

EIGHTEENTH ANNUAL REPORT

REPUBLICAN RIVER

COMPACT

ADMINISTRATION

FOR THE YEAR 1977

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LINCOLN, NEBRASKA

JULY 7, 1978

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Eighteenth Annual Report  
REPUBLICAN RIVER COMPACT ADMINISTRATION

In conformity with the Rules and Regulations of the Republican River Compact Administration, the Eighteenth Annual Report is submitted as follows:

1. Pursuant to Rule 12, as amended, this report covers the period from July 1, 1977, to July 7, 1978.
2. Members of the Republican River Compact Administration are the officials of each of the states who are charged with the duty of administering the public water supplies, and are as follows:  
  
Guy E. Gibson, Chief Engineer, Division of Water Resources, State Board of Agriculture, Kansas;  
  
C. J. Kuiper, State Engineer of Colorado  
  
John W. Neuberger, Director, Department of Water Resources, Nebraska
3. The Nineteenth Annual Meeting of the Administration was held on July 7, 1978, in the lower level conference room of the Nebraska State Office Building, Lincoln, Nebraska. Minutes of the meeting are included with this report.
4. During the period covered by this report, one meeting of the Engineering Committee was held. A report from that Committee together with summary tabulations of the computed annual virgin water supply and the consumptive use for the 1977 water year in the Republican River Basin was presented and accepted by the Administration.
5. C. J. Kuiper, Colorado Member of the Administration, was elected Chairman to serve until the next annual meeting of the Administration.

Minutes of the  
Nineteenth Annual Meeting  
Republican River Compact Administration  
Nebraska State Office Building  
301 Centennial Mall South  
Lincoln, Nebraska - July 7, 1978

The meeting was called to order by John W. Neuberger who stated that the first order of business according to Rule VI of the Compact was to elect a chairman. It was moved by C. J. Kuiper, official member from Colorado, that Mr. Neuberger be appointed temporary Chairman of the Administration. Guy E. Gibson, official member from Kansas, seconded the motion. Those present were asked to introduce themselves, and a list of those in attendance and their organization follows:

<u>Name</u>	<u>Organization</u>
Michael Jess	Nebraska Dept. of Water Resources
Glen Engel	U. S. Geological Survey
K. A. MacKichan	U. S. Geological Survey
Dudley Jackson	Nebraska Dept. of Water Resources
Fred Zabel	Nebraska Dept. of Water Resources
Keith Paulsen	Nebraska Dept. of Water Resources
Tom Hamer	Nebraska Dept. of Water Resources
Robert F. Bishop	Nebraska Dept. of Water Resources
Gerald E. Hilmes	Kansas Division of Water Resources
Guy E. Gibson	Kansas Division of Water Resources
John W. Neuberger	Nebraska Dept. of Water Resources
C. J. Kuiper	Colorado State Engineer
Jeris A. Danielson	Engineer Adviser - Colorado
Jerry Wallin	Nebraska Natural Resources Commission
Dayle Williamson	Nebraska Natural Resources Commission
Bob Kutz	U. S. B. R. - McCook, Ne.
Dennis E. Allacher	U. S. B. R. - McCook, Ne.
Fred T. Krauss	U. S. B. R. - Denver, Colo.
Roger A. Weidelman	U. S. B. R. - Denver, Colo.
Ron Wunibald	Lower Republican NRD - Alma, Ne.

Approval of Minutes of 18th Annual Meeting

The Chairman asked for changes or corrections in the minutes of the last annual meeting. Mr. Kuiper moved that the minutes as published be approved. Mr. Gibson seconded the motion.

Report of Chairman

The Chairman stated that notice of the meeting was mailed May 30, 1978, and according to the rules and regulations the meeting was to be held before August 1st. He reported that the rules and regulations were up-to-date as published in the Seventeenth Annual Report. It was reported that on May 15th the Chairman received a copy of the annual operating plan from the Bureau of Reclamation.

