there are four brackish water conversion installations owned by municipalities or other local water purveying agencies. All four of these units—at Coalinga, California; Buckeye, Arizona; Port Mansfield, Texas; and (under construction) Dell City, Texas utilize ED. The Dell City unit is within a mile or two of the New Mexico border. We are enclosing a selection of local press clippings on the Dell City plant, including one from the Carlsbad *Argus*, as well as other current background literature.

We shall be happy to supply additional information as it may be needed.

Yours sincerely,

IONICS, INC.,  
WILLIAM E. KATZ,  
*Vice President.*