#### Report of Official Member from Colorado

Mr. Kuiper presented the report for the State of Colorado. He reported that Colorado had one of the driest years on record and that all streams set new record lows except two. It was reported that heavy withdrawals of ground water saved many crops but that there were heavy withdrawals on the aquifers. There has been an extremely high snowpack and slow melting of the snowpack. Mr. Kuiper reported that there had been negotiations between the State of Colorado and the Bureau of Reclamation to purchase Bonny Reservoir and that it would be converted into a recreation area.

#### Report of Official Member from Kansas

Mr. Gibson reported no significant change relative to the Bostwick Irrigation District. He reported that there was a problem with the Solomon River with regard to surface water and that there had been no requests below Norton Reservoir for administration. Mr. Gibson reported that there are now three areas in Kansas where no more water is to be appropriated. The Kansas Legislature has established a procedure to follow in declaring a closed area. Ground water management districts may petition the Chief Engineer to hold hearings in an area. As a result he has authority to make a determination of the boundaries for control areas. Also, landowners may petition the Chief Engineer to hold hearings within a district and decide boundaries and make limitations which he may find advisable. Mr. Gibson reported that there are three or four interim committees looking into water law in Kansas and that the Governor's Task Force has been very active. A law in Kansas now makes it the responsibility of the Chief Engineer to determine the extent of vested rights, which are rights existing prior to 1945. Anyone who believes he is entitled to a vested right must file an application with the Chief Engineer and the Chief Engineer is required to notify every right of record within a five-mile area and issue an order stating the extent of the right. As of 1980 no more vested rights may be established. A new statute in Kansas states that once you obtain a date in which to perfect an application that if you do not request an extension of time or do not notify the State of completion of work that application is automatically dismissed. Kansas is one of three states working with the U.S.G.S. in a cooperative well testing program. The Kansas program involves testing of wells in the Ogallala formation. A new system for water use reports has been developed in Kansas. Although response was about 60% previously a new system which is a postal card type of response has been designed to make reporting less difficult for the water user.

#### Report of Official Member from Nebraska

Mr. Neuberger reported that very few changes or new programs came out of the last session of the Nebraska Legislature concerning water. One bill allows NRD's in the absence of a control area to control runoff provided the source of the water is ground water. LB 688 provides a penalty for transferring ground water out of the state, and it is now a Class IV misdemeanor which is consistent with Nebraska's Criminal Code. In the water planning and policy area the Legislature directed the Natural Resources Commission and seven other state agencies to redirect and accelerate the state water plan, mainly directed toward a list of ten broad policy questions. Efforts are being made to have before the Legislature by November 15th of this year a policy statement and work plan for modernizing the State's water policies--one of which is the matter of transbasin diversion which is the key issue in a hearing presently before the Nebraska Department of Water Resources.

The stream gaging program in the Republican Basin in Nebraska has been increased significantly. Nebraska has added five continuous record gaging stations plus a good many miscellaneous base flow measurements on many formerly ungaged streams in the Republican Basin. At the request of the Bostwick Irrigation District Nebraska is examining into the private pump diversions in the section of the river from Harlan County Dam to the Superior-Courtland Diversion Dam to determine the cause of loss of storage releases being carried in that fifty mile section of the river. In connection with these activities in the Republican Basin two full time staff members have been added to the Nebraska Department of Water Resources.

Michael Jess reported on ground water control activities in Nebraska. On August 1, 1977, a control area was created in the Upper Republican Natural Resources District in Perkins, Chase and Dundy counties. The Board of Directors of this district adopted rules and regulations in March, 1978. Allocation and spacing requirements are being considered. Nearly 3,000 wells are involved in this area. A moratorium has not as yet been declared in any portion of the area. This is the first area in Nebraska where permits from the Department of Water Resources are required prior to drilling irrigation and municipal wells.

It was noted that about sixty-five water rights were considered for cancellation for non-use after hearings for that part of the Republican Basin below Harlan County Reservoir.

#### Report of Engineering Committee

The Engineering Committee report was distributed by the Chairman, Robert Bishop. The Engineering Committee held one meeting during the year, April 26-27, 1978. A correction on page 13 in the Seventeenth Annual Report was noted. The total in the second column under ground water should read 110,530 instead of 11,530. A motion was made by Colorado that the Engineering Committee Report be approved and accepted. Kansas seconded the motion and the Chairman declared the motion passed. The engineering report is included with this annual report.

#### Report of Bureau of Reclamation

Robert Kutz of the Bureau of Reclamation reported that the Bureau is still working with the Colorado Division of Wildlife regarding sale of space in Bonny Reservoir. Since the Corps of Engineers planned to do some work in Harlan County any water possible was to be retained in upstream tributary reservoirs. Harlan County elevation was to be 1940 by August 1st. The only reservoir spilling at that time was Medicine Creek. Over the Memorial Day weekend 3,800 acre-feet was to be retained in Medicine Creek instead of letting it down into Harlan County, but it turned out that 2,177 acre-feet was actually retained. Mr. Kutz reported all reservoirs short of normal and precipitation short at all reservoirs. Precipitation was reported 78% of normal for all reservoirs.

A report on the Bureau of Reclamation's total water management study in the Republican River basin was presented by Fred Krauss and Roger Weideman. A summary of the study has been provided by Mr. Joe Hall, Regional Director of the Lower Missouri River Division of the U. S. Bureau of Reclamation and is shown following the engineering report.

### Unfinished Business

There was a discussion as to what guidelines should be followed by the Compact Administration during a water short year. Reference was made to the last paragraph on page eight of the Sixteenth Annual Report and the first paragraph on page six of the Seventeenth Annual Report regarding this matter. Kansas reported that they submitted the report of the Special Engineering Committee on April 3, 1978. This report was dated July 30, 1975, and was submitted with the thought that it might be a basis for assignments for the coming year. Mr. Gibson moved that consideration be given to the appointing of a special committee to review and update the report of the Special Engineering Committee of July 30, 1975, and make recommendations to the Compact as to the most equitable division and best solution possible in the event of a water short year. The motion was seconded by Mr. Kuiper.

There was discussion as to the Compact being in an after-the-fact situation, and it was pointed out that the Compact does provide a procedure for the adoption of rules and regulations.

Mr. Kuiper suggested that Kansas select a Chairman for a Special Engineering Committee. Mr. Gibson selected Gerald Hilmes to be Chairman of the Special Engineering Committee for the next year. It was agreed that each state should pick two members to serve on the Committee. Mr. Danielson asked that the Compact provide direction or guidelines for the Special Committee. Mr. Hilmes pointed out the motion by Mr. Ball which was seconded by Mr. Kuiper at the Seventeenth Annual Meeting which states that the Administration shall submit 60 days prior to the next annual meeting a report which contains assignments for such a committee.

### New Business

The role of the Republican Compact Administration in the Bonny Reservoir adjustments was discussed. Mr. Kutz stated that the Bureau of Reclamation was not ready at this time to come before the Compact or the individual members with figures on what to be expected. It was determined that there was not need to call a special meeting at this time. Mr. Gibson moved that the status of negotiations on the Bonny Reservoir adjustments be put on next year's agenda by the Chairman and that the Bureau of Reclamation be invited to come before the Compact and report whatever activities or progress has taken place during the year. Nebraska seconded the motion.

Mr. Gibson moved that the Engineering Committee remain the same and that their responsibilities remain the same. The motion was seconded by Mr. Kuiper.

Dayle Williamson of the Nebraska Natural Resources Commission provided members with copies of the report on the High Plains study.

Mr. Neuberger moved that a resolution to Marion E. Ball be prepared by Nebraska with appropriate language recognizing Mr. Ball's service to the Compact. This is to be prepared for the signature of the Official Compact Members and a copy forwarded to Mr. Ball. A copy should also be included as a part of the Eighteenth Annual Report. The motion was seconded by Mr. Kuiper.



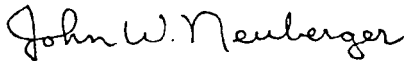
Election of Officers

Mr. Gibson made a motion that Mr. C. J. Kuiper of Colorado be elected Chairman of the Compact for the coming year. The motion was seconded by Mr. Neuberger.

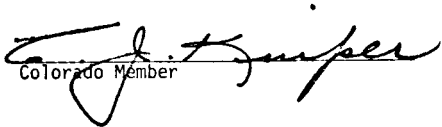
The Nineteenth Annual Meeting of the Republican Compact Administration was adjourned at 11:45 A.M.

Respectfully submitted,

by:

  
\_\_\_\_\_  
Nebraska Member (Chairman)

  
\_\_\_\_\_  
Kansas Member

  
\_\_\_\_\_  
Colorado Member

RESOLUTION

WHEREAS, M. E. Ball, Director of the Nebraska Department of Water Resources has been the Official Member for Nebraska on the Republican River Compact Administration since July 1, 1974; and

WHEREAS, Mr. Ball was Chairman of the Committee on Procedure for Computation of Annual Virgin Water Supply and Chairman of the Engineering Committee of the Republican River Compact from July 1959 until June 30, 1974; and

WHEREAS, Mr. Ball, through the years, has contributed his knowledge, professional skill and services to the fulfillment of the purposes of the Republican River Compact and to the organization and performance of the Republican River Compact Administration;


NOW, THEREFORE, BE IT RESOLVED, that the Republican River Compact Administration does hereby acknowledge the outstanding contributions of M. E. Ball to the States of Colorado, Kansas and Nebraska and does express on behalf of the people of these states their sincere appreciation and commendation for his services and extend to him best wishes for the future.

BE IT FURTHER RESOLVED, that this resolution be entered into the records of this Administration and that the Chairman be instructed to send a copy to Mr. Ball.

Adopted at the Nineteenth Annual Meeting of the Republican River Compact Administration at Lincoln, Nebraska, on the 7th day of July, 1978.

  
Official Member from Colorado

  
Official Member from Kansas

  
Official Member from Nebraska

Report of Engineering Committee  
Republican River Compact Administration

July 7, 1978

The Republican River Compact Administration at its 18th annual meeting held June 30, 1977, agreed the assignments to the Engineering Committee would be as follows:

1. Compute annual virgin water supply, 1977 water year;
2. Compute annual consumptive use, 1977 water year;
3. Compute adjusted allocations on annual five-year average and ten-year average basis;
4. Any other special assignment that might be assigned to the Committee by the Compact Administration during the coming year.

The Engineering Committee held one regular meeting during the year, April 26-27, 1978, to study the virgin water supply and consumptive use of the water supply for 1977. Submitted here and made a part of this report are the following:

1. (Exhibit A) Computed annual virgin water supply Republican River Basin, 1977 water year;
2. (Exhibit B) Computed annual consumptive use Republican River Basin, 1977 water year;
3. Computed inflow to Lovewell Reservoir and net evaporation of Republican River water stored in Lovewell, 1977 water year;
4. Computed adjusted allocations on annual five-year average and ten-year average basis.

It is the recommendation of the Engineering Committee that the computed annual virgin water supply and computed annual consumptive use for the 1977 water year be published in the 18th annual report of the Republican River Compact Administration.

The detailed computations of the virgin water supply and consumptive use, the adjusted allocations on an annual basis for 1977, and a five-year and ten-year average basis are available for inspection by members of the Compact Administration.

The following exhibits are available to the members of the Compact Administration with the recommendation that they not be published in detail in the Eighteenth Annual Report:

- 10A. Computed Annual Virgin Water Supply for the 1977 water year;
- 10B. Adjusted allocations computed on the Basis of Annual Virgin Water Supply, for 1977 water year;
- 10C. Average Annual Virgin Water Supply for Five-year Running Averages for 1973-1977 and Ten-year Running Averages for 1968-1977;
- 10D. Adjusted Allocations by Five-year and Ten-year Running Averages for same years as 10C.
- 10E. Computed Annual Consumptive Use by States for 1977 water year.

The above computations made by the Engineering Committee followed the procedures of previous years.

Municipal and industrial uses are not included in the virgin water supply computations; but, for the record, those available to the Committee are as follows:

1977 Calendar Year

	City of Norton	660 Ac. Ft.
(Amoco)	Midwest Oil Co.	306 Ac. Ft.
(Ladd)	L.V.O. Oil Co.	15 Ac. Ft.

Recorded diversions from the North Fork Republican River by the Haigler Canal for 1977 were:

Colorado	3,370 Ac. Ft.
Nebraska	8,090 Ac. Ft.
Total	<u>11,460</u> Ac. Ft.

Colorado diversions from ground water were based on an average diversion of 169 acre-feet per well producing from valley alluvium and are shown below in acre-feet along with other diversions from surface water with the exception of the Hale Ditch.

	<u>Ground Water</u>	<u>Surface Water</u>
S. Fk. Republican River	2,370	2,500
N. Fk. Republican River	510	3,900
Arikaree River	5,240	0
Beaver Creek	0	0

Nebraska diversions in 1977 by individuals from surface water by other than major canals are given below in acre-feet along with diversions from ground water by individuals. Surface water diversions were computed as 1.4 acre-feet per acre intended to be irrigated. The ground water diversion was computed from a 10% sampling applied to all registered wells in the valley alluvium as using 1.5 acre-feet per acre for lands irrigated from the wells.

	<u>Ground Water</u>	<u>Surface Water</u>
Republican River	121,030	19,500
Frenchman Creek	50,250	2,110
Medicine Creek	11,920	730
Red Willow Creek	5,030	420
So. Fork Republican River	950	0
Buffalo Creek	410	1,320
Beaver Creek	14,950	1,130
Sappa Creek	16,190	2,280
Driftwood Creek	1,490	0
Prairie Dog Creek	1,390	80

Diversions by individual irrigators from alluvial wells and streams in Kansas were estimated on the basis of water use reports from 41% of the water users. Average of all reported diversions in the Republican River Basin in Kansas was 1.8 acre-feet per acre. Average rate of diversion from ground water was 1.9 acre-feet per acre and from surface water was 1.4 acre-feet per acre.

Estimated diversions by individuals in Kansas for 1977 are given below in acre-feet:

<u>Sub-basin</u>	<u>Ground Water</u>	<u>Surface Water</u>
Arikaree River	280	0
South Fk. Republican River	9,150	0
Beaver Creek	14,270	640
Sappa Creek	10,670	30
Prairie Dog Creek	15,950	820
Republican River above Hardy	320	1,420

Return flow percentages were computed for the major canals from data provided by the U. S. Bureau of Reclamation as follows:

<u>Canal</u>	<u>Return as Per Cent of Total Diversions</u>	<u>Canal</u>	<u>Return as Per Cent of Total Diversions</u>
Culbertson	45%	Franklin	55%
Culbertson Ext.	51%	Franklin Pump	42%
Meeker-Driftwood	43%	Naponee	48%
Red Willow	43%	Superior	48%
Cambridge	42%	Courtland-Nebr.	21%
Bartley	41%	Courtland-Kansas	
Almena	60%	above Lovewell	46%
		below Lovewell	46%

Return flow percentages for other canals and diversions were estimated as given below:

Hale Ditch and Haigler Canal	38%
Champion and Riverside Canals	45%
Ground water and surface water diversions	25%

Computation of return flow from the Courtland Canal in Nebraska is shown below:

<u>Item</u>	<u>Acre-Feet</u>
Courtland Canal-Headgate	86,360
Courtland Canal-Stateline	-73,920
Total Loss in Nebraska	12,440
Direct Supply to Nebraska Lands	- 1,290
Courtland Canal Transportation Loss in Nebraska	11,150
Return Flow Percentage	x 75%
Transportation Loss Returned to River	8,360
Direct Supply Returned to River (2,890 x 25%)	+ 320
Total Return Flow in Nebraska	8,680

In Kansas 68% of the irrigable land above Lovewell was irrigated in 1977 with an average diversion rate (based on net supply) of 2.1 acre-feet per acre. From this data it was estimated that 1,620 acre-feet were diverted on 780 acres above Hardy and the return flows were 745 acre-feet. The average diversion rate (based on farm delivery) was 1.3 acre-feet per acre.

Diversion of return flows between tributaries and main stem Republican are given below in acre-feet.

<u>Canal</u>	<u>Diversions</u>	<u>Return Flows %</u>	<u>Ac.Ft.</u>	<u>Division of Return Flows</u>	
				<u>Frenchman</u>	<u>Main Stem</u>
Champion	2,570	45	1,160	1,160 (100%)	
Riverside	1,500	45	680	680 (100%)	
Culbertson	16,270	45	7,320	6,080 (83%)	1,240 (17%)
Culbertson Ext.	23,290	51	11,880		11,840 (100%)
Totals	43,630		21,040	7,920	13,080

<u>Canal</u>	<u>Diversions</u>	<u>Return Flows</u>		<u>Division of Return Flows</u>	
		<u>%</u>	<u>Ac. Ft.</u>	<u>Frenchman</u>	<u>Main Stem</u>
Meeker-Driftwood	28,420	43	12,220	Driftwood 2,930 (24%)	Main Stem 9,290 (76%)
Red Willow	7,550	43	3,250	Red Willow 330 (10%)	Main Stem 2,920 (90%)

The 1977 annual virgin water supply was computed using the above together with streamflow, diversion and reservoir records.

Net evaporation from Harlan County Reservoir was divided (65%) 9,070 acre-feet to Kansas and (35%) 4,890 acre-feet to Nebraska based on total diversions by the canals in each state below Harlan County Reservoir.

Division of consumptive use of the Courtland Canal transportation loss thru Nebraska is given below:

<u>Courtland Canal</u>	<u>Acre-feet</u>
Transportation Loss	11,150
Return flow to river of transportation loss	- 8,360
Consumptive use-transportation loss	<u>2,790</u>
Kansas Share = $\frac{\text{Stateline Flow}}{\text{Headgate Diversions}} = \frac{73,920}{83,360} = 86\%$	

Kansas Share of Loss C.U. = 2,790 x 86% = 2,400 Ac. Ft.  
Nebraska Share of Loss C.U. = 2,790 - 2,400 = 390 Ac. Ft.

Consumptive use in Nebraska by the Courtland Canal was computed from the return flow computation rather than using the virgin water supply data, as follows:

<u>Courtland Canal in Nebraska</u>	<u>Acre-feet</u>
Net supply	1,290
Return flow (1,290 x 25%)	- 320
Consumptive use-irrigated lands in Nebraska	<u>970</u>
Consumptive use-transportation loss	+ 390
Total consumptive use in Nebraska	<u>1,360</u>

Computations of inflow to Lovewell Reservoir show a 1977 total inflow of 58,440 Ac.Ft. of which 51,760 Ac.Ft. was diverted from the Republican River. Computed operations of Lovewell Reservoir for 1977 show a net evaporation loss of 2,980 Ac.Ft. from Republican River Water. Storage in Lovewell Reservoir at the beginning of the water year was 27,160 Ac.Ft. of which 4,140 Ac.Ft. was water from the Republican River. At the close of the water year, storage in Lovewell was 41,870 Ac.Ft. of which 13,340 Ac.Ft. was water from the Republican River.

Computation of consumptive use in Kansas of water diverted from the main stem Republican River, including prorated shares of net evaporation from Harlan County Reservoir and Courtland Canal transportation loss thru Nebraska was 49,060 acre-feet in the 1977 water year.

Consumptive use to mouths of tributaries in Nebraska were computed. The results are shown below:

Consumptive Use in Nebraska - 1977

<u>Sub-basin</u>	<u>By Formula Ac. Ft.</u>	<u>Above Mouth Ac. Ft.</u>
Prairie Dog Creek	0	1,100
Beaver Creek	12,060	16,630
Sappa Creek	8,580	10,830
Medicine Creek	10,110	11,270
S. Fk. Republican River	710	710
Buffalo Creek	1,300	1,300

It was noted an error exists on Exhibit A, page 13, 17th Annual Report, Republican River Compact Administration. The ground water virgin water supply for the Main Stem of the Republican plus Blackwood Creek should read 110,530 rather than 11,530.

It was agreed the next annual meeting of the Engineering Committee would be held in Denver, Colorado.

The meeting was adjourned at 11 o'clock A.M. on April 27, 1978.

Respectfully submitted,

 June 19, 1978  
Nebraska Date

 June 22, 1978  
Kansas Date

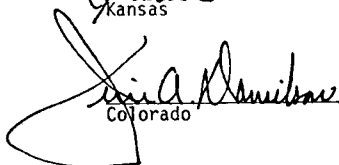
 June 26, 1978  
Colorado Date



Exhibit A

Computed Annual Virgin Water Supply  
Republican River Basin

<u>Drainage Basin</u>	<u>Compact Ac. Ft.</u>	<u>Ground</u>	<u>1977 W.Y. Ac. Ft.</u>	
			<u>Surface</u>	<u>Total</u>
Prairie Dog Creek	27,600	11,960	20,480	32,440
Sappa Creek	21,400	19,100	7,440	26,540
Beaver Creek	16,500	21,910	2,850	24,760
Medicine Creek	50,800	7,780	39,820	47,600
Red Willow Creek	21,900	3,770	22,730	26,500
Driftwood Creek	7,300	1,120	5,880	7,000
Frenchman Creek	98,500	37,690	82,030	119,720
South Fork of the Republican River	57,200	9,350	22,280	31,630
Rock Creek	11,000	0	9,550	9,550
Buffalo Creek	7,890	310	5,110	5,420
Arikaree River	19,610	4,140	8,710	12,850
North Fork of the Republican River	44,700	380	41,240	41,620
Main Stem of the Republican plus Blackwood Creek	*94,500	95,460	161,600	257,060
<b>TOTALS</b>	<b>478,900</b>	<b>212,970</b>	<b>429,720</b>	<b>642,690</b>
* Main Stem Blackwood Creek	87,700 6,800			

Exhibit B

Computed Annual Consumptive Use  
Republican River Basin

1977 Water Year

<u>Drainage Basin</u>	<u>Colorado</u>	<u>Kansas</u>	<u>Nebraska</u>	<u>Total</u>
Prairie Dog Creek	--	14,610	1,100	15,710
Sappa Creek	--	8,020	10,830	18,850
Beaver Creek	0	11,180	16,630	27,810
Medicine Creek	--	--	11,270	11,270
Red Willow	--	--	11,130	11,130
Driftwood	--	0	1,120	1,120
Frenchman Creek	--	--	63,540	63,540
South Fork of the Republican River	8,550	6,860	710	16,120
Rock Creek	--	--	0	0
Buffalo Creek	--	--	1,300	1,300
Arikaree River	3,930	210	0	4,140
North Fork of the Republican River	5,390	--	5,020	10,410
Main Stem of the Republican River	--	49,060	179,260	228,320
TOTALS	17,870	89,940	301,910	409,720

## Summary

### Republican River Basin Water Management Study

### Bureau of Reclamation, Lower Missouri Region

June 13, 1978

I. Location of Study Area - The Republican River Drainage Basin including the Upper Republican, Frenchman-Cambridge, Bostwick, and Kanaska Divisions (Colorado - Kansas - Nebraska).

II. Description of Problem - Water supplies for existing projects in the upper portion of the Republican River Drainage Basin have decreased since (at least) the later 1960's, while individuals are promoting further development in the lower portions of the basin.

III. Purpose of Study - This water management study would re-examine the precipitation patterns, runoff characteristics, and resultant water supply along with present surface and ground water use within the basin to determine what changes in operation and additional facilities, if any, could promote more efficient use of the available water supply in meeting the varied water demands such as recreation, fish and wildlife, and municipal and industrial. This study will examine the existing and projected water supplies and demands, and analyze methods to improve the overall use of water in the basin. The problems associated with the determination of water supply capability in the Republican River Basin are related to several factors, including past and future depletions of surface water flows by ground water use, conservation and farming practices, and possible changes in rainfall and associated runoff patterns.

First year activities will include assembling streamflow, water rights, and ground water data. In addition, an environmental assessment will be initiated and a plan of study and public involvement program will be developed.

IV. Background Information - The construction of Bonny Dam in the Upper Republican Division was completed in 1951. Construction of the Frenchman-Cambridge Division was essentially completed in 1964, and its facilities serve approximately 66,000 acres of irrigable land. Construction of the facilities for the Kanaska Division was completed in 1967, and serves approximately 5,350 acres of irrigable land. Construction of the Bostwick Division was completed in 1968, including the Pump 3A and Pump 3B Canals, and serves about 66,700 acres (22,640 acres in Nebraska and 44,058 acres in Kansas) of irrigable land.

The Rehabilitation and Betterment Program Report (Revised) for the Frenchman-Cambridge Irrigation District was published in 1976. Funds were subsequently appropriated by the Congress. Installation of 50 miles of pipe laterals is being carried out by the district. The feasibility study on the Armel Unit is complete and a concluding report was published in March 1977. An appraisal report for the Frenchman Unit was published in January 1977. Additional studies have been completed under the provisions of the Rehabilitation and Betterment Program.

V. Authority and Funding - Funds were written-in in the fiscal year 1978 budget to initiate this study. The total estimated cost of the 6-year study is \$1,437,000. Funding in the amount of \$50,000 is available in fiscal year 1978 and \$254,000 is programmed for fiscal year 1979.

VI. Local Support - The study has strong support from State and local interests. The local interests include: the Upper, Middle and Lower Republican Natural Resources Districts, Frenchman Valley and H & RW Irrigation Districts, and the Frenchman-Cambridge Irrigation District in Nebraska; and the Almena Irrigation District, Republican Valley Conservation Association and the City of Norton in Kansas. The States of Colorado, Kansas and Nebraska also strongly support the studies.

VII. Current Status of Study - Concern has developed as to whether ground water development and modern farming practices have and will continue to reduce surface water supplies in the Republican River Basin. Our efforts to date have been to review and array existing data and past studies in an attempt to identify any flow reduction. Histograms have been prepared for the stream flow of the Frenchman River at Enders Reservoir (1941-1975) and double mass curves have been prepared for several locations in the basin.

Streamflow data at several of these locations indicate that decreases may be occurring. Further depleted streamflows have been estimated by the Geological Survey for Frenchman Creek, Rock Creek and Spring and Stinking Water Creeks as part of a ground water study in Chase, Dundy, Keith and Perkins Counties. We are concerned that similar situations may be developing elsewhere in the Upper Republican River Basin. One of the first efforts of this study will be to determine if this is, in fact, the case.